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STUDENTS' CHALLENGES IN ACADEMIC WRITING: INTERNATIONAL PERSPECTIVE

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Abstract

The aim of the article is to identify international tertiary students' challenges in academic writing. The article suggests a systematic review of the scientific literature related to higher education students' challenges in academic writing. Possible reasons for that might be the mismatch between required English language proficiency upon graduation and application to the higher education; L1 interference and incompetent linguistic ability. This article serves as background for further empirical study. Additionally, the paper provides suggestions and recommendations to overcome mentioned difficulties in academic writing. The results are useful for tertiary instructors who teach English writing related courses.

Keywords: academic writing; challenges; international perspective.

Introduction

Writing is one of the most essential skills that foreign language students should learn in school and after they graduate. According to Adams & Keene (2000) as cited in Al-Tamimi (2018) students who can achieve communicative competence in writing can develop their language skills and succeed academically at all levels of education. Moreover, writing is considered as a process of discovery as writers seek their way while struggling experiencing a challenge in thinking, composing, and putting their ideas together (Ismail, 2010).

Students' literacy issues were evident in their writing, as observed by their teacher during the process, and were attributed to students' literacy backgrounds. This emphasizes the importance of a "Foundation program" (Dimitriou et al., 2020, p. 17) for students like these.

According to Bailey (2011) the most difficult feature of academic writing is vocabulary of academic English. Meanwhile, they have to study "a series of conventions in style, referencing and organization". Furthermore, their lecturers are frequently concerned about their students' lack of critical thinking skills, as well as their inability to answer specific questions and their inability to develop logical answers. Additional concerns include vocabulary, plagiarism, and referencing abilities.

Aim of the study

The study aimed to investigate students' challenges in academic writing from an international perspective. Hence, the findings of this study will contribute to the higher educational institutions, specifically to instructors to reduce the challenges that students face in academic

writing by identifying their difficulties and offering some recommendations to overcome them.

Previous studies: challenges in academic writing and suggestions for overcoming

Singh (2019) conducted a qualitative study to explore international English as a foreign language (EFL) Master's students' academic writing challenges in a Malaysian university. Those difficulties were investigated from instructors' perspectives. The data was collected through semi-structured interview from 16 lecturers who taught graduate students in various courses. It was discovered that students mostly face difficulties with "lack of English language proficiency, challenges in expressing ideas, unorganized academic writing structure, intentional plagiarism, proofreading and editing, translation, mismatch in academic writing culture, cheating in their academic writing" (Singh, 2019, p-s. 977&978). Furthermore, it was suggested for students to improve their English language proficiency before entering the university or during their studies not to face aforementioned challenges.

A similar study conducted in Indonesian university to investigate the ability of EFL learners in writing academic papers (Husin & Nurbayani, 2017). This paper aimed to explore students' thesis quality. The descriptive-quantitative research examines the thesis quality of students in terms of "language, structure, concept understanding, theoretical framework, methodology, content, writing mechanism, and references" (Husin & Nurbayani, 2017, p. 1) used. This research also seeks to identify any factors that influence the thesis quality of English Department students. The main data comes from fourteen English Department students' theses that were tested in 2013. From a variety of perspectives, students' thesis stands in the moderate category, with an average score of 3.16 on a scale of 2.61–3.40. The aspect of language, as mentioned above, becomes important for determining students' ability to write a thesis well and correctly. All whilst, the quality of the development and application of a theoretical framework is categorized as low, with an average score of 2.5. However, the aspects of methodological capacity and complete and relevant references classify the quality as very high, with an average score of 3.8.

Another study was conducted by Tajik et al. (2021) to investigate graduate students' perceptions of the importance of the English language, the impact of previous experience on their perceptions, and the difficulties they face in academic reading and writing in English. The data was collected through online survey from 10 Kazakhstani universities. Academic reading and writing in EMI sessions are perceived differently by undergraduate and graduate students than

reading and writing in their L1 medium. The main reasons were cultural differences and differences in medium instruction across countries. International studies, for example, have found that even if a student is excellent at English according to their country's standards, the writing standards and styles of EMI may differ significantly from what students are used to. Furthermore, students' previous experience in academic writing in secondary school differs from that required for EMI sessions. Furthermore, participants suggested that universities may provide more courses in EMI programs, as well as more comprehensive, timely, and effective support to help students improve their academic reading and writing skills (Tajik et al., 2021).

Cennetkusu (2017) investigated international students' challenges in academic writing from U.S. university graduate students and course instructors' perspectives. Moreover, documents analysis was also conducted where the researcher analyzed "graduate program manuals, course syllabi, writing samples from the students and online resources such as manuals and writing samples" (p. 3). The study implemented mixed method (both quantitative and qualitative) to collect the data from participants. The quantitative data from 65 international graduate students and course instructors were collected via survey and qualitative part of the data was collected from aforementioned documents' careful analysis. Furthermore, despite of that course instructors claimed that the most challenging feature in academic writing for students were "using proper grammar", "connections and transitions", followed by "presenting ideas clearly" (p. 4), students assumed that it was "having less rich vocabulary and expressions" and "choosing correct words". Cennetkusu claims that it is evident that there is a misconnection between what professors observe and what students experience while writing an academic text. According to the findings of the study, if parties in higher education become aware of each other's expectations and practices, higher education via second/foreign language would most likely produce successful writers.

According to Al-Fadda's (2012) study the most challenging feature of academic writing for students was differentiating between spoken and written styles of English, followed by constructing an outline before starting a writing and avoiding plagiarism. The analytic descriptive approach was implemented to collect the data from participants of the study. The researcher collected the data via questionnaire tool from 50 postgraduate students in King Saud University, Saudi Arabia.

Al Badi (2015) scrutinized the difficulties that ESL learners experience in academic writing. The study implemented the qualitative design and the questionnaire as the tool for a data collection.

The data was collected from 20 postgraduate international students who were studying in an Australian university. As a result, it was discovered that students faced challenges mostly with "language use, coherence, and cohesion followed by both expressing their own voice as well as selecting a significant topic and relevant references" (p. 5). It was suggested that in order to overcome those challenges in academic writing, students' needs and difficulties should be identified by course instructors and curriculum designers. Moreover, it should be clear what instructors expect from students to do: instructions and expectations regarding writing tasks. Another useful strategy is to teach students brainstorming skills regarding the writing task (Abdulkareem, 2013). Lastly, the research mentioned that there might be various reasons for students' challenges in academic writing which is an issue for a further investigation.

Conclusion

This study reviewed the literature systematically regarding students' challenges in academic writing from an international perspective. It was discovered that difficulties of students in academic writing differs based on some features such as their L1, cultural context and previous learning experience. Furthermore, most mentioned difficulties were the students' low level of English language proficiency, specifically inappropriate usage of the grammar and vocabulary, and challenges in expressing ideas. As the study is a basis for further empirical research, it will be completed by data collection, data analysis and finding's sections. To overcome challenges in academic writing several recommendations were provided in the previous studies such as taking a "Foundation program", improving the English language proficiency before entering the higher education and discussing expectations of academic writing course instructors and students from each other. To sum up, this study made a partial contribution in investigating students' challenges in academic writing and can be useful for instructors and program coordinators.

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RECOGNITION OF BASIC HAND GESTURES ON A HORIZONTAL SURFACE USING A SINGLE CAMERA

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Abstract

The horizontal hand gesture recognition is an innovative, cheaper way for human-computer interaction. Currently, most researchers work with sensors, devices for hand gesture recognition, which require more resources. Instead, the presented horizontal method for hand gesture signal recognition by frames. A key element of this work is the research of a recognition algorithm using only single camera. In the presented framework, the hand detection works as a converting BGR image to RGB before processing. Then, the palm and fingers are segmented so as to detect and recognize the fingers. There are handedness and hand landmarks on the image as a result of a hand detection. Each point of landmark has coordination x, y, z values. There is comparing algorithm of points to recognize hand gesture by fingers. The model has been implemented getting landmark values on a data set of hand images, which collected from video frames. In the presented framework, the hand detection works with computer vision (CV) algorithms, in general MediaPipe as a converting blue, green, red (BGR) image to red, green, blue (RGB) before processing. There are handedness and hand landmarks on the image as a result of a hand detection. Each point of the landmark has coordination x, y, z values. The performance of the method highly depends on the result of hand detection on horizontal surface and collected dataset.

Keywords: CV, ML, MediaPipe, hand gesture, BGR, RGB, human-computer interaction.

Introduction

It is well-known that CV is implemented in a daily life, and vision-based technology as hand gesture recognition is one of the most important part of human and computer interaction. Nowadays, there are some projects basic interactions between human and computer using sensor display, touch screen, keyboard and mouse, but in other cases, quick development of hardware and software, new types of human-computer interaction methods have been required, because not everyone have these kind of opportunities. That's why in this project take attention to this problem and try to help people with disabilities, because here is some research of working only single camera on computer and recognition algorithms.

Gesture is a symbol of physical behavior or emotional expression. It includes body gesture and hand gesture. It falls into two categories: static gesture and dynamic gesture[1]. For the person, the posture of the body or the gesture of the hand denotes a kind of signal. Gesture can be used as a tool of communication between computer and human [2]. It is greatly different from the

traditional hardware based methods and can accomplish human-computer interaction through gesture recognition. Gesture recognition determines the user action through the recognition of the gesture or movement of the body parts. Nowadays hand gesture recognition projects works with sensors, ovation, raspberry PI, etc. methods. These methods claim another devices, gadgets, but there is not comfortable for using them in casual life.

First, the hand region is detected from the original images from the input devices camera. Then, some kinds of features are extracted to describe hand gestures, the recognition of hand gestures is accomplished by measuring the similarity of the feature data. The input devices providing the original image information includes normal camera. The skin color sensitive to the lighting condition and feature points are attended to detect and segment the hand region. One of the first steps were recognizing a hand by finding finger indices and angles. There is MediaPipe algorithm to help detect hand and find landmarks, drawing handedness. The best solution is the best trained algorithm.

Literature review

In the past decades, many researchers have strived to improve the hand gesture recognition technology. Hand gesture recognition has great value in many applications such as sign language recognition[1–3], augmented reality (virtual reality) [4–7], sign language interpreters for the disabled[8] , and robot control [9, 10].

In [1, 2], the authors detect the hand region from input images and then track and analyze the moving path to recognize America sign language. In [10], Shimada et al. propose a TV control interface using hand gesture recognition. Keskin et al. [10] divide the hand into 21 different regions and train a SVM classifier to model the joint distribution of these regions for various hand gestures so as to classify the gestures.

Zeng et al. [8] improve the medical service through the hand gesture recognition. The HCI recognition system of the intelligent wheelchair includes five hand gestures and three compound states. Their system performs reliably in the environment of indoor and outdoor and in the condition of lighting change.

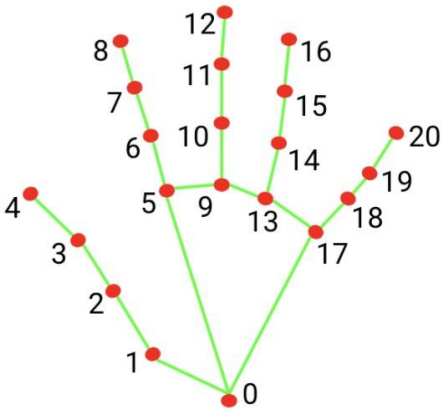
The main difference of this project from other hand recognition project is working with only two fingers, finding the gesture by these fingers commands and not only one command, which can be solved with only one frame. The project "Gesture Hand Controller" of Luiz Henrique da Silva Santos and Matheus Vyctor Aranda Espíndola recognizes the hand command by all fingers.

They show one command with hand, the program detects it and makes according command [11]. For example, the hand gesture "like" the big finger up - means "click", "zoom out", "zoom in" command are the detect by the first and second fingers. When the distance between fingers are big then - zoom out, if - less, then zoom in command will be done and there is no any animation [12]. The dataset of this project is collected by MediaPipe library, also. It works with the dataset, which contains x, y, z values in one file. That's why it can detect in real-time frame [13].

Methods and Materials

Detecting hands is a decidedly complex task. First, there is trained a palm detector instead of a hand detector, since estimating bounding boxes of rigid objects like palms and fists is significantly simpler than detecting hands with articulated fingers. In addition, as palms are smaller objects, the non-maximum suppression algorithm works well even for two-hand self-occlusion cases, like handshakes [16]. Moreover, palms can be modelled using square bounding boxes (anchors in ML terminology) ignoring other aspect ratios, and therefore reducing the number of anchors by a factor of 3-5. Second, an encoder-decoder feature extractor is used for bigger scene context awareness even for small objects (similar to the RetinaNet approach) [16].

There are many lists of frames collected manually to classify the gesture signs with the following signs: zoom in, zoom out, right, left. Each type of hand gesture is found using only 2 points from the hand fingers as shown in the figure 12,16 (Figure 1). There are also some faster data collection methods like to cut video by 4 frames, and collect key points and keep them in the classified folders. There are 4 frames are accessible for reading and setting landmarks by MediaPipe.



0. WRIST
1. THUMB_CMC
2. THUMB_MCP
3. THUMB_IP
4. THUMB_TIP
5. INDEX_FINGER_MCP
6. INDEX_FINGER_PIP
7. INDEX_FINGER_DIP
8. INDEX_FINGER_TIP
9. MIDDLE_FINGER_MCP
10. MIDDLE_FINGER_PIP
11. MIDDLE_FINGER_DIP
12. MIDDLE_FINGER_TIP
13. RING_FINGER_MCP
14. RING_FINGER_PIP
15. RING_FINGER_DIP
16. RING_FINGER_TIP
17. PINKY_MCP
18. PINKY_PIP
19. PINKY_DIP
20. PINKY_TIP

Figure 1. Hand Landmarks.

There is a requirement that the hand recognition model should be read on a horizontal

surface and the distance between hand and camera should be 1m. The hand tracking model first finds a palm and then draws landmarks of fingers where MediaPipe recognition algorithms best fits for. A palm detector that works on a full input image and makes bounding boxes for palms for localization.

There are many algorithms used to detect the hand and find landmarks of it: firstly it takes a frame from a video. Then synthesize images, make hand presence, find handedness dots and lines (Figure 2). The main algorithm firstly finds the palm, then by palm finds finger landmarks. There are 5 points of the palm, which are in every finger position and one is in the bottom part of the palm. Every finger has 3 landmarks: upper side, medium, bottom side (Figure 1).

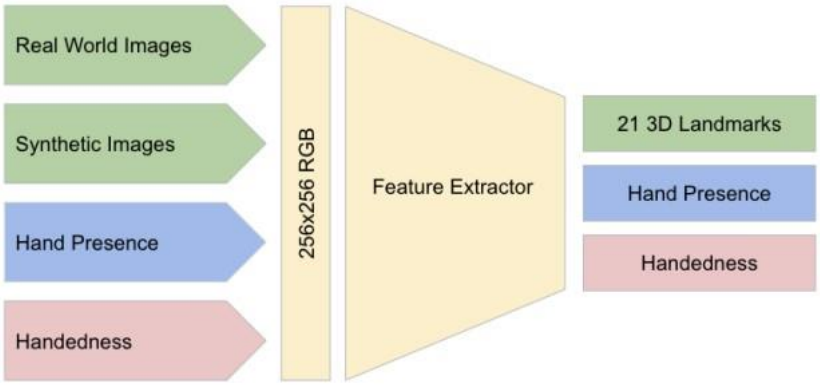


Figure 2. Architecture of research hand landmark model. The model has three outputs sharing a feature extractor. Each head is trained by correspondent datasets marked in the same color [14].

Hand landmark model operates on bounding boxes to provide key-point localization of 21 3D hand coordinates via regression algorithms that pass to coordinate prediction (Figure 3). The model learns a consistent hand pose representation and is still good even to partially visible hands[15].

Overall there are several trained models perform together :

A palm detector model (called BlazePalm) that operates on the full image and returns an oriented hand bounding box.

A hand landmark model that runs on the cropped image region defined by the palm detector and returns high fidelity 2.5-3D hand key-points.

A gesture recognizer for classification [15].

Each frame has 21 numbers of landmarks in x, y, z position. So, in general there are 63 points. There are 252 point data for one gesture and only one ended video motion frames, it has got from 63*4 points. All these data points help to train a model for hand gesture recognition.

For example, for "zoom in gesture" the program will need more x, y, values from 2 points and collect them into a one dimensional array and classify them. Also, no need to keep 252 points in the dataset, the researchers try to make model simple and fast using only 4 x 4 points, and classification integers (0 - zoom in, 1 - zoom out).

There are many videos of hand gestures: zoom in, zoom out, left, right, down, up. That helps us to collect frames automatically, but the number of frames are different. In general the frame numbers of video was 4. The program divided it into 4 and read each frame of gesture to get landmarks of hand. Each x, y position of each gesture is written in key-points CSV file only with "x"-position, "y"-position.

For this experiment there are using only 2 types of classes: 1st type - "zoom in" gesture; 2nd type - "zoom out" gesture. The representation of the dataset is in the following figure 3 (Figure 3).

0	0.2399062961	0.2463133335	0.2429064214	0.2340668887
0	0.4205651879	0.3967759013	0.3858606815	0.3879730999
1	0.4462751746	0.4238047004	0.409937799	0.4092714489
1	0.4412176013	0.418343842	0.404360652	0.4055868089

Figure 3. Example of 0-zoom in and 1-zoom out type gesture dataset in x positions dataset file.

The another type of collecting data was getting 2 points from fingers, for train and future prediction, which firstly gave the type of gesture then show the gesture.

Results and Discussion

```
Testing SVC with 9 tuples...

              precision    recall  f1-score   support

           0       0.00      0.00      0.00         2
           1       0.50      0.67      0.57         3
           2       1.00      0.50      0.67         4

    accuracy                           0.44         9
   macro avg       0.50      0.39      0.41         9
weighted avg       0.61      0.44      0.49         9


0.444444444444444
```

```
    accuracy                           0.22         9
   macro avg       0.13      0.22      0.17         9
weighted avg       0.13      0.22      0.17         9
```

Figure 4. SVM and KNN algorithms result.

In the beginning there were tested KNN, SVM algorithm. The first SVM had an accuracy

of 0.44 and KNN of 0.22. The decision to dive deeper and modify algorithm to make the best classification. First part was to collect dataset using simple commands and write them automatically to a CSV file by dividing the program into Train and Test modes. To increase the probability, decision was to keep only one type of target classification: zooming in and out. The best results are obtained from the NN algorithm. As the prediction was almost perfect for 2 classes, zooming in and out. Accuracy was good in the ideal environment, showing more than 90%.

The results obtained from the training NN model was pretty good from the 30 epochs:

Epoch 1/1000

1/27 [>.....] - ETA: 0s - loss: 1.1295 - accuracy: 0.3203

Epoch 00001: saving model to model/classifier/classifier.hdf5

27/27 [==========] - 0s 11ms/step - loss: 1.1004 - accuracy:

0.3602 - val_loss: 1.0431 - val_accuracy: 0.5220

Epoch 2/1000

1/27 [>.....] - ETA: 0s - loss: 1.0440 - accuracy: 0.4844

Epoch 00002: saving model to model/classifier/classifier.hdf5

27/27 [==========] - 0s 3ms/step - loss: 1.0503 - accuracy:

0.4297 - val_loss: 0.9953 - val_accuracy: 0.6397

Epoch 3/1000

1/27 [>.....] - ETA: 0s - loss: 1.0043 - accuracy: 0.5312

Epoch 00003: saving model to model/classifier/classifier.hdf5

27/27 [==========] - 0s 4ms/step - loss: 1.0210 - accuracy:

0.4582 - val_loss: 0.9545 - val_accuracy: 0.6523

Epoch 4/1000

1/27 [>.....] - ETA: 0s - loss: 0.9503 - accuracy: 0.5625

Epoch 00004: saving model to model/classifier/classifier.hdf5

...

The data used for testing model are 2 points from fingers, for train and future prediction (Figure 5).

