

Create-My-Course: An Automated Course Generator for Self-Paced Programs

Anjana Wijerathne

Department of Information Technology
Sri Lanka Institute of Information Technology Malabe,
Sri Lanka

Buddhika Sandaruwan

Department of Information Technology
Sri Lanka Institute of Information Technology Malabe,
Sri Lanka

Deelaka Fernanado

Department of Information Technology
Sri Lanka Institute of Information Technology Malabe,
Sri Lanka

David Oddugama

Department of Information Technology
Sri Lanka Institute of Information Technology Malabe,
Sri Lanka

Abstract:- Live lectures and uploading recorded lectures to any server are the two conventional methods of distributing lectures to students. Due to the proliferation of new technologies in the modern world, people are gradually switching to the asynchronous learning approach, in which lectures are uploaded to a web server and made available to students at any time and from any location. This solves issues for students who can't get together for a live teleconference at a certain time or who don't possess a computer and must utilize borrowed or public computers to complete the course. However, the issue with the current trend in the globe is that it is not an effective method of learning and cannot be used to produce efficient results. We have discovered that there are a few causes for that after conducting some investigation. Under these conditions, the research presented here suggests using Create-my-course, an asynchronous e-learning platform that encourages active participation from students. When students are found to be inattentive, they are provided with opportunities to engage in a wide range of activities. These activities include segmenting the recorded materials into topic-based sections to make the content easier to understand, providing a summarized lecture note in English, Sinhala, and Tamil, answering questions in three different formats and having an AI assistant that is available 24/7 to reach out to students. With these capabilities, Create-my-course is offered as an all-inclusive system that distinguishes itself from existing e-learning platforms and assists educational institutions in delivering flexible, self-paced, asynchronous learning to its students.

Keywords:- AI, Asynchronous, E-Learning, Machine Learning.

I. INTRODUCTION

In the previous era of learning, students and lecturers used to teach and learn by gathering physically in a classroom. This continued for over a century until recently, when there was a radical advancement in technology where learning was coupled with multimedia with the use of the internet and was called E-learning, which means enabling access from anywhere to every person on this planet. This was a significant breakthrough in the education industry. It has helped people to study what they like or to check their field of interest by watching learning content from various platforms like LinkedIn Learning, Coursera, Udemy, Codecademy, etc [1].

The fundamental goal of the e-learning research domain is to improve the quality of teaching and learning. It is important to accommodate the learning preferences and demands of the students. Effectiveness and efficacy need to be increased. Increasing user accessibility and scheduling flexibility will help students become more involved in the learning process. Around the world, there have been numerous research efforts in the field of e-learning.

The "Create-My-Course" project is mostly asynchronous learning-focused. Asynchronous eLearning may make use of email, blogs, discussion forums, eBooks, CDs, and DVDs, among other technologies. Learners can download materials and access information at any time. Asynchronous learning was more popular among students than synchronous learning since it allowed them to attend online classes whenever it was convenient for them and without interfering with their regular routines.

These platforms paved the way to access lecture materials through mobile phones and computers, enabling people to access them while they were at home without wasting time traveling. The advantage of this technology is that it saves a lot of money [2] for people who were traveling to campus by vehicle and saved time at the same time. But still, most people used traditional learning techniques to deliver lectures to students until the year 2020 when a devastating incident happened in the world. The new virus "Covid Virus" started to spread in every part of the world. The death toll of human lives began to escalate every second. Because of this escalation of the death toll, every government in the world started to isolate every person in their houses to prevent the spreading. This was the triggering point for the E-Learning sector to escalate rapidly.

Every lecturer started to conduct lectures by delivering them through various online platforms to students since the pandemic. [3] To give an effective way of teaching people most platforms have introduced micro-learning, where the lecture gets broken down into small fragments or pills of content, also known as micro-content. This has shown significant progress and efficiency in learning where the majority of people are now using this method of learning because they can gather the learning content part by part and store it in their memory swiftly. The issue with this platform is the background noises because most lecture contents were recorded at the house. Eliminating background noise with segmented lecture videos will give the student a better learning experience.

It is only possible to assess a student's level of comprehension after a lecture through the use of questions. [4] However, there is no tried-and-true method to evaluating the effectiveness of asynchronous learning. This system suggests adding a new function to that platform, which will monitor each individual student's level of knowledge. The majority of students prefer to improve their academic performance by using online tools, and they would like to see a greater emphasis placed on utilizing technology. [5] [6] The majority of students have indicated that they are most comfortable using online quizzes to evaluate their subject-matter expertise. When it comes to manually creating exam questions, educators are often faced with a challenging situation, which is made even more challenging when they have a limited amount of time. A considerable investment of time and effort is required in order to produce test questions that are up to the required standard of quality. At the end of each video is a quick quiz that is automatically generated and serves to test the students' understanding of the content. The student will not be able to go to the subsequent video or activity if they are unable to complete the quiz with a passing grade.