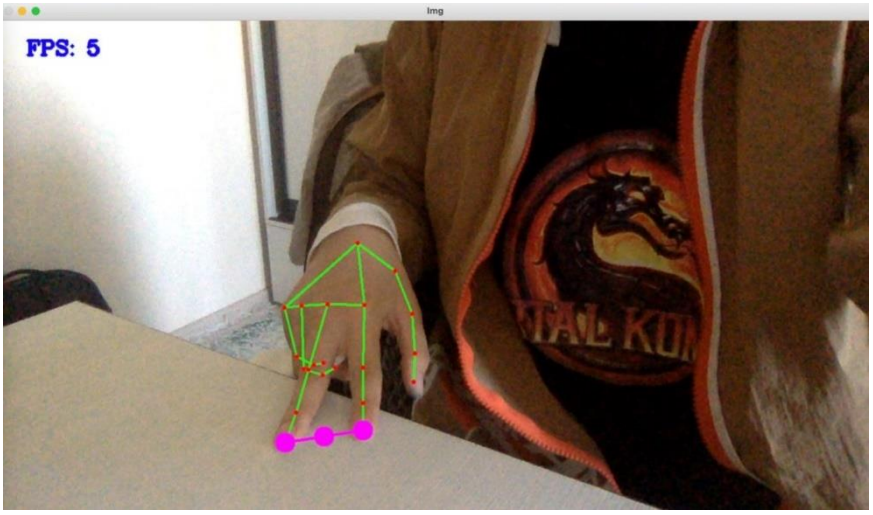


Figure 5. Zoom in hand gesture detection with the two fingers.

There is a test result for zoom in: [9.8105639e-01 1.8674169e-02 2.2328216e-04 4.6191799e-05], 0 - zoom in

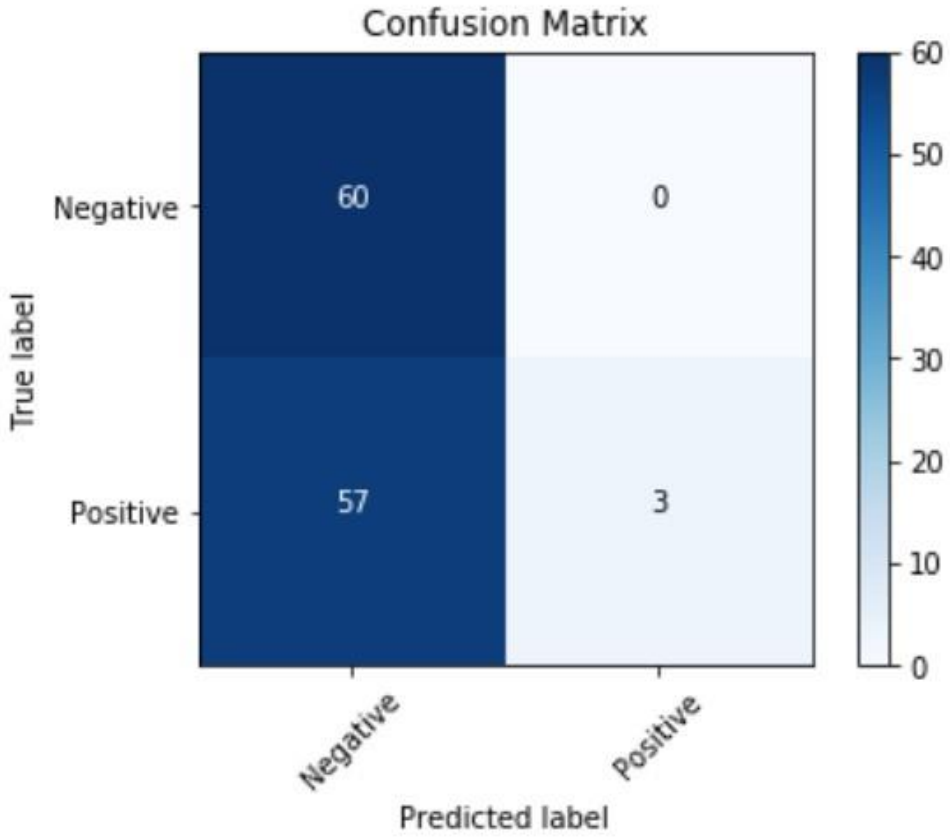


Figure 6. Confusion matrix for NN model.

As a process conclusion, there is finger indices and positions which can help to recognize hand gestures from the animation (list of key-points) and perform some commands. Firstly, to make the better model, data collection plays the main role, so developed simple collection script in the project will help easily collect classification data, while the data is collected in real time by pressing space button. The second big impact from script is to prevent False Positive positive results retraining the model adding new dataset on fly. The recognition of hand gestures is found using well-known classification algorithms in machine learning. The effectiveness of method is evaluated on a data set of hand images. The experimental results will be shown after researches' approach.

The performance of the their method will highly depend on the result of hand detection on horizontal surface and collected dataset. If there are moving objects with the color similar to that of the skin, the objects exist in the result of the hand detection and then degrade the performance of the hand gesture recognition as in previous works. That's why it's better to write wrapper function to separate hand, and then to pass the copy of the new image to MediaPipe. The researchers hope in future works, machine learning methods and 2d cameras may be used to address the complex background problem and improve the problem of hand detection.

For the future research: should add logic recognition hand gesture in horizontal and adding some algorithms, by training, to make it smarter.

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THE EFFECTIVENESS OF GAMIFICATION ON LANGUAGE LEARNING IN HIGHER EDUCATION CONTEXT

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Abstract

The higher education system is currently facing outdated methods of language teaching. It is well established that today's students are technology-oriented and prone to mixing game elements with learning subjects. Gamification is a practical method in language teaching and other areas of education. The goal of this study is to determine the effects of using appropriate gamification methods in language learning in a higher education context and find out the students' perception toward gamifying the language disciplines. In this context, appropriate gamification methods mean suitable and modern game tools for students of the growing generation. To explore the existing study, an online questionnaire survey with several open-ended questions was distributed to undergraduate third-year students of a language specialty. The participants were selected according to their language disciplines, understanding of gamification, and experience in specific subjects. The results showed a positive perception and impact on changing and variation of the gamification method. Based on the qualitative analysis, it concluded that using meaningful and practical game elements are important factors to consider when designing the lesson plan for higher education students of a language specialty. Teachers' perception of gamification language disciplines should be taken into account for further development of the study.

Keywords: Gamification, higher education, language learning

Introduction

Technology has a strong impact on people. Large amounts of information that people receive through the Internet decrease the attention span and lead to short-term memory. In education, the purpose of any study is to consolidate the educational material for the long term. Especially, teaching a language needs different creative tasks to fix the knowledge for a long time. Consequently, the current education needs to find a modern method such as gamification to teach in an attractive way. As the new generation of students grows, teaching subjects in a traditional way is no longer relevant. Learning foreign language requires complex tasks and cognitive processes, a high level of engagement and motivation which is difficult to achieve without differentiation of teaching methods.

The term Gamification was first used in 1896 and became widespread in 2010. The term is not new, but this approach which was created a long time ago, is not suitable for today's learners. According to Deterding, Dixon, and Nacke (2011) this method gained popularity after the

Foursquare application. Deterding et al. (2011) determined gamification as "the use of game design elements in non-game contexts". Gamification establishes game-like behavior and is used to attract motivation, interest of learners, promotes the process of critical thinking process and problem solving skills, which is extremely important for the training of competitive specialists. The significance of this study is expected to contribute to further development of gamification method in language teaching and learning at a higher education level.

The main objectives of the research is to find out the higher education students' perception toward gamification in language classes and determine the effects of gamification to higher education students in language learning classes for further development of gamification in higher education context. The research was conducted by a qualitative method through using questionnaire surveys of undergraduate students of a language speciality. These research questions will help in finding answers for this study:

What are the higher education students' perceptions towards using gamification in language classes?

What are the effects of the application of gamification on higher education students?

In addition, the study provides an overview of existing gamification methods at the present time and suggests for future teachers, current students of language speciality to use appropriate game elements for teaching learners.

Materials and methods

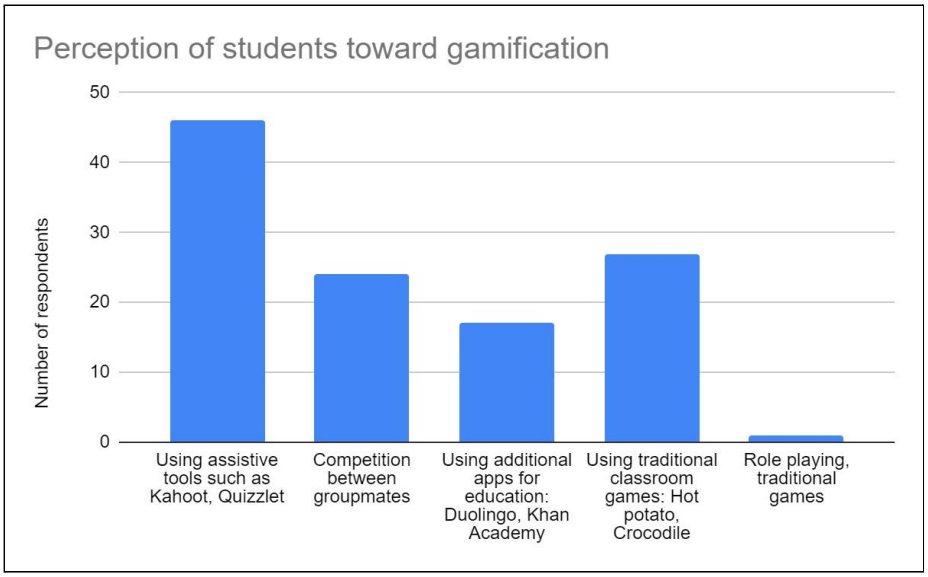
The research was conducted to identify effects of teaching language by gamification methods to students at higher education level and perception of students towards the traditional and gamified methods of learning language. The research approach was chosen as qualitative research. The instrument that was used in this study is a questionnaire survey through Google Forms which conducted both types of qualitative and quantitative questions. The research applied a descriptive qualitative method. The research was conducted at the specific university of Kazakhstan among the third year bachelor degree students of the faculty "Two Foreign Languages"(TFL), as the students of this faculty are already familiar with the teaching methods and in several languages. The format of the conducting survey was online. The research was aimed to collect opinions of 52 undergraduate students towards gamification of language subjects. During the stage of primary research, the survey included multiple choice, ratings and open-ended questions. The participants were selected according to their language disciplines, understanding of

gamification and experience in using it. Participation was voluntary, a link for survey was sent individually via emails and to groups in WhatsApp chats of third-year students of TFL which consist of 100 users. The questionnaire was analyzed as the main data source for obtaining answers to research questions. The Google Forms interpreted a graphic collection of answers and represented it. It was taken for summarizing the overall statistics of participants. All sections of the questionnaire were summarized and a collection of the open-ended questions' responses were made in a spreadsheet.

Results and Discussion

The aim of the questionnaire was to understand the perceptions of students toward gamification of language classes and identify the benefits of gamification from results of the questionnaire survey. All 52 participants studied at a specific university in the third-year of bachelor degree. 47 of them are females and 5 of them are males. Age of participants varies from 17-19 (24 participants) and 20-25 (28 participants). The students of different language classes were asked to participate. From 52 participants, 18 from French, 6 Chinese, 13 German, 6 Korean, 5 Spanish, 3 Turkish and one of them from Italian language class.

Chart 1

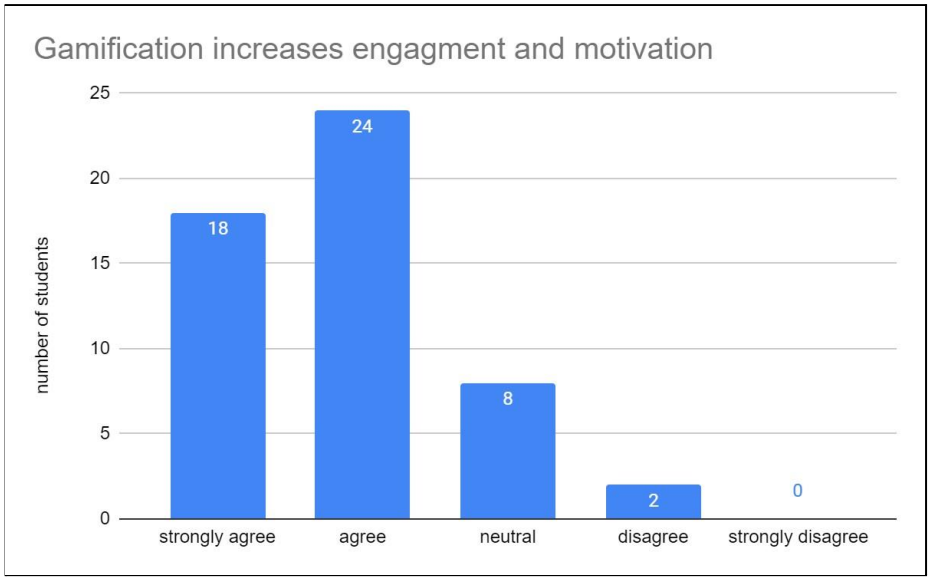


Source: compiled by the author

The students were asked to respond how they see the gamification in real-life context. Chart 1 shows that all participants 88.5 % see the gamification as using in class assistive tools such as Kahoot and Quizzlet. While 51.9% see the gamification in language classes as using traditional

games such as "Crocodile" or "Hot potato". 46.2% prefered to choose competition as the gamification and 32.7% see the gamification as only using apps such as "Duolingo" and "Khan Academy". The last one participant sees that role-playing is a gamification.

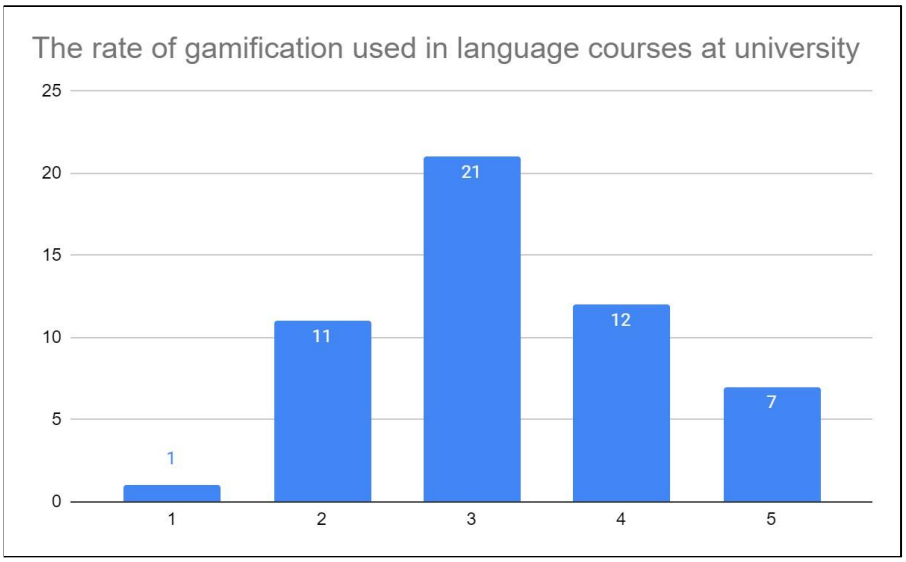
Chart 2



Source: compiled by the author

To understand students' perception for future application of gamification, it was necessary to consider their opinion about the effects of motivation and engagement in gamification. As chart 2 shows 24 participants agree with the statement that gamification increases motivation and engagement of students in the learning process. 18 participants strongly agree and 8 of them are neutral. Last 2 participants disagree with this statement.

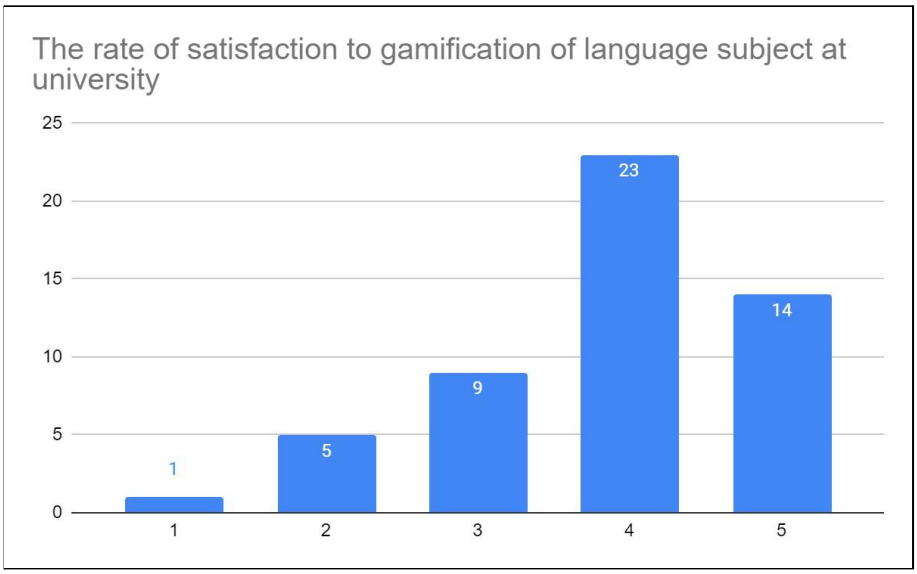
Chart 3



Source: compiled by the author

As in Chart 3 from all 52 participants, 21 participants chose that gamification in language courses used, but rarely with identification of rate 3 which is located below of the chart. 11 participants chose that gamification is not used a lot, only for several times with identification of rate 2. 12 respondents chose that gamification is used usually, but not always (rate 4). While 7 of the respondents answered that gamification is used very often (rate 5). Only one respondent chose that gamification was never used (rate 1).

Chart 4



Source: compiled by the author

Chart 4 represents the rate of satisfaction of students on their past and current experience

in gamification methods at language classes. As in chart representation, 23 of participants chose the rate 4, which means that they are dissatisfied, but not completely. While 14 of respondents were fully dissatisfied with the gamification method that their instructors used in the learning process.

As it mentioned earlier, the responses were collected by open-ended questions. One participant with number 16 responded that repeated games are not suitable for all learners.

I would like to come up with a new game, not only Kahoot, personally I played only Kahoot games in my classes. I am sure that not only me. There are so many other games, I would recommend teachers to find or think out new games, and it's not only computer based games, it can be traditional group games connected with a course itself.

Another participant with number 30 responded that gamification is not only for fun.

I want the games to be more meaningful, because in some classes we play it only for fun. Yes, it is engaging, however I sometimes feel like we are just wasting time. I think games that are played only for fun could be included a few times just to engage, unite the students, but I do not think that games for fun should be played in almost every lesson.

Participant with number 26 whose answer described that old gamification should be replaced with new ones.

Willingness of teachers to change their old methods and to use more modern ways of games and technologies in our lessons. It will be better if the games, even if they are old traditional games, add new facts and new words which are taken from the current subject.

By considering the respondents' answers that they are quite satisfied with, the effect of using gamification makes the language learning easier to comprehend, as the university system of education is tough.

The data analysis showed that perception of students toward gamification was relevant and students want to have more reliable and practical knowledge to learn their second languages at their university. By offering a gamification method, most participants showed positive reactions and mentioned the importance of including gamification into the learning process.

Following research questions used in this study:

RQ1. What are the higher education students' perceptions towards using gamification in language classes?

According to Bartle (1996), games might be the same, but not every player is the same.

The main goal of designing gamification is to suit every learner's need in gamifying lessons. Many of the participants offer their own interpretation and suggestion into gamifying the current teaching of languages. As a suggestion, students offer modernization of existing games, both traditional and technological games. Diversifying the teaching materials, coursebooks, adding cultural importance of language that have been taught, adding the importance of using specific language that students learn. Thus, the perception of students toward gamification shows that they are willing to learn by gamification and it seems that gamification makes students active and enjoy the learning process, but the problem is in the using old methods of gamification at their university, which reduces the motivation to learn by gamification.

RQ2. What are the effects of the application of gamification on higher education students?

As Landers (2014) stated "reason for failing is usually poor planning or inadequate design." (p.17). The most common reasons for implementing gamifying language disciplines is using the same platforms and lack of using games at all. Half of the responses showed that the lesson plans of foreign language teachers do not have diversity in educational materials, the topics are covered superficially, no authentic materials to connect it with gamification. In addition, most teachers use the same game-design for all their subjects, as an example Kahoot platform, which led to getting used to the same games and monotony. As a result, it led to demotivation of students, which must not be in language learning classes.

However, the limitations of the results obtained are the non-inclusion of teachers in the survey, which would explain why certain issues in teaching languages happened. Problems may lie in the education system of a particular university, which rules and boundaries that teachers cannot go beyond. But, the aim of study is to look from learners' side to their study.

Conclusion

The research aimed to identify the effects of gamification methods in language classes on students and their attitude to that method. Based on the qualitative analysis, it can be concluded that using meaningful and real-life practical game-elements are important factors to consider when designing the lesson plan for higher education students of language specialists. The results indicated that students are welcome for collaborative work with teachers and ready to test different new approaches of gamification. Students' perception is quite positive which explains their willingness to use modern ways of learning through gamification. This research clearly illustrates the problems of the current teaching system of languages, but it also raises the question of teachers'

willingness to change the methods that have been proven over the years. Because, as the results showed, today's students need changes and new methods. To better understand the implications of these results, future studies should address the opinions and perceptions of teachers, as well as a larger number of students from various courses, in which language is taught at least two times per academic year.

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COMPARATIVE ANALYSIS OF STANDARD DEVELOPMENT PROCESS OF ISO, CEN AND NATIONAL STANDARD OF KAZAKHSTAN

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Abstract

Every day, millions of businesses and organizations use standards. As the number of places where standardization is used increases day by day, there is a need for analyzing the standard developing organizations. Nowadays there exists many organizations that develop standards. The process of development may differ from organization to organization. Our lives are safer, easier, more comfortable, and more efficient with the help of standards. Standards can be classified into three categories: international standards, regional and national standards. There are a small number of research examining various standard developing organizations by categories. So, the main aim of this paper is to provide a comparative analysis of the standard development process in three different categories as International Organization for Standardization (ISO), the European Committee for Standardization (CEN), and the national standard developed by Kazakhstan to improve standard development quality and efficiency in Kazakhstan. The study will provide similarities and differences among standard developing organizations in terms of their stages, estimation time, and the structure of development.

Keywords: Standard,standard development process, comparative analysis, ISO, CEN,Kazakhstan, national standards, international standards

Introduction

Standard is a regulatory and technical document that establishes a set of norms, rules, requirements for the object of standardization that is formed by consensus and authorized by a recognized organization [5].

The process of standard development is an important area of research as it plays a big role in our life and society. Almost every area of our daily life is regulated by standards. The purpose of standards is to establish minimum requirements for product or service quality, provide safety and save natural and energy resources.

There are three main levels of standardization: international, regional and national. In this article, we have provided the comparative analysis of these three main levels of standardization and considered their process of development of standards by their stages and structure.

The rest of this paper is written out as follows. The second section goes over some background research on the process of standard development. The ISO standardization process is explained in Section 3. Section 4 describes the standard development of CEN. In Section 5, we

provide the national standard development process of Kazakhstan, and finally, we sum up our analysis that was made in this research.

Literature review

There have been a small number of works and researches on the subject of standard development done. This part will look at the previous works that have been done by other writers. A variety of comparative analysis approaches have been used.

J.Li in his work [10] established a standard development mechanism of three countries such as the Russian Federation, the United States of America, and the United Kingdom. This research clearly describes the stages of standard development in three different countries. Three various organizations of each country were taken in this study. Exactly, Federal Agency on Technical Regulating and Metrology of Russia, ANSI organization of USA, and BSI of UK. The author in his work concluded, that the process of development of standards can be distinct in every country or organization.

While J.Li [10] made research comparing three countries the authors Gao. Y and Zhao. W [4] made a study over the peculiarities of the Russian Federation's standardization procedure. The overall system and mechanism of standardization, classification of standardization documents are presented in this work.

The standards can be applied in many domains such as education, medicine, technology, food, IT security, etc...Some of the researchers made a comparison of standard developing organizations in the field of information security management [11], medical devices [1], medical devices for dentistry [2]. The authors Susanto et al [11] considered ISO27001, BS 7799, PCIDSS, ITIL, and COBIT standards in the field of information security management and provided a broad comparison of big-five standards. While Deliversky et al [2] proposed European and International standards of medical dentistry.

Kozhuhov [8] in his research analyzed the composition, organizational structure, and development stages of international standards such as ISO and IEC. Whereas Johnson et al [7] studied the similarities and differences of the process of development of IEEE and IEC standards.

Another work of J.Li [9] examines the standards systems in China, the United States, and the United Kingdom in terms of standards bodies, scope, and function to facilitate the development of new standards systems and reform in standardization mechanisms of China.

Z.Xianghua [13] presented comparative research of standard development organizations such as

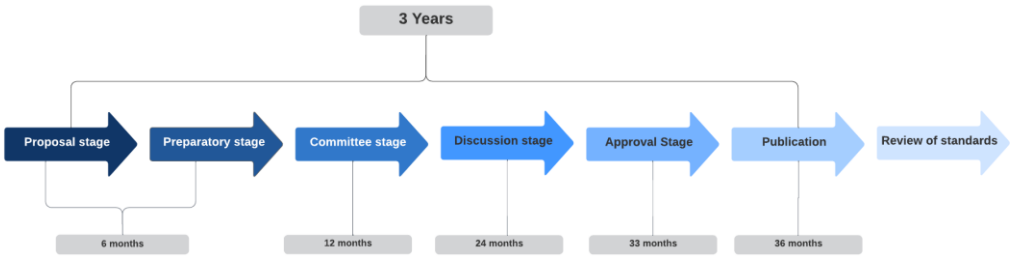
IEEE, ASTM, W3C, IETF, and the top ten organizations of China. This work compares the Chinese standard development organizations with foreign organizations in terms of their organizational structure and standard development procedures. As a result, the Chinese social organization's standard development method is rather easy, and there is a lack of innovation.

As we see from our literature review there is a lack of studies done in this area and there are no works that considered the comparison of the national standard development process of Kazakhstan with other organizations.

Standard development process of iso

An international standard is a standard that has been adopted by an international organization. A standard is a document that specifies product qualities, implementation guidelines, and characteristics of manufacturing processes, as well as job or service performance. Terminology, symbols, packaging, marking and regulations for their use, can be included in the standard. The main international organizations that carry out activities in the field of international standardization are ISO and IEC.

Created in 1946 by twenty-five national standards organizations International Organization for Standardization(ISO) is a non-governmental organization consisting of 167 members from national standard organizations. The main goal of ISO is the development of international standards for the development of international trade and the expansion of international cooperation. The scope of ISO concerns standardization in all areas such as engineering, chemistry, ores and metals, information technology, construction, medicine and health care, the environment, and the quality assurance systems. The standard development process of ISO consists of 6 stages which are developed by a technical committee and experts. [6] The main description of this process is described below (Figure 1) [6].



(Figure 1) *Standard Development Process of ISO*

1. Proposal Stage: The first step in developing an International Standard is to confirm

that a particular International Standard is needed.

2. Preparatory Stage: At this stage, various revisions of the working drafts may be accepted.

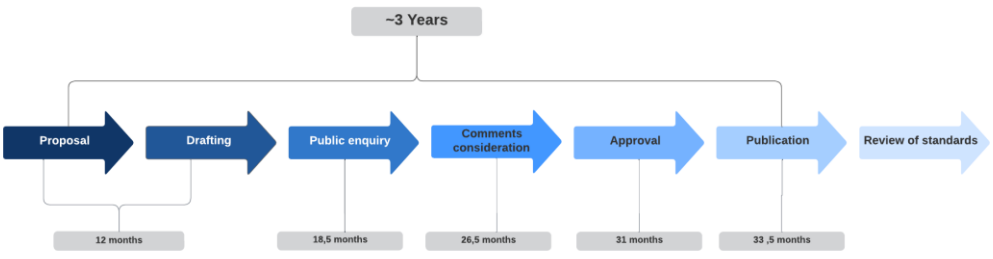
3. Committee Stage: As soon as the first committee draft is ready, it is registered by the ISO Central Secretariat. The committee draft is sent to committee members to comment on it and vote on it.

4. Discussion Stage: During the discussion phase, a draft for discussion within 4 weeks should be circulated by the CEO's office to all national organizations for voting within 5 months.

5. Approval Stage: In the approval phase, the final draft International Standard (FDIS) must be circulated by the CEO's office within 3 months to ISO, to all national bodies for voting within 2 months. 6. Publication: The secretary sends the final paper for publication at this point. The overall standard development process of ISO lasts for 3 years. 7. Review of standards:Every five years, a standard is revised. After that, the decision is made to confirm, revise or withdraw the ISO standard.

Standard development process of cen

The European Committee for Standardization (CEN) is an organization that brings together 34 European nations' National Standardization Bodies. CEN is a framework for developing European Standards and other technical papers covering a wide range of goods, materials, services, and processes. The standardization process of CEN takes 6 stages. The steps of this process are shown below in (Figure 2) [3].



(Figure 2) *Standard Development Process of CEN*

1. Proposal Stage: Any interested organization can give a proposal to develop a new European Standard.

2. Drafting Stage: After approval of a standard proposal, the proposal moves on to the drafting stage, which is based on reaching a consensus.

3. Public Enquiry: Once an EN draft has been completed, it is made available for public comment (CEN Enquiry)

4. Comments Consideration: When the public enquiry is completed, the votes and comments on the standard are analyzed.

5. Approval Stage: At this stage, the outcomes of voting are determined.The European standard (Euronorm) is considered adopted if it is not voted for by less than 80% of CEN members. The adopted standard is introduced into the national standardization systems of all member countries, including those who voted ”against”.

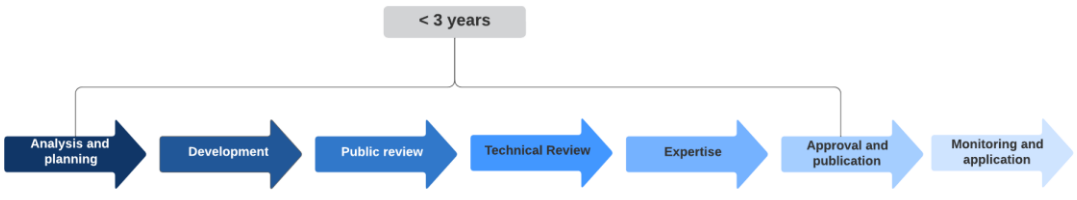
6. Publication: Final standards are sent to publication. The standard developing process of CEN lasts for approximately 3 years or 33,5 months.

7. Review of Standards: A European Standard is reviewed at least five years after it is published to verify that it is still current. The EN is confirmed, modified, revised, or withdrawn as a result of this review.

National standard development process of kazakhstan

The legal basis for standardization in the Republic of Kazakhstan was first established by the Law of the Republic of Kazakhstan ”On Standardization and Certification”, adopted in 1993.

In 1999, the Law ”On Standardization and Certification” was revised taking into account the development of Kazakhstan and market reforms, and a new Law of the Republic of Kazakhstan ”On Standardization” was adopted, which on June 10, 2003 was substantially amended and supplemented. This law regulates public relations in the field of standardization, defines the legal framework for the State Standardization System and measures to protect the interests of the state and consumers in matters of product quality, processes (works) and services through the development and application of regulatory documents on standardization. Standardization documents are developed in accordance with ST RK 1.2 ”National Standardization System of the Republic of Kazakhstan. Procedure for the development of standardization documents”.The standard development process of Kazakhstan is described in (Figure 3) [12]



(Figure 3) *Standard Development Process of Kazakhstan*

1. Analysis and planning: Analysis of a new project is done in this stage.

2. Development: Standardization documents are being developed at the second stage.

3. Public Review: Public discussion is carried out following ST RK 1.2 in the information system of technical regulation within 60 (sixty) calendar days from the date of placement of documents on standardization.

4. Technical Review: When the public review is completed, the technical committee makes a review for standard.

5. Expertise: At this stage, the results of the technical review are defined and the expertise in all fields is done.

6. Approval and publication: After expertise of the standard, the standard is approved and published on the website. The development of standard in Kazakhstan must take less than 3 years [12]

7. Monitoring and application: Final standards are monitored and their applications of it are checked.

Results of comparison

In Table 1 the comparison table of standard development process of three different categories of standardization are

TABLE

	ISO	CEN	Kazakhstan
Governing bodies	·General Assembly ·Council ·Technical Management Board ·Central Secretariat	·General Assembly ·The administrative Board ·The presidential Committee	·Government of the Republic of Kazakhstan; ·Authorized body; ·State bodies within their competence; ·National body for standardization;
Number of stages	7 stages	7 stages	7 stages
Estimation time	3 years	~3 years	must be <3 years
Systematic review	every 5 years	every 5 years	every 5 years

Table I - comparison table

illustrated. In the comparative analysis the structure, number of stages, estimation time and systematic review were considered. From this table we get that the structure of ISO, CEN and Kazakhstan are different and each institution has it's own fixed structure. But the number of stages and systematic review time are identical to each other, while the time taken for development of standard are approximately same in all three organizations.

Conclusion

In this we did a substantial research on analysis of standard developing organizations which are classified by international , regional and national categories. Our job in this paper was to compare the process of standard developing of ISO, CEN and Kazakhstan and their structure. According to the results, that we have we can say that every organization has its own process of development and structure of organization. Some stages of development can be the same with each other, but we can't say that the process of standard development is identical to each other. Basically, the number of stages in all three organization are equal. But the content of stages vary from each other. From this mechanism we conclude that there are many steps, models can be used to develop the standards.

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2022 International Young Scholars' Conference

CALCULATING THE EFFECTIVENESS OF SPEEDING UP PAGE LOADING OF THE REACT.JS WEBSITE BY IMPLEMENTING THE NEXT.JS FRAMEWORK

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Abstract

The main purpose of this article is to investigate the effectiveness of the Next.js tool for speeding up website loading in browsers. For qualitative research, information about how the client's browser works will be shown. How the React.js framework works, as well as how the Next.js framework works, their advantages and disadvantages, as well as the distinguishing features from each other. For practical proof of the effectiveness of implementing the Next.js framework on the site, site hosting will be used, in which a subdomain for two sites will be created: the first using only the React.js framework, and the second using the Next.js framework. To improve the comparison of indicators, both of these sites will use the same functionality. The end results will be compared against several metrics: the size of the final stable build of the program that can be tested and offered to the user, as well as platform independent scores for measuring site accessibility.

Keywords: React.js library, Next.js framework, Speeding up the React.js loading, performance evaluation rating, first contentful paint, time to interact parameter

Introduction

Website developers are constantly improving development tools and libraries in order to make their websites more functional. Various frameworks and auxiliary libraries are popular among developers, and the most popular among them is the React.js library. According to the "Stack Overflow Developer Survey 2022", the React.js library is used by 40.14% of 67.593 respondents [1].

The React.js library allows you to assemble a complex project from small and isolated pieces of code called components [2]. Websites like Facebook, Netflix, Instagram, and many others use React.js as a development tool [3]. After creating an application in React.js, we get a SPA application. One of the main advantages of the SPA application is that clients will be able to get instant results from working with the website (going to other pages, etc.), because the SPA applications are downloaded completely on the client side. Also, due to the use of service workers, the SPA application can work offline. On the other hand, one of the main disadvantages of this type of application is the size of the final JavaScript files that website clients have to download.

One of the main attributes of the website to the user is the time of its loading. According to the data from the "WebsiteBuilderExpert" service, 73% of mobile website users experience

website loading time issues [4]. Also based on them, one in four users leaves the site if it doesn't load in four seconds. In 2006, Amazon conducted an A/B test that found that every 100 milliseconds the website load increased, resulting in a 1% loss in sales [5]. That is why website loading is one of the most important attributes for a business.

In order to get around this shortcoming of the React.js application, the Next.js framework was invented [6]. It is a React-based framework that allows you to build web applications with improved performance and improved user experience with additional pre-rendering features such as full SSR (Server-Side Rendering) and SPG (Static Page Generation). As a result, the server will give the client the filled HTML, the filled state, and also all the necessary JS, CSS, and other resources. The client will receive HTML resources, synchronise the state, and work with the application as with a regular SPA.

There are a large number of articles on the Internet regarding the use of the React.js library and the Next.js framework. In some articles, the experience of using the React.js library is given, and in others, the Next.js framework. This article will focus on comparing the loading speeds of websites with the same functionality built into both of these tools. To structure this article, it will be divided into several logically separated sections in a numbered order from 1 to 5, including this introduction section. In Section 2, we will have methods for this topic. Section 3 presents the results and discussion of this framework. Section 4 provides conclusions. Finally, section 5 provides references, and the last section provides an abstract.

Methods

In order to start working on projects, you need to install a special npm package manager. It can be installed by downloading a special installer from the official website [7]. After successful installation, open a terminal and type "npm -v" in Figure 1 to check if the package manager works.

```
temirlankudabayev@MacBook-Pro-Temirlan articles % npm -v
8.9.0
```

Figure 1: NPM Version check

After checking the functionality of the package manager, you need to install the React project. To install, you need to enter the command "npx create-react-app article-react-app" in the terminal in Figure 2 [8].

Figure 2: Installing the article-create-app

Once installed, a basic React app will be created that can be launched using the "npm run start" command in Figure 3 [8].

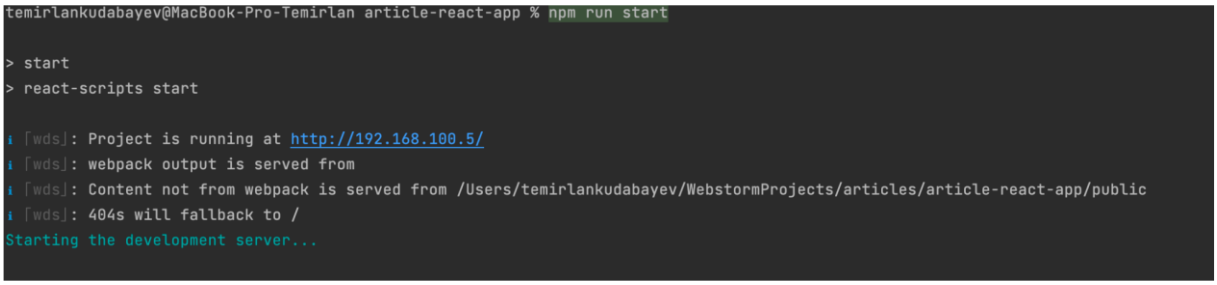

Figure 3: Run the article-create-app server

To work with styles, you need a node-sass library to work with a CSS framework called Sass [9]. Also, to speed up the creation of pages, the bootstrap library was added, which has ready-made stylized classes and components [10]. The finished application will have four pages: home, about us, clients, team, and contacts.

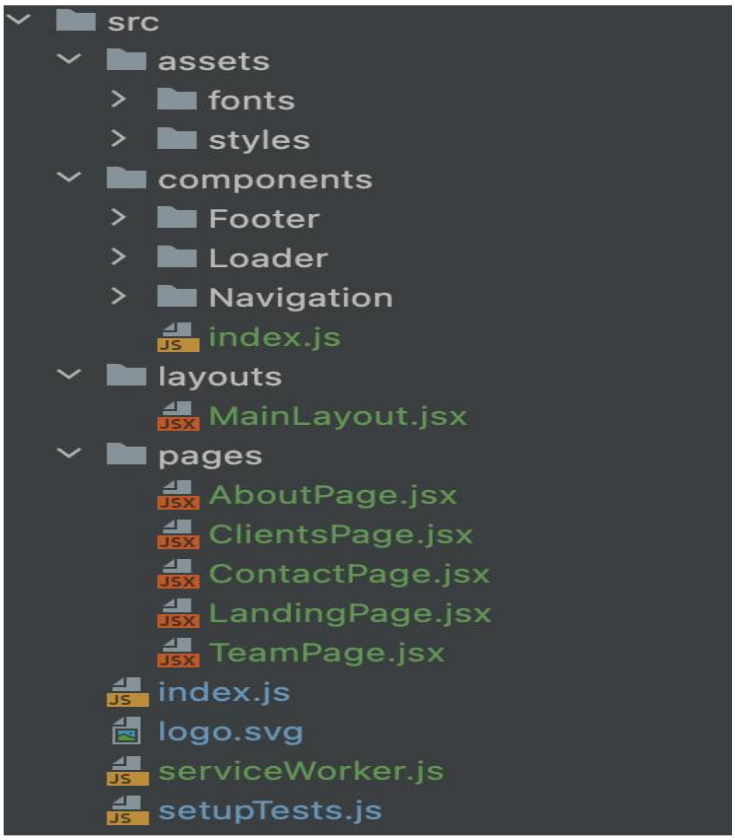

Figure 4: Architecture of the article-create-app

In order to make better structured applications, the file system will be divided by their logical bundles, as shown in Figure 4:

- The Assets folder, where the styles of the application are stored, as well as the fonts used
- The Components folder is where individual React components used in layouts or pages are placed.
- The Layouts folder, which stores a common layout for the entire application.
- The Pages folder, where application pages are stored.
- The index.js file is the React library's main application.
- The file logo.svg is the main logo of the site.
- The serviceWorker.js file is a service worker of the React application [11].
- The setupTests.js file is the file that is responsible for the test system in our application, but in this case, we will not be responsible for writing the tests.

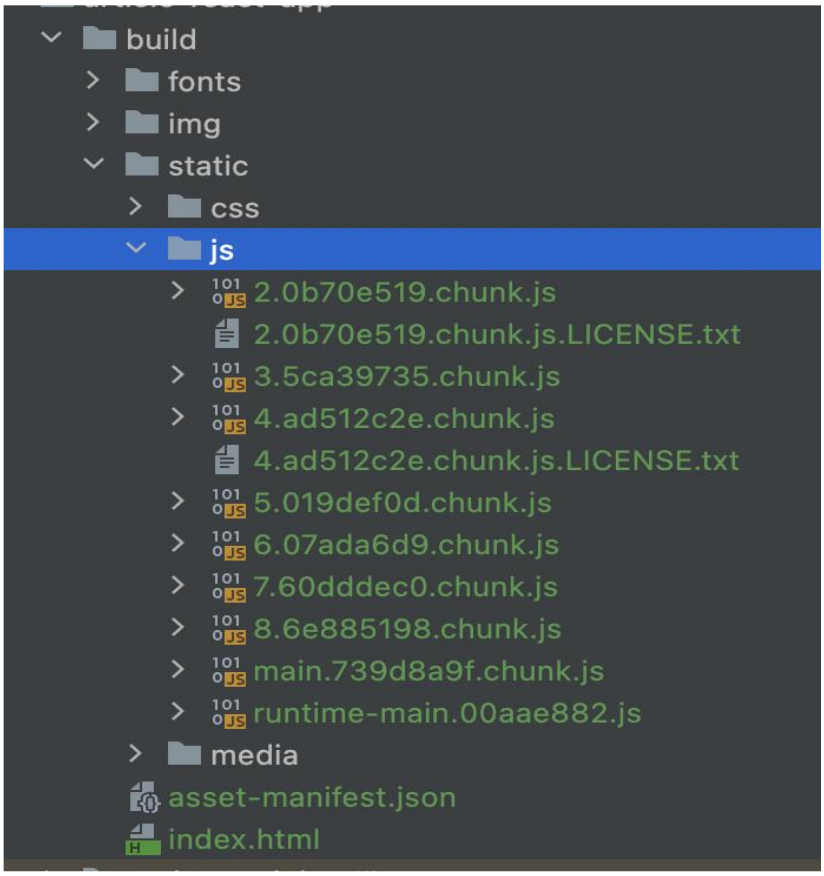

Figure 5: Optimised production build of the article-create-app

After completing work on the react project, using the "npm run build" command [8], react will make a build (a grouped folder with ready-made and compiled files) in Figure 5, which can be uploaded to the server. Working with a Next.js project is a bit different than working with a React.js project. There is also a section in the official documentation of the next.js framework on how to properly migrate a react website to next.js [12]. First you need to copy the article-react-js project, which stores a completely finished, previously made react project. Next, you need to install the next package and add the "next.config.js" configuration as shown in figure 6.

```
temirlankudabayev@MacBook-Pro-Temirlan article-nextjs-app % npm install next

up to date, audited 49 packages in 2s

4 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities
```

Figure 6: Installing the Next framework to the article-nextjs-app

Next.js has a different folder allocation system than React. In React, we created separate page files and then imported them into a common router as shown in figure 7 [13].

```
<Switch>
  <Route exact path="/about" component={AboutPage} />
  <Route exact path="/clients" component={ClientsPage} />
  <Route exact path="/team" component={TeamPage} />
  <Route exact path="/contact" component={ContactPage} />
  <Route path="/" component={LandingPage} />
  <Route path="/*" component={() => <Redirect to="/" />} />
</Switch>
```

Figure 7: Routing system in article-react-app

In the next.js project, the framework checks for the presence of files in the "pages" folder and builds routing systems relative to them, as shown in figure 8 [14].

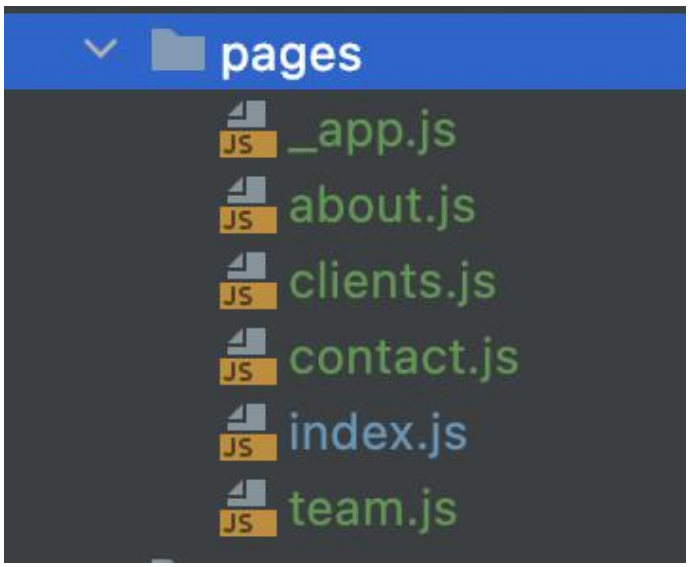

Figure 8: Routing system in article-nextjs-app

After the migration to the Next.js framework is completed, we launch the project using the "npm run start" command, and the project is assembled [6]. Next, go to "localhost:3000" and see the same project as on React.js, but now it is produced using the Next.js framework. To create the optimised build of article-nextjs-app, first of all, you need to enter the npm run build command. After creating the ".next" folder, you need to enter the npm run export command [15]. The result of these operations will be the creation of a separate folder called "out", where the build for the frontend part of the application will be stored as shown in Figure 9.

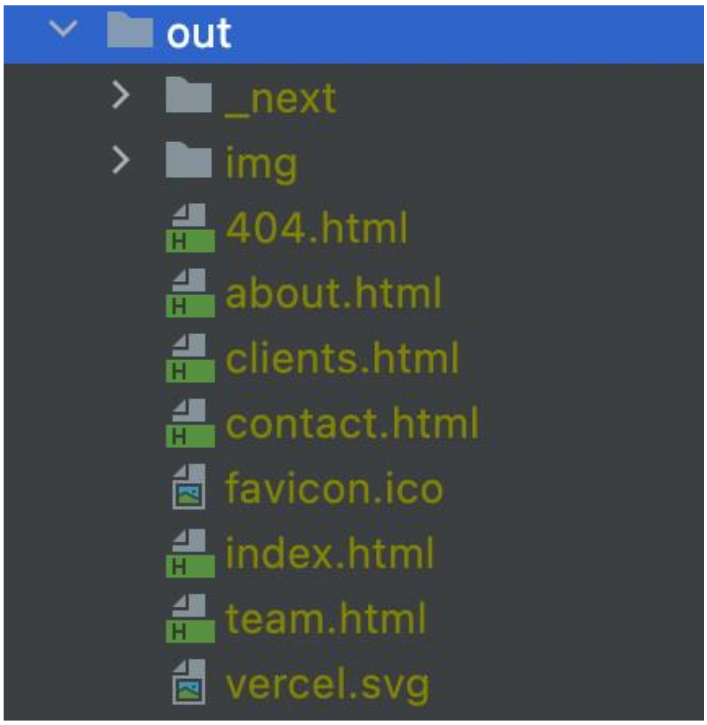

Figure 9: Optimised production build of the article-nextjs-app

After creating a build of two projects, we can visually compare them. The optimised build of article-react-app (Figure 5) has a single index.html file that loads the main javascript file and auxiliary chunks, while the article-nextjs-app build generates all rendering for the user.

To compare the results of the work of two projects, you need to upload them to a hosting with two separate domains connected. These domains must be different for the convenience of the experiment. Hosting must be configured correctly since the services that test the operation of sites emulate the operation of the browser. To improve the quality of testing, it is necessary to properly configure the server so that the test results are minimally dependent on the server. In order to properly configure the server, you need to understand how the browser works [16]:

- The user enters the address of the desired site to be bypassed.
- The browser looks up the server by IP address in DNS.
- The browser attempts to establish a connection to the server using a special TCP/IP protocol.
- The browser sends an HTTP request to the server to display the page.
- The server, using Apache or nginx, processes the request and sends a response to the browser to display the page the user needs.
- The browser processes the response and displays the requested content.

The first two steps depend on the availability of the server and the domain associated with them. The fifth step depends on the correct configuration of the server. For the experiment, a virtual host was chosen, which already had an initially fully configured web server. For website hosting, we use the Kazakhstani service ps.kz. We rent hosting there and bind 2 subdomains to the existing newtone.kz domain for the react project and for next, react.newtone.kz and nextjs.newtone.kz, respectively, as shown in figure 10.

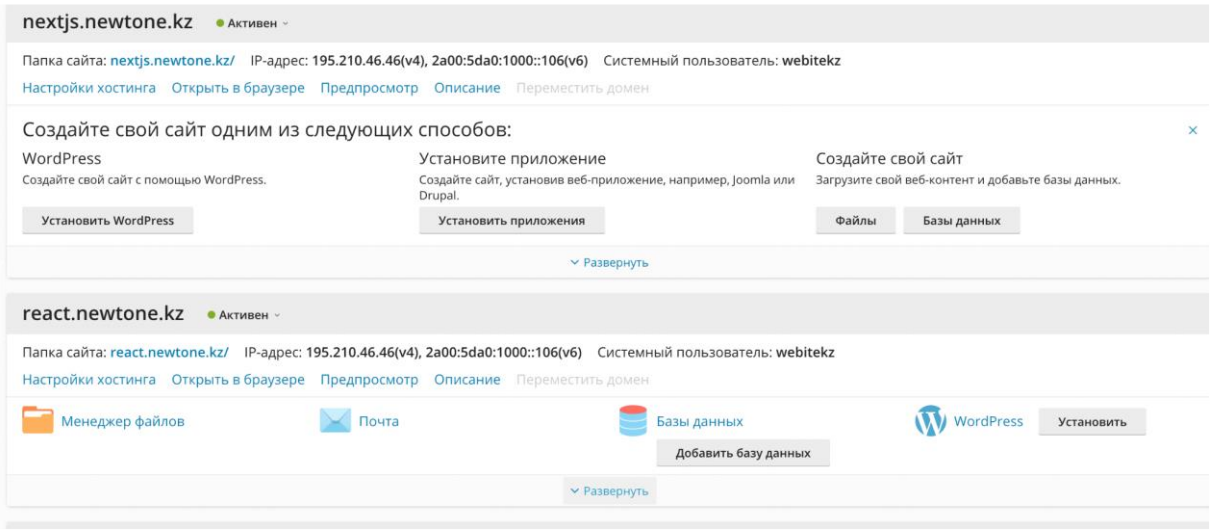

Figure 10: Creating separate subdomains for the experiment

Next, we also install SSL/TCL certificates for two subdomains and set up a redirect from HTTP to HTTPS. After installing subdomains, folders with the same subdomain names were automatically created. They need to fill in the details of our applications. After downloading all the necessary files, we go to the sites https://react.newtone.kz and https://nextjs.newtone.kz and see that our applications are successfully functioning on figures 11 and 12, respectively.

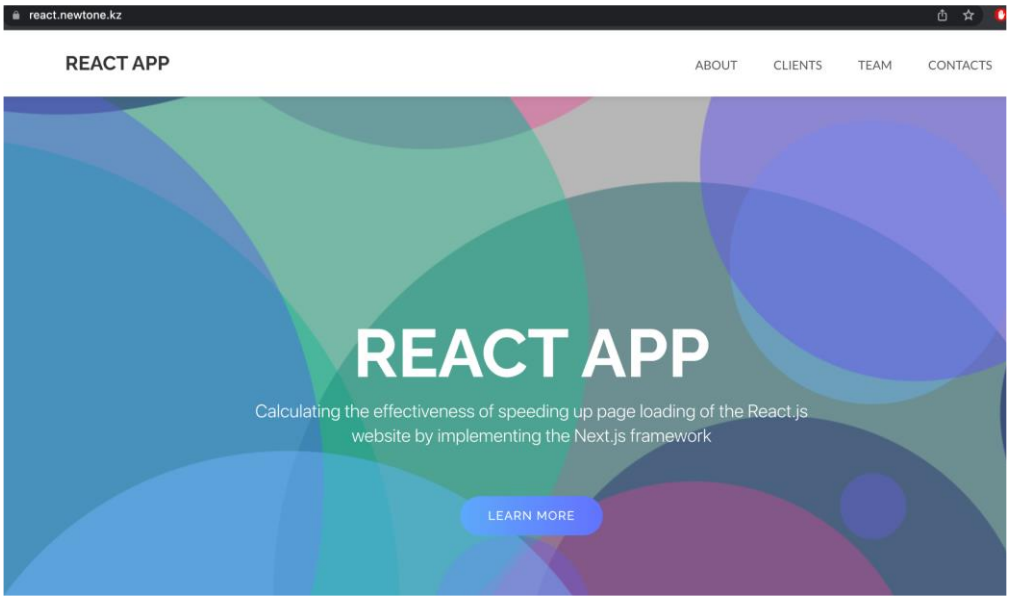

Figure 11: https://react.newtone.kz website

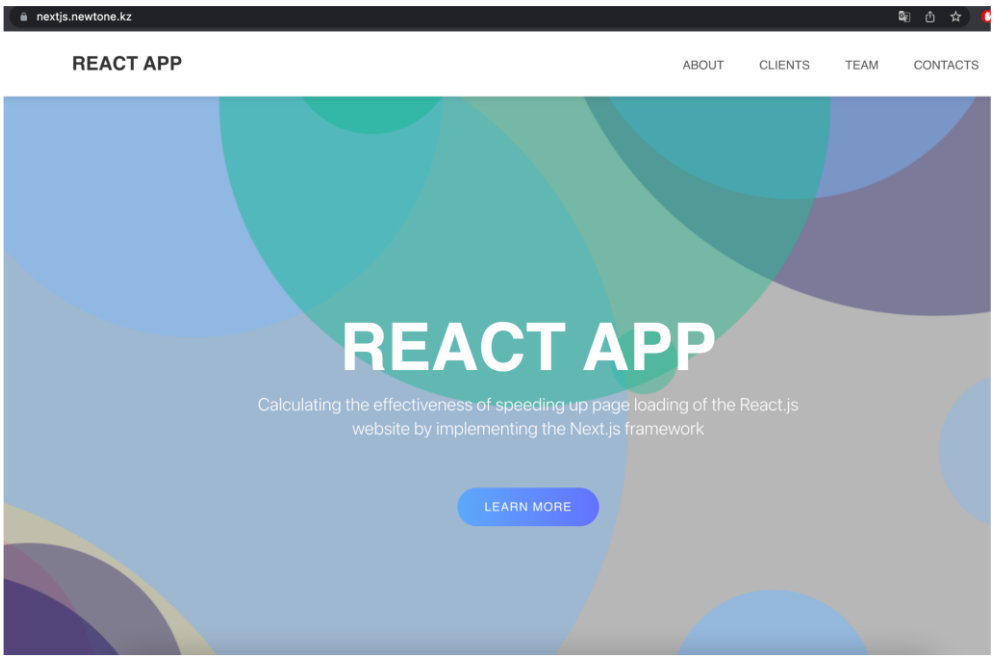

Figure 12: https://nextjs.newtone.kz website

Several popular and independent services will be used to evaluate the site's loading speed:

- pagespeed.web.dev. A service from Google that allows you to receive reports on the speed of loading pages on mobile devices and computers, as well as tips on how to increase this speed.
- pr-cy.ru. service for a complete analysis of the content of the site. The service has

useful tools for webmasters, SEOs, marketers, and copywriters. To test the site's loading speed, the speed_test section is required.

- gtmetrix.com. service for evaluating the performance of a website. The site allows you to select a country from the available list, the server of which will check the speed of the site. The only drawback is the lack of checking the mobile version of the site.

The verification algorithm is to go to each service that is listed above, drive in the link to our sites, and wait for the results. From the general list of results, you must select parameters such as overall rating, first contentful paint, and time to interact. For each of these parameters, the results will be entered into a separate table relative to the mobile and desktop versions of the site.

Results and discussion

The verification algorithm is to go to each service that is listed above, drive in the link to our sites, and wait for the results. From the general list of results, you must select parameters such as overall rating, first contentful paint, and time to interact. For each of these parameters, the results will be entered into a separate table relative to the mobile and desktop versions of the site.

	react.newtone. kz	nextjs.newtone .kz
The size of the final build in megabytes	5.96	3.99

Table 1

The final build size is very important for website loading speed. This size means the maximum amount of data the user will need to download in order to fully work with the website. This means that the smaller the size of the final build, the better it will be for the user. Table 1 shows data regarding build sizes for each of the projects. The results show that the build of nextjs.newtone.kz is 1.97 megabytes less than that of react.newtone.kz.

	pagespeed .web.dev.	pr-cy.ru	gtmetrix.com
react.newtone.kz	87	87	-

nextjs.new tone.kz	96	96	-

Table 2

Table 2 shows the download speed estimates for mobile versions of sites out of 100. The results of the gtmetrix.com service are not taken into account due to the inability to test the loading of the mobile version of the site on this service. The results show that, on average, independent services score 96 for nextjs.newtone.kz, while for react.newtone.kz the score is 87. This means that, in general, sites on next.js load faster on mobile devices.

	pagespeed .web.dev.	pr-cy.ru	gtmetrix.com
react.newt one.kz	97	96	70
nextjs.new tone.kz	100	100	79

Table 3

Table 3 shows the download speed estimates for desktop versions of sites out of 100. The situation for desktop devices is the same as for mobile devices. Based on the results of the three services, all three services score higher on next.js than react.js. The average rating of the site nextjs.newtone.kz is 93, while the site react.newtone.kz has 87.

	pagespeed .web.dev.	pr-cy.ru	gtmetrix.com
react.newt one.kz	2.9	2.9	-
nextjs.new tone.kz	1.1	1.2	-

Table 4

	pagespeed .web.dev.	pr-cy.ru	gtmetrix.com
react.newt one.kz	0.9	1	2.3
nextjs.new tone.kz	0.3	0.4	1.6

Table 5

Table 4 shows the results of services for the first contentful painting parameter on mobile devices, while Table 5 shows the results of this parameter for desktop devices. The first content parameter is very important in terms of website loading speed. This parameter shows how long after the page starts loading, the user begins to receive the first site data on his device. Based on the results, next.js sites render 1.7 seconds faster on mobile and an average of 0.7 seconds faster on desktop than react.js sites.

	pagespeed .web.dev.	pr-cy.ru	gtmetrix.com
react.newt one.kz	2.9	2.9	-
nextjs.new tone.kz	2.2	2.3	-

Table 6

	pagespeed .web.dev.	pr-cy.ru	gtmetrix.com
react.newt one.kz	0.9	1	2.3
nextjs.new tone.kz	0.3	0.4	2.1

Table 7

Table 6 and Table 7 show the results of services for the time to interactive parameter on

mobile devices and on desktop devices, respectively. The time to interactive parameter shows how many seconds after the start of loading the web page, the user can start working with the site. Based on the results, Next.js based project starts up 0.65 seconds faster on mobile, and an average of 0.47 seconds faster on desktop than a React-based project.

We expected that the implementation of the next.js framework into a React application when developing from the front-end part of the application would speed up the initial loading of the application. Based on the above aspects and results, we can conclude that the implementation of the next.js framework allows you to speed up the initial loading of the react application.

Conclusion

We have developed two projects on the React.js library and on the Next.js react-based framework with the same functionality and design. We uploaded them to the same server and set up the server so that the test results depend only on the results of the project build. The results were compared against several parameters, such as build size, first contentful paint, and time to interactive parameters, as well as website loading speed scores on mobile and desktop devices. In all of the above results, applications written in the Next.js framework performed better than applications written in React. With the help of Next.js, we accelerated the project using the React.js library.

To improve the research, in the future we can collect more additional parameters to improve our performance indicators. Also, to improve performance, we can increase the list of independent services. One of the ways to develop this research is to write an automated algorithm that would collect results from various services. Also, due to the fact that we used a fairly simple web application, we can modify it or make it non-standard so that the final javascript files are larger than they are now. These changes will improve the reliability of our comparison.

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DEVELOPMENT OF LONG RANGE ANIMAL TRACKING SYSTEM USING IOT TECHNOLOGIES

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Abstract

The population of our planet is growing at a rapid pace, with an annual growth of 1.1 percent. The population is expected to continue to grow and reach 8.4 billion by 2030. Although this is a fairly positive fact, this phenomenon carries with it enough negative aspects. And one of which is the lack of food, which requires the rapid development of agriculture. Agriculture will have to increase its production massively by 70 percent. The solution to this problem is the technology of the Internet of things. With the help of technology we can avoid morbidity in livestock, excess in power consumption and generally make life easier for the farmers. In this work, a strong focus will be placed on tracking the location of animals, which will be quite cheap and of high quality. This research aims to find the most optimal technologies to track animals on long ranges, while being low-priced and effective enough.

Keywords: agriculture, technology of internet of things, livestock, farmers

Introduction

The cow runs away from the pasture for various reasons: frightened by a stranger, other animals or annoying insects, in search of tastier grass or better weather. And even if there is a shepherd nearby, it is not always possible to quickly find an animal lost in the forest or fields. And when grazing, animals can often leave the pasture, get lost, or even worse, they can simply be stolen. To find the lost cattle, one has to travel tens and even hundreds of kilometers. It can take days, and sometimes weeks, and the animals can still be found. So in order to solve this issue, the farms should become 'smart'. But in order to equip an agricultural enterprise, it will be necessary not only to buy specialized equipment, build a complex of buildings, hangars, but also properly organize the care of cattle. Depending on the type of animal, the rules of care also vary.

In order to ensure the rapid growth of cattle, it is necessary to provide comfortable conditions indoors - the optimal level of humidity, temperature and constant air flow. It will be required from the owner not only to install a ventilation system that will provide an influx of fresh air mass, but also to monitor cattle. This is a professional set of activities that is aimed at facilitating the procedure for breeding livestock by obtaining information about health, current indicators indoors. Such a system must be carefully calibrated and designed in a robust manner to ensure accurate measurements.

Modern technologies are being actively introduced in agriculture, helping farmers to automate routine processes with maximum convenience. One such solution is livestock tracking. Livestock tracking allows you to protect your animals from theft, injury, and natural disasters. In addition to tracking movements and recording livestock, the system allows you to track the most frequent areas of his stay for further walking planning and searching for the best pastures and territories. The used equipment based on LoRaWAN technology effectively monitors and transmits data to the cloud over very long distances. In addition, due to low power consumption, trackers work much longer and do not require cellular communication.

Technology used

A. Internet of Things

The Internet of Things (IoT) is about the vast array of "things" that are connected to the Internet to communicate with other things - IoT applications, connected devices, industrial machines, and more. Internet-connected devices use builtin sensors to collect data and, in some cases, act on it. IoTconnected devices and machines can improve the way we work and live. IoT application examples range from a smart home that automatically regulates heating and lighting to a smart factory that monitors industrial machines to find problems and then automatically adjusts to avoid failures.

Today we live in a world where there are more devices connected to the IoT than people. These devices can be either smartwatches or RFID inventory tracking chips. IoT connected devices communicate through networks or cloud platforms connected to the Internet of Things. Real-time information from the IoT is driving digital transformation closer. The Internet of Things promises many positive changes in health and safety, business operations, performance and global environmental and humanitarian issues.

Many industries are using IoT to understand consumer needs in real time, increase agility, instantly improve the quality of machines and systems, streamline operations, and find innovative ways to work as part of their digital transformation efforts. And the agriculture is not an exception. In agriculture, "smart" farms and greenhouses dispense fertilizers and water themselves, and "smart" animal trackers notify farmers in time not only about the location of animals, but also about their health status, analyzing heartbeat, body temperature and general activity.

B. Arduino Nano 33 IoT

The Nano 33 IoT is based on a 32-bit Microchip ATSAMD21G18 microcontroller with a

48 MHz ARM Cortex- M0 + computing core, 256 KB of flash memory and 32 KB of RAM. The U-blox NINA-W102 module based on the ESP32 chip is responsible for wireless communication. It supports Wi-Fi 802.11 b / g / n networks in the 2.4 GHz band and data exchange via Bluetooth v4.2. The platform was supplemented with the STMicroelectronics LSM6DS3 inertial module, which includes a three-axis accelerometer and a three-axis gyroscope for precise orientation in space.

Along the edges of the board are two pin plugs of 15 pins with a pitch of 2.54 mm, which allows you to install it on a breadboard for prototyping a device with various electronic components. The Nano 33 IoT has a total of 22 general purpose I/O ports. Some of them have additional features:

- 8 pins with ADC can represent analog voltage in digital form with sampling up to 12 bits.
- 5 pins are capable of outputting an analog signal in the form of PWM with a resolution of up to 12 bits.

Hardware interfaces SPI, I²C and UART are also available on the board.

C. LoRaWAN

With the development of IoT technologies, networks of the LPWAN (Low Power Wide Area Networks) family, energyefficient long-range networks, have emerged as a separate segment. However, for several years, the main problem was the lack of a unified protocol with the support of the main market players. In other words, dozens of communication protocols similar in characteristics, but not compatible with each other, have appeared. Another important problem is the proprietary nature of each protocol, i.e. closed technology (belonging to only one company). In March 2015, IBM Research and Semtech presented a new technology for energyefficient long-range networks - LoRaWAN (Long Range Wide Area Nerwork), which has a number of advantages over conventional technologies for providing M2M (Machine-toMachine) communications.

For many years, the enormous potential of the IoT has been held back by technical challenges such as short battery life, short range, high cost, and lack of uniform standards. LoRaWAN technology has overcome all these obstacles. Based on a new specification and protocol for LPWAN using an unlicensed frequency band, LoRaWAN technology has allowed sensors to be connected over long distances while offering optimal sensor battery life and minimal infrastructure requirements. The advantages of LoRaWAN include [4]:

- use of the non-licensed frequency range of 868 MHz, which does not require permission and payment for use;
- data transmission range up to 10 km;
- high energy efficiency of end devices, providing a service life of up to 10 years from one battery;
- network architecture that allows easy scaling to different territories;
- the ability to remotely control and set up a schedule for transferring data from devices.

The main disadvantage of all LPWAN wireless technologies is associated with the limited size of the transmitted data packet and the periodic nature of their sending. As a result, technologies cannot be used to monitor parameters in real time.

D. ThingSpeak Cloud

As a cloud server used by the system, the ThingSpeak server [11] is proposed, which is a platform that provides various services designed exclusively for creating 1oT applications. It provides the ability to collect data in real time, visualize the collected data in the form of charts, the ability to create plugins and applications for collaboration with web services, social networks and other APIs. The core element of ThingSpeak is the "ThingSpeak channel". A channel stores data sent to ThingSpeak and consists of the following elements:

- 8 fields for storing data of any type - they can be used to store data from a sensor or from an embedded device;
- 3 location fields - these can be used to store latitude, longitude and altitude. They are also very useful for tracking a moving device;
- 1 status field - a short message describing the data stored in the channel.

To use ThingSpeak, you must register and create a channel. You can then send data that allows ThingSpeak to process it, as well as receive it back.

Implementation

The main idea of this paper is that the trackers are attached to the animal in the most convenient way, most often it is a collar. Data from the tracker is received by LoRaWAN gateways, which, depending on the terrain, are installed at a distance of 8 to 30 km. Gateways can be connected to the Internet via satellite. The cloud software (in our case ThingSpeak) displays the data collected by the gateways, providing tools to analyze the movement of animals over long distances. The tracker uses the GPS positioning system and sends the location coordinates to the

ThingSpeak server via the LoRaWAN wireless network by default.

Special devices will be connected to cattle, which will include the technologies already listed - LoRaWAN, Arduino Nano 33 IoT and GPS tracker. The GPS tracker will read the current location of the livestock on the map via satellite. Further, the LoRaWAN device will send coordinates (longitude and latitude) to a common gateway up to 10 kilometers. The gateway, also equipped with a LoRaWAN device, will receive data from all sensors connected to the cows. Being the only device connected to the Internet, the gateway will send the received data to a special channel created in the ThingSpeak cloud. The received data can be read thanks to the API of ThingSpeak itself and read through the application on iOS or Android, or read this data directly through the web application.

The data on the API is displayed as a json request, which has a special syntax. With the help of programming, this query can be parsed and formatted into a human-readable form. This application can be used by both shepherds and special responsible people in the farm.

Fig. 1. Screenshot example of an application on iOS.

Future work

This project focuses on livestock tracking and data acquisition and display. But this project has a bunch of different possible additions that will make this project even more useful and exciting. One of the primary tasks after the completion of all work is the implementation of machine learning through the ThingSpeak cloud, which provides these functions for the data stored on their servers. Thanks to this innovation, it will be possible not only to read the location of cattle, but also using the obtained data to prevent illness and death of animals and collect data on the most prolific territories. Already having these data, you can greatly simplify the life of farmers, while reducing livestock mortality and accidental losses.

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GRADE PREDICTING SYSTEM

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Abstract

Nowadays, prediction of academic performance became necessary for educational entities and universities. As you know most higher educational institutions have a portal system that monitors academic performance. This is necessary in order to assist at-risk students and ensure their retention, as well as to provide exceptional learning resources and experiences, as well as to improve the university's rating and reputation. Predictive analytics employed advanced analytics, including machine learning implementation, to improve achievement and to generate high-quality performance. As a result, the primary goal of this project is to demonstrate the feasibility of training and modeling on a small dataset size, as well as the feasibility of developing a prediction model with a credible accuracy rate. Using visualization and clustering algorithms, this study investigates the possibility of identifying the key indicators in the small dataset that will be used to create the prediction model.

*Keywords***:** Grade Prediction, Machine Learning, Predictive system, Algorithm techniques

Introduction

Every higher education institution has its own student academic management system to keep track of all student data, including academic results such as final test marks and grades in various courses and programs. Today universities are prestigious for higher education and considered to be the first step towards adulthood. It is a critical time for everyone because it determines our future. Because of this, student retention in these universities is a serious challenge. As a result, the university's tasks are to support students everywhere and provide them with everything they require. Everything will be new for first-year students at the start of their university careers. It is necessary to develop a solution that would help students stay in higher education institutions. So, early grade prediction is one of the solutions that has a propensity to monitor students' performance and will lead to an improvement in the students' learning process based on anticipated grades.

Data analysis is a powerful tool for understanding what is going on with data in the background. Machine learning, through data visualization, allows us to easily understand and analyze processes, as well as make decisions. Using Machine learning algorithms can improve the student achievements. Machine learning techniques can be used to predict student grades across courses. Such methods will help students improve their performance based on predictive grades

and enable teachers to identify individuals who may need assistance with courses. There are several types of algorithms used for prediction such as Collaborative Filtering, Matrix Factorization and Restricted Boltzmann Machines.

The paper is written out as follows. The second describes the related research work of the grade prediction system. The methodology of prediction models is explained in Section 3. Section 4 describes results of predictions and analysis. Finally, the main conclusions of the paper are highlighted, along with some future directions.

Literature review

Several research in higher education have been undertaken to predict student grades using various machine learning approaches. According to research undertaken by, a strategy for predicting future course grades received from the Computer Science and Engineering department has been devised. this study uses algorithms such as Collaborative Filtering, Matrix Factorization and Restricted Boltzmann Machines, to improve the accuracy of students' final grade prediction. They work on 225 real data of undergraduate students to predict student grades in different courses. In this study, they remark that using Collaborative Filtering does not provide an accurate prediction for a sparse database. Moreover, their study results indicate that the proposed RBM, especially for modeling tabular data, gives efficient learning and superior prediction accuracy than Collaborative Filtering and Matrix Factorization with a minimum Root Mean Squared Error (RMSE) of 0.3.

And also, another study tested 3 models, such as fivehidden-layers neural network, linear regression for supervised learning and linear regression for deep learning. This study used a dataset which was collected in Kaggle. The best mean average error (MAE) was 3.26 in the linear regression.

Methodology

This section discusses the dataset we collected for this study. In this chapter, the article presents data collection and data pre-processing and Machine learning algorithms and tools.

Data collection and preprocessing

As this research study is about the university grading system, we began by collecting the data from the Suleyman Demirel University portal. The data contains all speciality courses of 2016/2018 year students of Information System and Computer Science(Engineering faculty). The dataset was compiled from comma-separated value (CSV) files. 2 dataset files were collected. 1st to predict GPA by ENT score, 2nd to predict similar courses' final grade. Dataset consists of about

1200 students, and we have 5000 records for our analysis. The file record has the following rows: student name, student id, gender, final gpa, ent scores, teacher name, course name, mid 1, mid 2, final grade. And we have some issues like grading policy changes, and ent score point was also changed.

ID	STUD_ID	GENDER_ID	PROG_YEAR	YEAR	PROG_CODE	DERS_KOD	EMP_ID	LETTER_GRADE	GRADE
1	160103002	2	2016	2018	10103	INF 321	10120	C-	63
2	160103095	2	2016	2018	10103	INF 321	10120	D	50
3	160107011	2	2016	2018	10107	CSS 324	10514	F	0
4	160107020	2	2016	2018	10107	CSS 206	10126	B	80

Figure 1. Sample of student dataset

First, we deleted records with missing value, indicating that students dropped the course or did not receive a grade. To obtain appropriate data for various predictions, we performed some pre-processing on the collected data. We created a dataset to predict GPA using ENT scores, final exam grades, make a correlation between similar courses, and analyze elective Data Science courses. Because the algorithm learns from previous years, the predictions become more accurate as more data from previous years becomes available.

Furthermore, we wanted to predict the final grade of the course using absence count, so we pre-processed data with absence and participation count. However, we started having problems such as an insufficient data. According to our findings, the digital attendance system was first used in 2017 and has changed the limit of absences counts two or more times. That is why we do not predict course grades based on absence, but it'll be a great way of predicting final grades in the future.

Machine learning algorithms

I have used linear regression and decision tree techniques to predict GPA of the student for the courses.

Linear regression is a method for quantifying the relationship with one or more predictors and one or more target variable. Fitting a regression model to predict the values of new findings is one of the most common reasons.

Decision Trees (DTs) are a type of non-parametric supervised learning method that can be used for classification and regression. The focus is to create a model that predicts the value of the dependent variable using simple decision rules obtained from data features. A tree is an example of a piecewise constant approximation.

Results

Correlation and prediction gpa

I had the suggestion to predict GPA using ent score at the start of this work to see how ent results impact GPA and if students' school achievements are similar to their university performances. I received data from the university portal. It contains the most important information for students in the 2016–2018 school years. I deleted rows with a GPA of less than 1.47 and an ent score of less than 50. After data preparation, we have about 3098 records. First, we decided to investigate the relationship between ent and GPA. In this work, correlations measured by pearson correlation coefficient using Python.

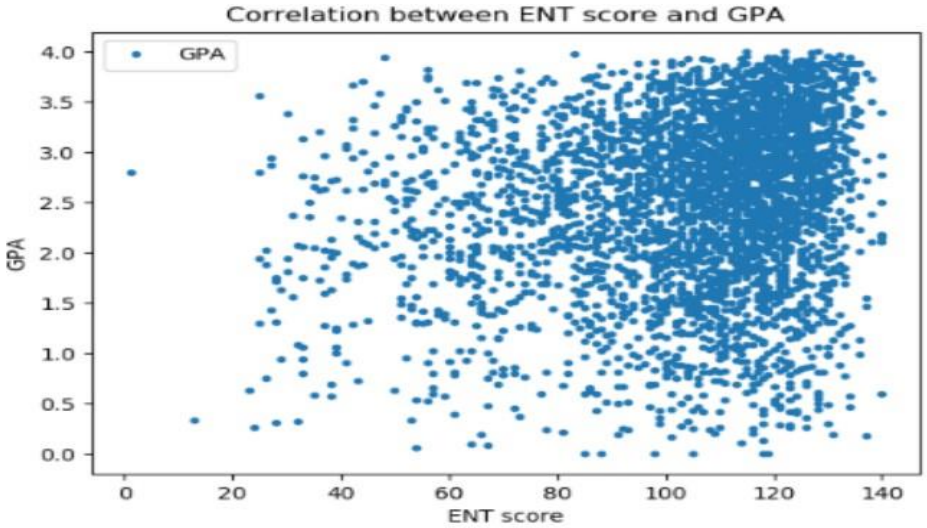

Figure 2. Correlation between ent and gpa

There you can see results, and correlation coefficient was low positive r=0.18 and relationship between them low and insignificant. In the figure 3, you can see the predicted

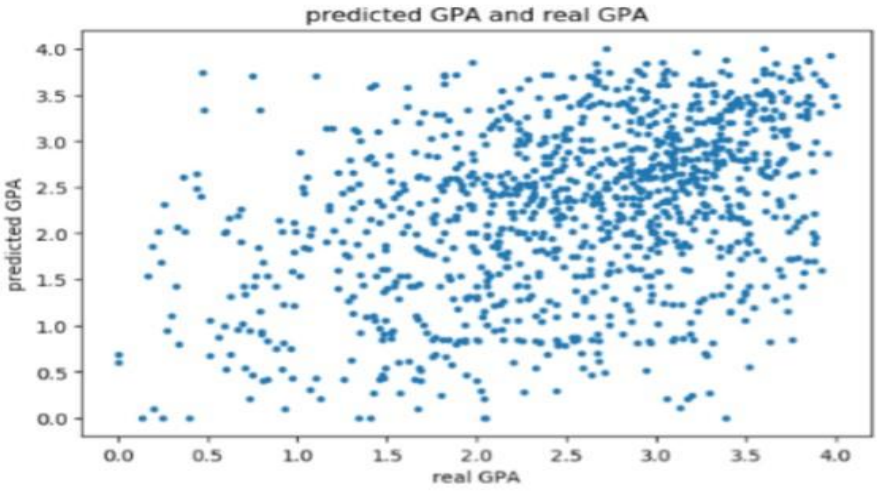

Figure 3. Predicting GPA with ent

Gpa, and to predict we have used the Decision tree algorithm on Python with Scikit learn. Using an ENT score alone to predict GPA returns no results. So we took GPA as an attribute value and introduced some elements such as class and program code that makes a more likely prediction. Because GPA keeps changing each semester, students' chosen courses and faculties also influence the change in GPA.

The possibility is extremely low. It is difficult to predict GPA with +50% accuracy because GPA is such a tiny number, and the correlation results show that the ENT score has little impact on GPA change. However, if we have more data for testing, the probability rises and the prediction becomes more accurate.

	Actual	Predicted
0	2.71	2.72
1	2.12	2.21
2	3.00	2.73
3	2.96	2.59
4	3.31	2.63
5	3.10	2.62

Figure 4. Predicting GPA with ent

Correlation and prediction final grade

There you can see predictions for final grades by similar courses. MAT153 and MAT 158(Mathematics for CS 1 and 2). I made a correlation between these courses using the Python Pandas package. The result was high positive correlation with Pearson correlation coefficient r=0.65. It is a very good result to predict. You can see that the relationship between these courses is very good, even if the teachers have changed. I built it using the DecisionTreeClassifier() class from the Scikit-learn library. We predicted the final grade with the accuracy 40%. The results shown in below:

Finally, I also predicted final grades. I used the Linear Regression class from the Scikit-learn library, to predict final grades using midterm grades as a regression model. Made correlation between midterm grades and final grade. Midterm1 grades' coefficient is 0.55, midterm-2 0.45. But this always changes depending on the chosen course. We got a good result as shown in Figures. But when grades are numeric values, it is hard to predict 100% accurately. So, to get better results I decided to predict grades using letter grades. I built it in the DecisionTreeClassifier() class in the

Scikit-learn library. Added features like year, term, teacher ID and used letter grade as a target variable. So, we predicted the letter grade using a classification method. The accuracy was 35%. These results are better than regression model results.

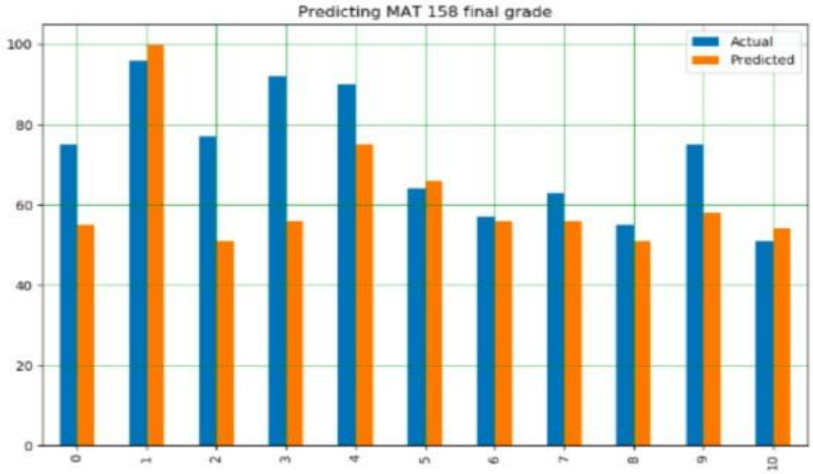

Figure 6. Predicting MAT 158 final grades

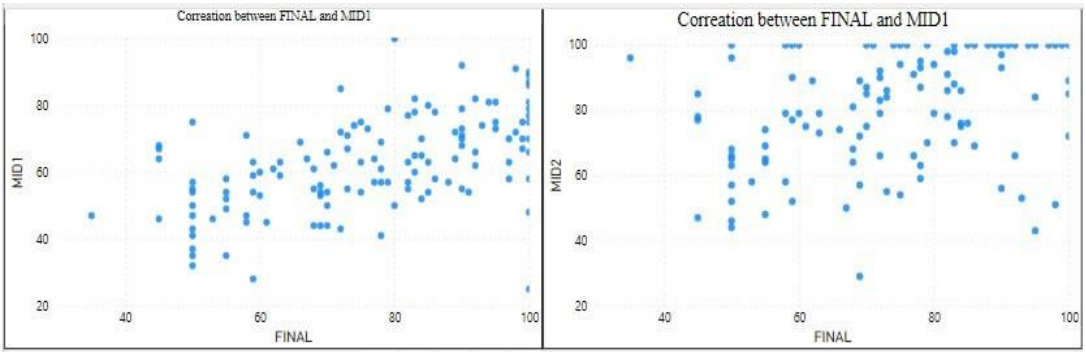

Figure 7. Correlation between final grade and MID1, MID2

Figure 8. Predicting final grade

Conclusion

Early warning system to motivate students and provide advance warning if they need to increase their skills in the courses. It also assists the course instructor in identifying weak students and providing necessary services to increase their performance. Thus, the rate of student retention can be increased. We discovered which characteristics have a significant impact on students' final grades. These predictions allow students to understand their predicted grades prior to the final exam and plan better. Additionally,in the future I want to do grade predictions by absence and teacher effectiveness. and also I'd like to do more predictions by using Ml algorithms in order to achieve really good results.

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EMPLOYEE PERFORMANCE MEASUREMENT USING ANALYTIC HIERARCHY PROCESS

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Abstract

Human resources and performance are the primary determinants of organizational success in today's contemporary enterprises. The main purpose of employee performance evaluation is to ensure a fair assessment of the employee's contribution to the workforce. An effective performance measurement system helps to boost employee productivity, focus on work discipline and make decisions in time.

Analytic Hierarchy Process (AHP) is a structured method for analyzing complex decision-making problems by calculating the weights of each criterion. Using a carefully constructed questionnaire, each respondent compares the relative value of each pair of elements. This method can be used for both qualitative and quantitative analysis. In this paper, Analytic Hierarchy Process (AHP) is used for employee performance measurement. The proposed AHP model contains criteria based on internal automated business processes of organization. As a result, it allows a straightforward consideration of each employee's performance by comparing all the criteria.

Keywords: Employee Performance Management, AHP, BPM

Introduction

Performance management that promotes human resource productivity is critical in today's competitive environment, where productivity is improving in all sectors and only firms that use their resources to the best of their capacity and have the highest performance can survive.

Performance management can be defined as a set of metrics and data used to improve the level of optimal use of facilities and resources in order to achieve goals in the most cost-effective and efficient manner possible. Performance management allows you to track your employees' performance and determine whether they require additional assistance, can handle more advanced training, or deserve a raise. Maintaining high standards in your organization requires an organized approach to performance management and tracking.

In addition, evaluating the contribution of each employee to the overall result allows a reasonable approach to the distribution of the payroll and the most efficient use of financial leverage to solve the tasks facing the team.

The concept of performance management and measurement is generating a lot of discussion in this age of increasingly competitive marketplaces and corporate goals that demand higher revenue and profits. The issue is that there is no one suitable methodology for creating a

performance assessment system. Organizations have tested and used a wide range of formal and informal systems, but they are still striving to find the ideal system for them.

In this paper AHP is used for employee performance measurement in internal business process management systems. A business process management system allows for the modeling, planning, execution, and maintenance of business activities and the workers that execute them across departments and locations. These software solutions are intended to assist businesses in maximizing the efficiency and productivity of their daily business procedures. This work considers the use of AHP to check the business process completion quality.

Analytic Hierarchy Process (AHP)

AHP is a multi-criteria decision-making process for dealing with complicated, unstructured problems invented by Prof. Thomas L. Saaty in 1980[3]. Problem modeling is the most creative aspect of decision-making that has a significant impact on the outcome. The key to implementing AHP successfully is to identify the decision hierarchy. This method involves pairwise comparisons and is essentially the formalization of a difficult problem using a hierarchical framework.

AHP creates ratio scales from paired comparisons of criteria, allowing for minor judgment errors.

The AHP approach divides the problem into three parts:

The issue that has to be fixed

The different solutions that are available to tackle the problem

The criteria used to evaluate the alternative (most significant component of the AHP technique)

Literature review

The areas of application of the AHP in the framework of the competence based approach to human resource management are as follows:

The work [1] describes a specific case of applying the AHP: in February 2009, a telecommunications company in Iran used this method to select a candidate from five people who passed the interview. The choice was made on the basis of the following competencies:ability to work in various structural units, previous experience, ability to work in a team, fluency in a foreign language, strategic thinking, oral communication and computer skills. As a result, a suitable candidate was selected.

Rafikul Islama and Shuib bin Mohd Rasad(2006) uses AHP to evaluate employee performance in organization. Overall ranking of the employees has been obtained using the

absolute measurement procedure of AHP.

Here are the criteria that used in this paper:

Quality/Quantity of work

Planning/organization

Initiative/commitment

Teamwork/cooperation

Communication

External factors

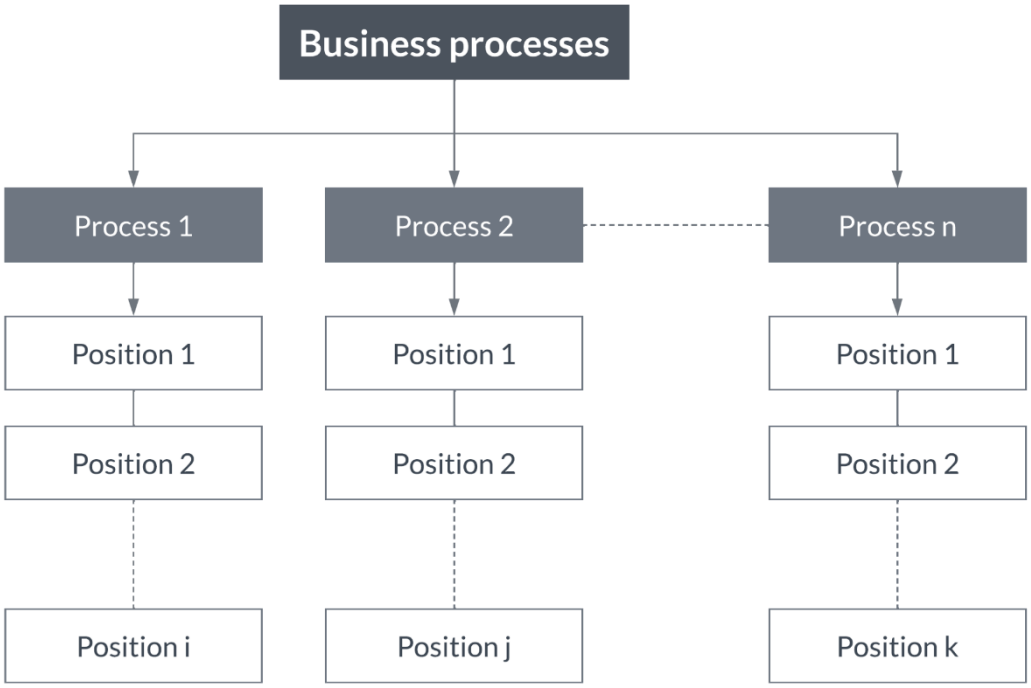
As a result, the authors developed the AHP model, which shows the performance of employees for each criterion.

AHP for performance measurement has been sufficiently studied by various authors, which will help to conduct study more accurately.

Methodology

In the AHP model the problem is organized as a hierarchy. AHP first divides a multicriteria decision problem into a hierarchy of interrelated decision parts (criteria, decision alternatives). The goals, criteria, and alternatives of the AHP are organized as a family tree in a hierarchical structure. The overarching goal of the problem is at the top of the hierarchy, followed by several criteria defining alternatives in the middle, and solution alternatives at the bottom. The act of building this structure helps not only to better identify all the components of the solution, but also to recognize their relationship.

To build an AHP model for performance measurement, all criteria and sub-criteria must be defined. Since in this paper the main goal is the performance of an employee in business processes, all business processes in which a particular employee participates are selected as the main criteria. Each business process has its own workflow scheme through which tasks are performed. Every position step in the process is considered as one action. In the Scheme1, the proposed AHP model for business process performance measurement is shown.



Scheme 1. AHP model for business process performance measurement

To measure employee performance with proposed AHP model, the steps mentioned below should be followed:

Step 1: The average time completion for each process (main criteria) will be calculated and the percentage of time from total will be the weight of each process.

Step 2: The weights of positions in each process will be calculated as in Step 1.

Step 3: Every employee's average time completion for each position in processes will be defined.

Step 4: In order to find the performance of each employee all criteria and subcriteria weights that belong to a current employee will be multiplied by the average time completion of the employee.

As a result, a list of employees and values showing their overall effectiveness in business processes will be available.

The proposed model can be changed using the pairwise comparison developed by Saaty in the 1990s to calculate the weight of each criterion and find the ratio between categories. In order to use pairwise comparison there must be an accurate assessment for each criteria.

Conclusion

An effective performance evaluation system that promotes continuous professional development improves the overall performance of the company. Their effectiveness and applicability directly depends on the goals set, the level of maturity of the company, its objectives and the type of corporate culture. In this paper the use of AHP for employee performance evaluation in business processes is explained. Such an analysis helps to objectively assess the quality of an employee's work and expand the use of business process management systems within the company. The final stage of the assessment is the adoption of managerial decisions about those employees who were assessed.

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PUBLIC INVESTMENT AS A MAIN DRIVER FOR GREEN ECONOMIC RECOVERY AFTER COVID-19

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Abstract

The COVID-19 related green recovery research is characterized by positive and speculative potential scenarios, and this paper adds two additions to the literature. The COVIDcrisis has created a series of potentials ('permissive circumstances') that can be exploited, but the analysis of such possibilities also must take into account the activities and geopolitical events ('constructive circumstances') and those that preceded them ('crucial antecedents') that form the basis for the utilization of these possibilities. Analysis of three major nations' green recovery expenditure plans (China, Japan, and Russia from 2000-2020) using the differencein-difference model focuses on differences in size, industrial allocation, and execution options. Following China is Japan, which spends the most in both absolute and GDP-related terms. Spending in Russia is 43% lower than in China. Only 57% of Japan's financing goes toward new technology, but in Russia and China, the majority of funding goes into current industries (infrastructure, railroads, electric vehicles, hydrogen). Climate mitigation, employment, GDP development, efficiency and exporting, international competitiveness, local assistance, and social justice are only a few of the strategic variables that we use to explain national disparities. Various socioeconomic repercussions of the COVID crisis, pre-existing worries (e.g., severe joblessness, social and regional inequities), the economic significance of certain industries, and pre-existing climate change policy initiatives are all factors that influence these varied motives.

Pre-existing circumstances, plans, and advancements hinder how the crisis-induced possibilities may be used to construct green recovery strategies.

Keywords: Green recovery, Speculative potential scenarios, socioeconomic repercussions, Covid-19, Difference-in- difference model

Introduction

In recent decades, growing public awareness about natural catastrophes has sparked a fresh interest in the business markets for climate-related risk. According to a growing number of recent studies, climate risk influences stock returns on a cross-sectional basis(Falchetta & Mistry, 2021). A few studies, such as those by (Healy & Clinch, 2004)and(Aristondo & Onaindia, 2018), present methods for building de-carbonized portfolios using easily traded stocks, but this area of climate risk hedging remains mainly unexplored. The model's magnitude and global emphasis raise concerns. Local, national, and socioeconomic distinctions in greenhouse gas

emissions are neglected. The underprivileged and social problems are overlooked. It is unlikely that a green economy can fulfil its environmental and justice goals without taking into consideration economic disparities, and it is not intrinsically pro-poor (Victor & Jackson, 2012). In many cases, the model's predictions about how much money may be spent and what enhanced technology can provide may be excessive(Iannaccone, 1998)found that green bond yields are an estimated two percentage points less than conventional financing, which is exacerbated by the negative premium. The findings of (Khandker et al., 2012) Increased taxation on polluting companies might slow their development or force them to change their ways. Trading permission has long been enough to accurately price CO2 gas pollutants. Affecting companies that consume fossil fuels or open land, groundwater, and forest supplies may also be done. These strategies aim to generate payouts that better reflect the value of natural assets (Pelz et al., 2018). Over six basis points, (Bukari et al., 2021)estimate, is the disparity between the prices of municipal and corporate debt instruments in the United States if they are not approved by a third party. Clearly, these green economy papers are not meant to be how-to guides for implementing green policies and instruments. They provide instances of how these policies and programmes have worked in both developing and developed nations, as well as when they haven't and why.

The degree to which these tools are embraced will determine the amount of change accomplished in each country. Adopting the entire set of greening methods described in these studies might result in a really revolutionary shift in the economy. The green economy is a complicated mix of options that must be properly blended to guide a nation, region, or city towards a more sustainable future. When it comes to US municipal bonds(Cnaan et al., 2003)found that green bonds had higher yields than predicted based on their credit characteristics.. Similarly, According to (Khanna et al., 2019), there is evidence of a considerable negative premium of roughly 15–20 basis points for green bonds, with the premium varying among countries and issuers in the marketplace but rising for maturity periods in the secondary market. Exposure to climate risk may affect stock returns in a variety of ways.

According to (Foster et al., 2000), when severe weather occurrences cause financial losses for a company, they may be seen as a physical manifestation of the effect of climate change on stock returns. It doesn't matter what sector or other features a company has(Gruber, 2005), since this so-called "tangible climate risk exposure" is primarily about the disruptive impact of climatic events on company operations, resulting in unstable working capital. The second route to a more

tightly regulated, low-carbon industry involves the high costs associated with enterprises' adaptation to new climate legislation as they counter their activities. While physical climate risk impacts a wide range of businesses, the transformational risk largely affects those in energy-intensive sectors that rely heavily on fossil fuels.

There are a variety of ways in which climate risk affects a company's stock returns, based on its exposure to severe or transitional risk types. In light of these uncertainties, a logical research issue is whether equity investments may utilize particular assets as climate hedging instruments. Given the semi-climate risk and indications that investors are receiving money for their susceptibility to climate-related risks, this is clearly a significant topic. Although the global economy has made cautious moves towards a worldwide greenhouse gas exchange, it is far from there. The European Union has proved how international commerce can function to provide regional rewards for emission reduction by constructing the first come from different industries with its emissions trading scheme (ETS): an eastern price on carbon has also been established; business owners have begun to incorporate this price into their choices; and the stock facilities for intergovernmental emissions trading have been established. However, if the emission trading schemes are to become the foundation of an international trading mechanism, they must be expanded and reformatted (Statistics, 2015)Similarly, the clean development mechanism (CDM) has provided the foundation for significant developing economic systems like Brazil, China, India, South Korea, and Mexico to construct projects or investments, efficiently tying them with worldwide greenhouse gas trade and finance(Molenaar et al., 1992).

Several studies have demonstrated that green bonds are an attractive equity fund for financing low-carbon development because of their ability to apportion the cost of mitigating adverse impacts of climate change across generations(Rahman et al., 2012).Green bonds have seen a surge in popularity among environmentally aware investors in recent years. Since the International Finance Markets Association published Green Bond Principles in January 2015, which define standardized requirements for loans to be classified as "green," the green bond market has grown rapidly. As a result, as green bonds have been listed on various stock exchanges throughout the globe and entered the portfolios of individuals and firms, their liquidity has risen rapidly(Wang et al., 2019).

Recent empirical studies show that the issuing of green bonds has been shown to benefit both issuers and investors. According to (Maxim et al., 2016) the issuing of green bonds has a

positive effect on short-term business value, firm size, and stock liquidity. Similarly, a question is as follows: found that the issue of green bonds had a favorable impact on a company's environmental and financial performance, as well as on the number of long-term green investors(Apergis et al., 2021). Because of their comparable GDP, demographic structure, and greenhouse gas mitigation pledges (Table 1), we chose these nations for our study. However, their green recovery packages differ greatly. We want to look at the strategic contexts and motivating factors that led each country to make the decisions that they did. We also want to look at the total amount of green recovery funding, how it was used, and how effective it was.

Countries	GDP in 2019	Population 2020	Net-zero by 2050
China	EUR2,431 bn	71.5 million	Target embedded in law in June 2018
Japan	EUR2,451 bn	78.9 million	Adopted as goal in 2017
Russia	EUR2,531 bn (GPB2,218 bn)	71.8 million	Target embedded in law in June 2018

This research examines green bonds as an investment and trading asset based on their dependency and network connectivity to other asset classes across alternative investment horizons. Since baller investors' reasons for holding green bonds might vary across time frames and marketplaces, the influence of price fluctuations from other asset classes on green bond prices relies not only on common pricing elements but also on non-pecuniary objectives. Consequently, it is critical to determine the attractiveness of green bonds for companies and investors alike to understand how price fluctuations in financial instrument markets impact price dynamics and risk-return profiles. Also essential is the efficient transfer of funds to the kinds of activities that are compatible with a clean economy. This paper aims to generate at least two advances to the existing body of research on green recovery. By presenting an indepth examination of green recovery programmes in China, Japan, and Russia, the study attempts to provide an analytical approach by utilising a difference-in-difference model from 2000-2020.

This study incorporates a number of evidence-based descriptions of green stimulus packages in different nations, which focus primarily on overall spending quantities as well as some

sector-specific dispersion, but just don't provide enough elaboration of the position of nations' pre-existing situations and corporate strategy. This analysis goes further. According to Vivid Economics and the Finance for Species Diversity Action Plan, there have been many printings of the Green Vegetation Stimulation Indicator, which evaluates how green various countries' stimulus spending is. This paper's second contribution is to suggest an expanded conceptualization of appropriate points for green recovery analysis, which was obtained from this research's deliberations and activities as well as pre-existing contextual factors that impact the reaction to those possibilities. Our empirical examination of China, Japan, and Russia is guided by important political science concepts.

Theoretical Framework

The most dynamic green bond parts of the economy, the EU and the US, are the focus of our empirical investigation. Governmental and debt securities are included in our list of asset classes because, apart from being green, they have some of the same characteristics as debt instruments. Due to the same risk characteristics of high-yield government debt and the price movements of energy stocks, we also employ these assets to help shape the risk level of green bonds. The Bloomberg Barclays indexes for green bonds, aggregation treasury, aggregating industrial and high-yield connections, and MSCI and DataStream electricity indices represent the pricing of EU and US securities and asset classes. In the long run, Treasury and industrial returns account for approximately 24% and 28% of short-term green bond price fluctuations in the euro and markets, respectively, which decreases to 16% and 23% in the long run. Green bond returns do not transfer significant price variability shocks to federal and corporate bonds, demonstrating that securities are net recipients of asset price shocks across various time scales.

Furthermore, our empirical data shows that environmental bonds are not strongly linked to other asset classes like high-yield bonds, equities, or energy stocks in the long and short term. Although we show that green bonds and high-yield bonds move in tandem at discrete times in the EU and US markets, the propagation of price shocks from green bonds to these markets is insignificant across various time scales.

According to (Zhao et al., 2021) research on financial determinants and connectivity, green bond price volatility shocks are shaped by unpredictability in equities and oil markets(Dauda & Hasan, 2018). To help investors manage the effects of asset price fluctuations on their current green bond holdings across a variety of investment horizons, we provide our results. Results show

that green bonds are a distinct asset class with changes in their value strongly affected by treasury and company bond prices in the EU and US, which suggests that they can be used to hedge and diversify other asset classes, such as investments, high-yield bond funds, and energy stock prices, over a wide range of investment time horizons. Due to the general perceived potential of resources like wind and solar to generate employment in relatively close proximity to nuclear power, which has a lengthy lead time and delivers less such employment, such a bias may exist, or be accentuated(Banerjee et al., 2021). Such factors may illustrate why current green recovery publications have tended to exaggerate some of the prices of renewables while largely neglecting power generation's potential benefit. Less well-known drawbacks of solar and wind power include the high system-wide financial costs mentioned, as well as severe pollution of various types, as well as a large and rapidly expanding amount of hazardous material from worn-out and abandoned solar panels and wind turbines. These materials are frequently disposed of in landfills or in underdeveloped nations because they are too expensive to recycle (Howarth et al., 2020). Wind and solar need a lot of acreage because of their poor energy density. To meet current United States energy needs with wind power, approximately 900,000 square kilometers, or 11% of the continental Americas, would've been required, resulting in considerable environmental and animal harm, pollution, and aesthetic blight (Fell et al., 2020).

Advancements in the operational efficiency and expected lifetime of emerging nuclear plants, as well as the advancement of possibly lower original innovations, such as small modular reactor designs that could benefit from economies of scale and standardization, are among the unmentioned possible benefits of nuclear power (Munyanyi & Awaworyi Churchill, 2020). Traditional worries about hazards associated with inadvertent radiation leaks (e.g., via socalled passive nuclear safety), nuclear waste, and proliferation may be alleviated by the comparatively quick rate of nuclear invention (Romero et al., 2018). The objective is to avoid making an "either-or" decision. Rather, we need a much more equal conversation on how to effectively mix renewable, nuclear, and other clean energy sources to meet long-term climate targets at the lowest possible cost, one that is less skewed by disputes about how to deal with short-term economic disruptions.

Our research is directly tied to the growing body of knowledge on green bonds. Many recent studies have focused on the impact of the purple label on the price of securities, in particular. Depending on the samples and time periods studied, as well as the kind of market (main or

secondary), the results are mixed. When it comes to the second hand market, (Deller et al., 2018) find relatively no evidence that green bonds are valued considerably differently from equivalent conventional bonds. According to(Bank, 2014), green bonds have been priced at a modest premium above standard bonds. For each of the 125 big, investment-grade green bonds in his sample, he predicts the yields of an equal synthetic debt instrument using a matching procedure. According to (Howlett, 1995), municipal green bonds have a lower secondary market yield than their conventional counterparts. In the main market, (Pelz et al., 2018)found that green munis are issued at a price comparable to some of the more comparable regular municipal bonds, even after accounting for tax implications. An asset pricing paradigm is used to explain how the demand for green bonds (or, broadly, a non-financial goal) impacts prices and portfolio selection. They found that, overall, green debt securities issued in the United States between 2005 and 2015 had better credit ratings and shorter terms than conventional municipal bonds. They seem to be more prone to being taxed, and they are also larger in size. When these qualities are taken into account, the yields on green bonds are around 6 basis points lower than the rates on conventional bonds. Assuming that the same US town issued both clean and non-green bonds on one day, with the same term and rating, (Ozawa et al., 2019)found no evidence for a premium. They argue that greenfield and brownfield securities issued by the very same issuer are almost interchangeable since their techniques maintain risk and payoffs constant. In addition to the research on pricing, a few important contributions look into the returns and consequences of green bond bond issues in real life. (Spinney, 2012)discover that green bond announcements have a beneficial effect on the stock market, as well as an increase in stock liquidity. (Rosenthal et al., 2018)demonstrates that, in addition to confirming a good stock market return, green bond issuance improves operational and environmental performance.

The main market at issuance for a global sample of bonds issued by supranational, financial, and non-financial issuers was examined for the price ramifications of the green label. By focusing on other sources of heterogeneity, such as the kinds of issuers, we add an essential qualifier to the conclusion of a price gap across greenfield and brownfield securities. Research that examines the link between money and the environment is equally relevant in our study. In a very well-written line of study, the environmental profiles of enterprises are contrasted to the expenses of their financing. According to(Cheng et al., 2021), companies with stronger corporate environmental management indicators have a reduced cost of capital. According to the

environmental trigger of the CSR index(Id, 2021) found a similar outcome for companies with massive environmental performance. According(González-Eguino, 2015), a researcher in this field, investment returns in environmentally concerned equities, such as those involving toxic chemicals, hazardous waste, and climate change issues, are greater. As the academic research on socially responsible investments has shown, market values are driven by unique investor preferences(Nussbaumer et al., 2012). It is possible that social norms influence consumer choices, which in turn have an impact on market results. According to(Pretty & Ward, 2001), norm-constrained institutions like pension plans are less likely to own "sin" equities (publicly traded corporations engaged in the production of alcohol, tobacco, and gambling) than mutual or hedge funds. Banks and investors alike take environmental hazards into account. A study by (Benjaminsen, 1993)found that companies with environmental issues are charged a greater loan spread and get loans from crime gangs with a smaller number of banks than those without environmental worries. Loan spreads seem to be unaffected by economic strength.

Research design

Difference-in-difference analysis based on the propensity score matching method

The China, Japan, and Russia Initiative's energy and climate change impacts were assessed using a DID estimation and a combination of fixed factors. The DID estimation would be used to evaluate the pre- and post-implementation modifications of the Initiative. The net impact of the initiative on energy usage and environmental protection was discovered by analysing the difference between both the experimental and comparison groups. The use of fixed-effects estimates allows us to adjust for time-invariant and moment-latent features of countries. The following was the configuration used to create the particular model in question.

$$yit = \beta 0 + +\beta 1Tt + \beta 2Dit + \beta 3Zit + ui + vt + it \quad (1)$$

Second, the nations in the experimental and comparison groups may have been impacted by unanticipated or time-invariant characteristics in their choice to join the Initiative after being matched by PSM. Even if the experimental and comparison groups had context-derived contexts and resource utilisation patterns, a random selection would always remain in the ATT number. We consulted (Sovacool et al., 2016)while using the PSM-DID approach to further reduce bias. Calculating the ATT of the PSM-DID technique is simple.

$$ATT = E(\Delta y_{1it}|D = 1) - E(\Delta y_{0jt}|D = 0) \quad (2)$$

Where$\Delta y1it = y1it - y0i, t-1and\Delta y0jt = y0jt - y0j, t-1$.

$$ATT = \frac{1}{N}\left(\sum_{D=1}\Delta y_{1it} - \sum_{D=0}\delta_{ij}\,\Delta y_{0jt}\right) \quad (3)$$

The kernel comparison approach was selected for this research due to the obvious big enough sample size and the fact that it may be used to get the most of the data from the nations in the comparison group. The kernel matching approach is based on the assumption that if i have nicmatching items and N_i^c, then the value is δ_{ij}; alternatively, it is 0. For the last intervention group, The following equation may be used to calculate the ATT given the observed factors in the control treatment:

$$ATT = \frac{1}{N^T}\sum_{i\in T} Y_i^T - \frac{1}{N^T}\sum_{i\in C} Y_i^C = \frac{1}{N^T}\sum_{i\in T}\left\{Y_i^T - \frac{\sum_{i\in C} Y_i^C G[(p_j - p_i)/h_n]}{\sum_{i\in C} G[(p_j - p_i)/h_n]}\right\} \quad (4)$$

Multiple mediating effect model

After establishing a link between policy and increased energy use and environmental damage, the attempt to influence method was examined using Grossman and Krueger's (1991) three mediator variable paths: economic growth, advanced manufacturing effects, and technological improvements. These were all assessed using the Grossman and Krueger indicators. The following are the equations that make up the numerous mediated effect model:

$$yit = a0 + a1PIPi + a2Tt + a3Dit + a4Zit + ui + vt + it \quad (5)$$

$$TRADEit = b0 + b1PIPi + b2Tt + b3Dit + b4Zit + ui + vt + \ it \quad (6)$$

$$INDUSit = c0 + c1OPIPi + c2Tt + c3Dit + c4Zit + ui + vt + \ it \quad (7)$$

$$TECHit = d0 + d1OPIPi + d2Tt + d3Dit + d4Zit + ui + vt + \ it \quad (8)$$

$$yit = e0 + e1TRADEit + e2INDUSit + e3TECHit + e4OPIPi + e5Tt + e6Dit + e7Zit + u_i + v_t + {}_{it} \quad (9)$$

Whereas PIP indicates for public investment plans for green economic recovery.

Investigate the significance of e_4. If it's substantial, PIP has a partly moderating impact, but if it's not, the impact on energy usage and pollution from the initiative is entirely mediated by the influencing variables. Run the Sobel test to see whether the data is significant.

$$z = b_1e_1/\sqrt{b_1^2S_{b_1}^2 + e_1^2S_{e_1}^2}, \quad z = c_1e_2/\sqrt{c_1^2S_{c_1}^2 + e_2^2S_{e_2}^2}, \quad z = d_1e_3/\sqrt{d_1^2S_{d_1}^2 + e_3^2S_{e_3}^2} \quad (10)$$

The moderating effect is there if z meets the requirements; conversely, it is absent. The PIP Initiative's impact on energy use and the environment can be shown by following the steps above.

Data Sources

This research which was conducted in China, Japan and Russia covers the period of 20002020. The World Development Indicator (WDI) is used to gather the data for GDP, carbon emission and spending for green recoveries. The WDI database is used to determine all the control variables.

Empirical results and analysis

Covid-19 related Government spending on green recovery

For most parameters, short-term persistence () estimates are significantly positive, while longterm persistence estimates are negative and statistically insignificant. If volatility clustering is present, this suggests asymmetric effects since favourable and unfavourable residuals impact return and volatility to varying degrees, as shown by the important feature. From 2012 to 2014 and numerous times in 2013–2018, dynamic correlations of green stock indexes with the physically and transitioning climate risk series fall into negative territory respectively. For example, in late 2014, the EU Emissions Reduction Scheme (ETS) began its third phase, which resulted in additional industries and gases being covered in environmental restrictions, which may of had a negative influence on equity prices. Negative correlations have been identified throughout numerous time periods between 2008 and 2015for durable stock prices, which follow a similar trend. Because of their low correlation with both environmental policy indices, we find that green or sustainable stocks are not safe-haven investments(Bhatia & Angelou, 2015).

Precious metal prices fall into a negative connection with global climate risk numerous times in late 2012, before the global meltdown, and again near the conclusion of the sample. That metals are not automatically trustworthy safe havens against climate hazards is suggested by the fact that their returns are negatively exposed to growing climate uncertainty. According to strong correlation with biophysical and transitional climate hazards, green bonds seem to be a more resilient choice for investors worried about their portfolios' exposure to climate risk. From late 2019 till now, seen continuously strong correlations between green bonds and both series of climate risk, with a substantial surge in correlations during the COVID-19 epidemic period, as we've seen also for green stocks and precious metals. This study found that green bonds may assist investors manage climate risk exposures by virtue of their positive correlations with climate

uncertainty.

	Green recovery spending	Economic recovery packages	Green as % of economic recovery	Green as % of GDP
China	EUR28.5 bn	EUR111 bn	18%	1.31%
Japan	EUR31.6 bn	EUR129 bn	19.1%	0.78%
Russia	GPB17.51 bn (=EUR21.4 bn)	No unified recovery package	Unclear	0.71%

Table 2. COVID-19 related government spending on green recovery, economic recovery, and total financial support

Green recovery sectors

The hedging efficacy HE value as high as 22.43 percent predicted by the green bond portfolio data shown in shows that green bonds provide considerable risk reduction advantages vs the undiversified passive portfolio. This shows that during times of severe climate uncertainty, adding green bonds to the active market index might dramatically lower portfolio risk. We also demonstrate that treasury bonds may give better risk-adjusted returns during times of significant climate uncertainty, which is consistent with(Nussbaumer et al., 2013). Overall, our data suggest that green bonds not only reduce climate change risks, but also boost risk-adjusted returns during times of severe climate uncertainty. Over medium and long-term periods, most notably from 2014 to late 2017, financial markets in the EU may be found to have a strong and considerable effect on green bonds. The energy market, on the other hand, has little correlation with the bond market. Furthermore, since late 2015, there was a significant connection here between financial sector and corporate and government bond markets, sustaining a strong dependency(Pachauri et al., 2004). According to arrows in the phases, all couples save for the financial and energy markets have a positive association (except for the latter).

At the start and finish of 2019, however, short- and medium-term stock market cointegration were low. In the last years of the quarterly data, the cointegration exists for power and high markets decreased across all time scales. It seems like the green bond industry is related to the government and corporate markets, but there is no apparent relationship to the strong valuation, given the facts on phases at various time scales. Finally, graphs show that green bond prices are driven by financial markets, except in the highyield market.

Table 3. Green recovery spending sectors in EUR billion and %,

Sectors							
China				Japan		Russia	
4 top sectors	Railway infrastructure	3.69	*17.4%*	6.00	*21.3%*	5.69	31.3%
	Electric vehicles	2.41	*12.2%*	7.88	*31.2%*	2.31	21.8%
	Building energy retrofits	5.67	*19.2%*	3.00	*3.4%*	3.59	31.4%
	Hydrogen	3.00[7]	*5.7%*	7.00	*29.8%*	0.31	1.5%
	Total	*21.7*	*61%*	*18.8*	*79%*	*13.7*	*67%*
Other sectors	Green transition (Unspecified) (a)	4.88	*21.3%*	0.38	*1.4%*	12.3	14.7%
	Air and maritime transportation	3.12	*4.8%*	2.18	*12.7%*	0.11	0.3%
Sectors				Japan			
China	Russia						
	Environmental rehabilitation and protection	2.21	*11.5%*	0.69	*2.6%*	1.29	8.7%
	Urban commuting and mobility	1.19	*4.7%*	0.66	2.4%	1.31	13.5%
	Agriculture, Aquaculture, Food, and Animals	1.03	*2.6%*	0.28	*1.2%*	2.44	11.4%
	Nuclear	0.18	*0.8%*	0.29	2.1%	0.71	4.8%
	Renewables[8]			0.21	1.2%	0.21	1.2%
	Total	*14.7*	*51%*	*3.5*	*17%*	*5.6*	*31%*
Total		*28.40*	48%	*31.6*	17%	*21.4*	25%

Spectral synchronization results for the bond issuance and capital industry are shown in respectively. The horizontal axis represents the time span from the begin to the conclusion of the sample period, while the vertical axis shows the frequency scales from 0 (one day) to 252 (one market year). Bridge values from 1 to 2, and the warmer the colour, the greater the cross-

correlation value. The bluer the colour, the lower the bridge value. In the time - frequency domain, Monte Carlo simulations are used to show the importance of connections. Both statistics show variable levels of reliance with time and frequency, with reliance varied substantially among financial markets and countries(Mirza & Szirmai, 2010).

Sector	Indicator	China	Japan	Russia
Chemicals	GVA	1.07%	1.71%	0.81%
	Jobs	0.59%	0.91%	0.41%
Metals	GVA	0.28%	0.81%	0.17%
	Jobs	0.31%	0.59%	0.19%

Table 4. Gross Value Added (GVA) and jobs per sector in 2018 (% of total GVA and jobs for each country)

The price patterns of the EU financial market are strongly correlated with firm and treasury market price fluctuations, as seen in for Single market. Intriguingly, this reliance persists across the whole sample period, in both the short and long term. Green bonds' price movement is mostly dictated by corporate and government bond markets, as seen by phases (shown by arrows). Green bonds' dependency on other EU treasury securities has dramatically changed. Especially(Jiang, 2008), the availability of financial resources is only somewhat dependent on the equity and energy markets in the past 2 years of the sample, with high dependency rates at the medium scale. Similarly, there is no strong evidence that these markets have a significant impact on the movement of green bond prices.

Country	Completed/ongoing			Planned (2020–2023)	
	Projects	MW		Projects	MW
China	20	1.31	12	866.70	
Japan	68	61.68	14	690.81	
Russia	13	2.49	8	199	

Table 5. Number of hydrogen demonstration and early implementation projects per country.

Empirical evidence suggests that high-yield corporate bonds have no long-term dependency, although short-term dependence is robust and significant but also transitory. Despite this, the phase findings show a mixed picture when it comes to the long-term consequences of

green and high-yield bonds.

	China	Japan	
Russia			
Gross Value Added (as % of total GVA)	0.70%	3.61%	0.91%
Jobs (% of total employment)	0.40%	3.03%	0.48%
% of total country exports	11.21%	18.88%	11.61%

Table 7. Implementation choices for electric vehicle government funding, EUR Billio

shows that the link amongst debt instruments and bank deposits in the Usa and the Eu is markedly different. Green bond prices are strongly correlated with changes in treasury market prices on a medium scale; this dependency is especially substantial in the near term and stays steady during the sample period in the U.S., the study found. Similarly, phase analysis shows that green borrowing costs follow the treasury market's price movement. There is also a stronger short-term correlation between ecological bond markets in the US and corporate bond markets in the EU than there is in the former. We also discover inconsistent results on the longterm influence of markets on each other (Day et al., 2016).

	Automobile industry		Automobile purchase		Charging infrastructure
			Private consumers	Public sector/NGOs	
China	1.4	1.8	0.21	–1.4	
Japan	3	1.3	0.3	1.6	
Russia	1.14	0.71	0.4	1.50	

Table 7. Implementation choices for electric vehicle government funding, EUR Billion

Moreover, keeping a healthy environment relies heavily on people's harmonious relations. People's discordant relationships, particularly during war, cause significant environmental damage. Massive deforestation occurs as a result of war. Improper thinking and policy lead to unending plunder and improper planning, which alter the natural world's face. Security and a New Deal are required for a green planet. We want the government to take a bigger role in creating a greener planet. This sparks a debate on how to promote peace and harmony among individuals and ethnic groups in order to eradicate vengeance and violence in the country. Furthermore, in order

to keep the globe peaceful, every country must adhere to international rules and treaties. Both harsh and gentle approaches should be used to punish rogue states who consider peace-seeking states weak. Three cities are participants in worldwide efforts primarily focused on city-networks focusing on urban resilience: Rome, Milan, and Venice are participants in the 101 Resilient Cities, while the latter is a member of the 0.45

	Jobs residential building sector	Jobs in non-residential building sector	Total jobs	Share of total country jobs
China	641,569	288,755	841,439	2.49%
Japan	762,432	332,688	1,290,121	4.03%
Russia	655,731	188,121	771,950	3.79%

Table 8. Jobs in residential and non-residential renovation sectors, per year on average for the period 2012–2016.

Cities are clearly a key point for studying COVID-19 consequences on sustainable mobility since they exhibit a variety of prototypes and local circumstances with vulnerabilities highlighted by the virus' propagation. Due to the crosscutting nature of urban concerns, cities are also key to the UN's Sustainable Development Goals (SDGs), being the direct focus of SDG 11 (Sustainable Cities and Communities) and having an influence on a wide variety of other SDGs (Damigos et al., 2021). Furthermore, urban sustainable mobility transitions have a distinct social and technical background that must take into account a variety of factors discussed in this paper, such as urban planning, infrastructure facilities, regulation and sales prices, public awareness, behaviour change, and local planning cultures(Vernengo & Nabar-
Bhaduri, 2020).

Green recovery strategies in China, Japan and Russia

We provide facts for the China, Japan and Russia. From an investing standpoint, green bond and mainstream bond markets are linked across three separate frequency bands, which may be seen as various investment horizons from an investing standpoint.(Martinez & Ebenhack, 2008) ,(Okulicz-Kozaryn, 2010) and, (Stark et al., 1986) among others, have shown that spectral band 0 covers motions from 1–5 days, which is equivalent to one work week. This band is consequently related to the short-term movement. This, in turn, might have a detrimental environmental

influence on the COVID-19 era's automobility norms and expectations, given that kids seem to favour the same mass transit regime as their parents . In a recent study of schoolchildren, it was indicated that although Tesla, the current emblem of totally battery-electric, sustainable automobiles, was recognised by the youngsters, it had much less appeal than well-known premium and performance car companies. Indeed, nearly 75% of the young people polled support the current social and technological system of trip flexibility, demonstrating expressed concerns about environmentally destructive mass transit paradigms that may become more prevalent as a result of COVID-19.

The second frequency spectrum represents an interval of six to twenty-two days, or approximately one working week to one commercial month.Finally, the long is represented by the third band, which covers the period of 19–199 days, i.e., from one business month to around nine business months. You should keep in mind that the rolling window length affects the lowest frequency band's edge. 4, First, the results of the Ltd. since spillover index approach are provided to give an overview of the dynamic nature of ripple effects across markets. To get the dynamic connectivity metrics, researchers used 200-day rolling windows, as reported by(Fragiacomo & Genovese, 2020), (Waddams Price et al., 2012), and(Zhou et al., 2010). Following the foundational research of(Awaworyi Churchill, 2017), a 100-day forecast horizon is used, even though the BK architecture is independent of the prediction horizon. For each window, a random effect model with two lags predicated on the Schwarz-Akik information
criterion is utilised.

	Public sector	Private sector		
	Residential privately owned		Social housing	SMEs
China	3	1	0.6	0.3
Japan	2 (shared between public and private sector)			
Russia	1.21	2.41	0.07	0.05

Table 9. Green recovery support for building energy efficiency measures, EUR billion.

our empirical findings for the China, Japan and Russia markets. Decomposition of prediction error variance was performed over an h-horizon of 10 days using the Bayesian akaike information (BIC) for each VAR model. According to Equation (15), price return benefits from the financial sector to other asset classes are reported in Panels A, whereas Panels B provide the same information,

but in reversal, i.e., from other asset classes to green bonds. This information is summarised in the following manner: We also provide the 96% confidence intervals for each spillover possible mechanism on 2000 Simulations of the Conditional variance in its simplified version. As seen in Panels A of for the EU bonds market, the effect of price shocks on various asset classes is minimal across a range of timescales. The effect on each asset class is less than 2%, and the aggregate of all affects is less than 3%, rising marginally from short to long term. Surges from the US bonds market have minimal impacts on various asset classes, which are confirmed in Panel A of , which shows that these effects stay consistent across various time frames. Overall, the information we've gathered shows that the EU and US green bond markets' variation in other assets is tiny, which is in line with the market's small size over the time period we studied.

	Slower implementation	Faster implementation
Emerging industries and sectors		*Japan*: To regain ground in global competition, technological advances and enterprises must be rapidly advanced with precision..
Existing industries and sectors	*China*: Reconfiguring preexisting fields over time (with some exploration of new ones)	*Russia*: Green reconfiguration in a wide range of industries is supported by distributing resources.

Table 10. Typology of green recovery strategies in Germany, France and the UK.

Conclusion and policy implications

This paper employs the DID model to analyse the impact of public investment plans in China, Japan, and Russia for the period of 2000–2020. COVID-related green recovery plans are often discussed in relation to the services they provide for the development and implementation of such plans by policymakers. We reach the conclusion that these papers tend to be too simplistic. There really was a policy window created by the crisis, which allowed the government to spend a huge proportion of recovery funds in a short period of time. However, our research on three leading countries (China, Japan, and Russia) reveals that the intentions and decisions of their green recovery packages were primarily influenced by country- and sector-specific circumstances and pre-existing plans, rather than attempting to exercise complete authority to change course.

Our research suggests that different green recovery strategies were developed based on

different combinations of constructive circumstances and critical ancestors. In order to gain a competitive advantage, China plans to quickly invest green recovery funds in a few manufacturing entrants. Investing quickly and widely throughout many (mostly already existing) businesses and electorates is how Japan plans to make progress in the long term. Assets in Russia's economy are spread out over a few (mainly established) areas, with the goal of creating jobs, decarbonizing the economy, and supporting regions. We summed up the three green recovery strategies based on their various motivational blends. There were many other factors to consider, including not only environmental concerns but also those related to the economy and the political climate in the province. In spite of the fact that many sustainable development scholars object to such concessions and prefer to see "green" considerations predominate, these data indicate that generates or green market strategies that aim to incorporate environmental, financial, and cultural objectives have greater true political momentum, especially when large asset decisions are being made.

As a result, we've come to the conclusion that green recovery plans entail not only a wide range of funding options but also a wide range of execution options as well. The three countries' economic policies, specific cases, and traditions were reflected in these decisions. Rather than focusing on a single issue, Germany takes a more systematic and integrated approach to electric cars and hydrogen. France has a comprehensive approach to hydrogen, but it doesn't subsidise recharging infrastructure for electric vehicles. While Japan's hydrogen planning process is minimal and primarily experimental, the country has taken a more methodological approach to electric cars, despite having very little demand-side assistance. Ad hoc, unexpected adjustments typified Japan's Green Homes Grant deployment, which was poorly supervised and halted after six months. In the public sector, France developed a new rewards programme for creative approaches to pretty much all the energy efficiency measures while continuing to use an entitlement framework to implement more fragmented solutions in private structures. Russia implemented its housing assistance via an already-existing programme, which is modest and homogeneous.

With the exception of Japanese hydrogen, most of these green recovery deployment options build on already-existing strategies and policies, and as a result, funding levels have been boosted and delivery targets have been accelerated. Thus, we can say with confidence that important precedents and productive circumstances greatly influence policy responses to crises. Suggesting that destabilising external shocks might open new possibilities for existing niche inventions is

consistent with social economic revolution theory. Problems should instead be seen more as windows of opportunity that allow for the acceleration of pre-existing trends rather than possibilities for new ones.

There are certain limits to the studies we've done. Because we depended on accessible public data, we were better equipped to investigate the role of strategy rather than real agency in a given situation. Utilizing interviews or data from conducting investigations in the future, future research might acquire a better understanding of the influence of certain policymakers, legislators, and other players on strategic decisions.

In addition to the three nations that were regarded as leaders in green recovery, there is another limitation: when nations throughout the globe are being highlighted, it may imply that they have taken advantage of the COVID crisis to boost green recovery efforts. While certain lowcarbon technologies were accelerated in some areas of the economy, our study shows that even the three most advanced nations did not use their green recovery plans to fundamentally shift their economies toward a greener future.

As the article's results suggest, green recovery pledges are at least in part dependent on the route taken. In addition to these three examples, we believe that nations that address the required three requirements are much more likely to form green recovery plans: a) pre-COVID management in the implementation of environmental sustainability, strategic vision in the manufacture of a wide range of green technology and particularly powerful waste sustainability. Although Russia and Japan are not global leaders in green manufacturing , these three criteria apply to the three nations we examined. It's also worth noting that many other nations (such as the United States, Finland, and the UK) are expected to implement (or enhance) green recovery packages in late 2020 or early 2021. When it comes to the first two criteria and ecological management, China and Japan are doing well, but are still insufficiently dedicated to green recovery. This compares with their more extensive green recovery plans following the 2008/9 economic meltdown.

In many nations throughout the globe, these conditions don't apply as much since they may have a limited amount of budgetary room to expand government expenditure. Why most nations haven't built green recovery strategies is explained in part by this. However, there is still time to enhance green expenditure. The change from short-term assistance programmes to long-term recovery plans is clear evidence that more countries are embracing (or improving) green recovery packages, as highlighted earlier in this post. We are hopeful that future research will expand on

our findings to go further into the specifics of these packages' development, strategic interests, and implementation decisions.

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DESIGNING A RECOMMENDATION SYSTEM FOR SPECIALIZED COURSES FOR THE UNIVERSITY

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Abstract

All universities have compulsory courses in, some of which students have to choose for themselves. This choice will affect the student's further career as they choose not only the subject they are studying, but what they will do soon. I know how difficult it is to choose a topic for myself. The recommendation engine is one of the most popular artificial intelligence applications. Since switching to the Internet, recommender systems have become widely used in everyday life without even being noticed. Many machine learning algorithms can used to implement recommender systems, but this task attracts many researchers from around the world. First, let's consider how to classify k-means.

Keywords: Recommendation system, ml, k-means, subjects, academies

Introduction

Recommendation systems (RS) are widely used in many areas of modern life. They can also be used in education. Universities with a credit system have compulsory and elective courses. The courses, that students must choose are named compulsory, elective courses must be taken by students themselves. Compulsory subjects are primarily aimed at completing research. Electives, on the other hand, are aimed at a narrower discipline. This choice will affect your entire life as the course you complete will determine your future work. From this, we can conclude that this decision is one of the most important. Create an automated system based on this. Of course, the recommendations within the university wall are appropriate. It analyzes and emphasizes the main aspects that influence the successful delivery of the subject and recommends selected students based on this. The main goal of my research is to create a recommendation system for students to help them choose a subject based on the results obtained when they pass a psychological test. This recommender system is built using the latest machine learning algorithm technology. The rest of the paper is organized as follows: Section II describes related courses and recommender system initiatives using different techniques.

The recommendation system proposed for optional course proposals is describ in detail in Section III. The results and conclusions are in Section IV.

Literature review

This article showed how to include a recurrent neural network (RNN) used to predict

behavior while preserving previously observed behavior. In the case of recommender systems, that means a series of sentences without intuitive foresight is too narrow, putting the user in a filter bubble. This article solved this problem. Predict the outcome of the courses offered to students to choose from the one that suit their interests. Create a set of models based on the course catalog (BOW) and another model based on the registration history (course2vec). Performance comparison of two models using validation datasets. Comparing the two models, user findings show a dramatic indifference to RNN policies. However, the machine learning of the course2vec model showed the best results for the task when validated offline. [1].

This article introduces some of the methods used in the course recommendation system. With the help of this system, students can know the approximate results in advance, which helps them choose to study. There is also a table and comparative analysis of the effectiveness of the educational data for each method. Then the best method was selected. And the final version of the recommended system was created. It can already be used in practice. [2].

The course recommendation system is designed to allow students to choose from a variety of subjects. However, the student's choice cannot depend solely on his or her interests. Teachers, peers, and others influence them. Existing rating matrices in the form of interpersonal relationships, rating text, and "user elements" form a multimodal data structure from multiple sources. Therefore, to make recommendations based on these different qualities, need a way to systematically combine the data. Therefore, this article proposes a hybrid recommended model that combines structured network functionality with the use of graph neural networks and interactive student actions with factorization of tensors. First, a structured graphical learning evaluation network is developed using student evaluations to characterize students, courses, commentary texts, grades, and interpersonal relationships. By examining the student's relationship structure, use a neural network with a random walk to create a vectorized representation of the student. Finally, use the Bayesian probability tensor decomposition to examine and predict the scores of students in subjects that are not attending and recognize these personalized traits as the third dimension of the evaluation tensor. Due to the small prediction error and improved recommendation accuracy, the proposed method outperforms other current matrix factorization models and neural networks (RTTF, xSVD++, DSE).[3].

Pakistani universities offer credit programs of all kinds to applicants. Pakistan Virtual University-Developed with the latest information technology. This university offers a choice of a

large number of professions and specialties. Each program has subjects that the student must complete. The chosen course that suits the competencies and interests greatly affects the final grade (CGPA) of the student. In this work, a system for recommending subjects in the Virtual University was created. The system has been tested on 470 courses that are accessible, including simulated data from 2,600 people. As a result, it has been proved that grades are influenced by the average score of the student in the courses already studied and the average score in similar courses. The implemented system and its accuracy were evaluated using the mean absolute error for 100 observations. The MAE was in the acceptable range. [4].

This document describes a hybrid RS that uses Content-Driven Filtering (CBF) and Collaborative Filtering (CF) to propose the most relevant courses for students based on several factors linked to both student and course information. The genetic algorithm (GA) was created to find the best RS configuration, which takes into account the most significant criteria and the remaining factors. The pilot project employed real data from the University of Cordoba's computer science program, comprising data collected from students over three academic years and based on 2,500 records from 95 individuals and 63 courses. The examination of the most acceptable criteria for course suggestions is demonstrated by experimental findings. The experimental findings show the relevance of employing a hybrid model that includes both student and course information to increase the dependability of suggestions, as well as better performance compared to earlier models [5].

Consider all the methods that were used in the works that are described above, as well as to conduct a comparative analysis and show the results of the work. The method proposed consists of several stages: (1) after reading all the resources, identify what technique is used (2) what was dataset used (3) what classification method be used (4) what the result works. To identify methods that will help me in further work, I brought out all the algorithms used, as well as the results of the work in Table 1.

Study	Technique	Dataset	Classifier	Obtained Results	
				Metrics	
Zachary A. Pardos and	Diversity based	student course enrollments at	BOW (div)	unexpectedness	3.550

Weijie Jiang 2020[1]	algorithms (BOW, Equivalency) vs Non-diversity algorithms (Equivalency, RNN)	UC Berkeley from Fall 2008 through Fall 2017		serendipity	3.227
				novelty	3.896
			Analogy (div)	diversity	4.286
			Equivalency (non-div)	successfulness	3.619
				commonality	4.500
H. Thanh-Nhan, N. Thai-Nghe, H. Nguyen 2016[2]	KNN, MF, BMF	Grading system at Can Tho University from 1994 to 2004 in ICT	UserKNN	RMSE	0.998
			ItemKNN	RMSE	0.862
			MF	RMSE	0.862
			BMF	RMSE	0.831
Yifan Zhu, Hao Lu, Ping Qiu, Kaize Shi, James Chambua, Zhendong Ni 2020[3]	xSVD++, DSE, TENTF	Beijing Institute of Technology, BIT-UASET evaluation system	xSVD++	MAE	8.4237
				RMSE	11.9673
			DSE	MAE	7.4385
				RMSE	10.7338
			TENTF (Proposed)	MAE	6.9133
				RMSE	9.5913
Aleem Akhtar 2020[4]	Collaborative Filtering, select	Virtual University 2600 students and 470	VU-CRS	MAE	5.12

	neighbours, predict score	courses data during 4 years			
A. Esteban, A. Zafra, C. Romero 2020[5]	Recommendation System, Collaborative Filtering, Content-based Filtering	Academic survey of University Cordoba, CS, 95 students and 2500 ratings of 63 courses from 2016 to 2018	Proposed hybrid RS	RMSE	0.971
				nDCG	0.682
			CBF with clustering	RMSE	1.224
				nDCG	0.234
			User-based & item-based CF	RMSE	1.166
				nDCG	0.549
			MCSeCF	RMSE	1.595
				nDCG	0.112

Table 1. Results of related works

Based on all of the above, say with confidence that the creation of a recommendation system for the university is very relevant at the moment. The articles that were presented to us will be very helpful in our work since they showed what goals to pursue in our work, what data to collect, what algorithms to use in our work. Analysis of Table 1 shows that all work is aimed at creating a system that can prompt the student as accurately as possible on which subject will be of interest to him based on his choice of previous subjects, the average grade for them, as well as the teacher who teaches the subject.

Method and results

Data structure

Data was taken from an open source as a basis[7]. It consists of 12784 rows and 7 columns about the course: its id, name, usage period in seconds, announced time, full description, completion status, and if the course is out-of-date. In Table 3, the top 5 rows displayed are sorted in descending order by the date the course was released.

	id	Title	Duration (sec)	Release Date	Description	Assessment Status	Is retired
0	prometheusconfiguringcollect-metrics	Configuring Prometheus 2 to Collect Metrics	5071	2021-07-14	A Prometheus deployment is only as useful as t...	None	no
1	kubernetes-creating-custom-resources	Creating Custom Resources in Kubernetes 1	6450	2021-07-14	Kubernetes comes with out-of-the-box support f..	None	no
2	kubernetesmonitoring-scaling-applications	Monitoring and Scaling Applications in Kubernetes	4924	2021-07-14	Organizations these days sit on massive piles ...	None	no
3	getting-started-microsoftazure-computer-vision-api	Getting Started with Microsoft Azure Computer Vision API	2796	2021-07-14	Processing images to get returned information ...	None	no
4	test-taking-skills-microsoft-certifications	Test-Taking Skills for Microsoft Certifications	6464	2021-07-01	Microsoft certification exams test not only yo...	None	no

Table 3. Courses data first 5 rows

Data Pre-processing

After receiving the data, one of the most important steps is the preprocessing of the data. Preprocessing data improves the quality of the data and makes it easier to draw meaningful

conclusions from the data. The process of cleaning up and deploying raw data suitable for building and training machine learning models is called machine learning data preprocessing. My data went through the following steps:

- Remove all null and none values
- Replace characters with empty space
- Leave only alphanumeric
- Remove stopwords
- Replace words with numbers using vectorization functions

The k-means method is a basic supervised machine learning technique that can be used to troubleshoot classification problems. The k-means method stores information only during the training phase, and when new data is received, it is grouped into clusters that closely resemble the new data. Based on the subject description, we have divided all university subjects into specific clusters. The elements in a particular cluster are contiguous. Next, the student describes his or her tendency. For example, he enjoys painting and inventing figures. Here, the recommended system provides him with elements from the first cluster, such as modeling, tools, or animation. The table below (Table 4) compares the different input parameters and outputs of the model using these parameters. After fitting the model with vector data, 30 different clusters are generated and Table 5 contains the top of the list of cluster results with the most important terms. Figure 1 shows how the sum of squares of the error decreases slightly as the size of clusters increases.

Parameters		
Cluster size	8	30
Iteration count	100	500
Centroid initialization	8	15
SSE	7583.8	7015.9
Accuracy	0.73	0.84

Table 4. Model comparison

Cluster 0	Cluster 1	Cluster 2	Cluster 3	Cluster 4

modeling	network	azure	data	test
tools	router	cloud	hadoop	studio
rendering	protocol	storage	science	unit
components	docker	virtual	big	automated
effects	access	aws	course	framework
animation	ccnp	services	analysis	penetration
techniques	comptia	database	visualisation	verification

Table 5. Top of the list of clusters results

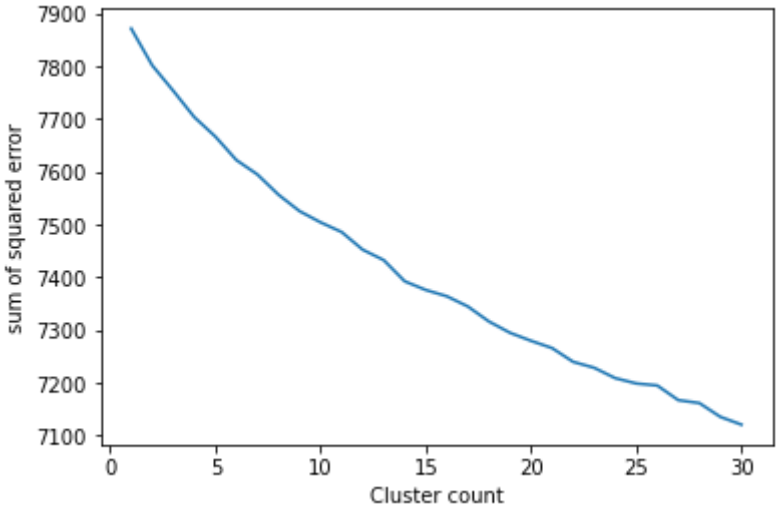

Figure 1. SSE within-cluster size

Conclusion and limitation

Based on all of the above, we are confident that creating a university recommender system is very important at this time. This task will help students find a course that suits their abilities by simply writing down the notes. Our method is to determine a more accurate cluster and output the corresponding rate. We also improved the previous method to get a more detailed clustering model. This model works well when you need to predict a course category with a fairly complete description of the subject and a description of the student's key skills, as the sum of connectivity

and root-mean-squared depends on it. For future work, you can retrieve datasets from SDUs and create university recommender systems.

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