In addition, students need support in order to comprehend how their papers will be graded. Students can gain a better understanding of the type of response that was anticipated of them by looking at old examinations. Students will be able to determine approximately how many points they will obtain using this strategy. When it comes time for pupils to take their actual tests and prepare their responses in

the appropriate manner, this can come in very handy. Students can evaluate themselves by analyzing old papers to find their areas of academic strength and improvement. The accuracy of students' responses will become an increasingly important criterion for evaluating their level of comprehension as well as the quantity of information they have retained from a lecture or lesson. Additionally, it will serve as a method for determining how well students are doing overall with that particular lecture or lesson. Put in place instruments and techniques of evaluation that you can trust. Implement a way to confirm that student responses provided for this component are accurate, and then make sure to convey the actual answers to the students who provided the answers.

Because past questions offer a glimpse into the context of the exam, studying with them is an essential part of the process. [7] One of the most important advantages that comes from studying past exams is that it gives students the ability to predict the subjects that are most likely to be tested on during the forthcoming examination. Examining past paper questions can help students save a substantial amount of time on topics that are not likely to be covered on the test, hence making revision significantly more productive. This is because the majority of classes cover a diverse variety of subjects. Through the use of sample questions, students are able to detect and recognize distinct question categories. It is absolutely necessary to have a solid understanding of the format of questions in order to do well on examinations. In addition, the system should establish a method for supplying pertinent prior exam questions to the part of the lecture that they are covering.

The students have always had trouble following the teachers' teachings on pronunciation since live and recorded lectures are plagued with personal ticks and audible interruptions that make it impossible for them to focus on the verbal components. Some students may have difficulty watching lecture videos because they are frequently interrupted or have trouble understanding the lecturer's voice, which is frequently caused by background sounds. As a consequence of these difficulties, the students may not be able to fully comprehend the material that is being presented in the lecture. Because the lectures that are given to the students are provided in an asynchronous format, and because there may be some students who are unable to understand what the lecturer is saying, it is best to have a method for transcribing the lectures in case issues of this nature arise.

In addition, throughout the lectures, the vast majority of students won't be able to take notes. [8] They are unable to produce their own class notes since it requires a significant amount of labor and there are a significant number of explanations that are complex. The students would not be able to remember the supplemental material that the instructor went through during the course of the lectures but which was essential to the discussion. [9] Some of the pupils are in a truly precarious position as a result of the language barrier. [10] In order to better accommodate the needs of the students, the transcription will be made available to them in

three different languages: English [11], Tamil, and Sinhala. In addition, individuals who are unable to take notes during lectures will have the opportunity to get a lecture note that provides a summary of the material presented as well as the comments made by the lecturer.

There has been much research done in the domain of asynchronous e-learning to improve the engagement of the students within the e-learning platforms. Most of them have not been able to archive the real-time student-teacher interactions in asynchronous platforms as done in Create-my-course. As shown, using a long time to get the feedback on questions due to the nature of online learning, leading to cause a low percentage of students who watch the lecture to the end. For this reason, it is practical to use chatbot based on artificial intelligent to get answers to the questions quicker. According to research conducted by Ranoliya [12] , introduces a chatbot for university-related FAQs that uses Latent Semantic Analysis (LSA) and Artificial Intelligence Markup Language (AIML) [13] to accurately and quickly respond to any question based on the dataset of FAQs. In another research, the authors proposed a bot that converses intelligently for Massive Online Open Courses to text-based responses to the learner's queries. In another research, the authors propose a chatbot using NLP and ML for academic purposes which gives the responses in text mode that can be made used by various educational institutions.

II. METHODOLOGY

The video segmentation module run as an independent module from others and past paper suggestions lecture note, transcribing and finally chat bot runs as a single module. This mechanism helps students to give their full attention while learning the content and enabling to grab important points from the lecture. For this, a comprehensive study was carried out to build this application.

A. Video Segmentation

The video segmentation pipeline is consisting of 3 modules that will be running as a background process and those are as follows,

- *Audio cleansing model.*
- *Topic prediction model.*
- *Video segmentation model.*

First, the uploaded lecture video will be used to extract the audio component from it to send to the cleaning process. In here background noises from the audio will be cleaned by using the noise reduction library in python. With the help of the python noise reduction algorithm called “noisereducer”, time-domain signals like voice, bioacoustics, and physiological signals may now be made quieter. It uses a technique known as "spectral gating," a type of Noise Gate. It computes a signal's spectrogram and then calculates a noise threshold for each frequency band of the signal and noise. To suppress noise, below the frequency-varying threshold, a mask is computed using that threshold. By using this mask background noise will be cleaned from the audio clip.

Secondly, a cleaned audio file will be sent to generate a transcript text file which will be used to discover topics. After transcribing process is finished, the transcript text is used to identify the topics and keywords. To represent the extracted topics in a vector space two different representations are adopted which is a similar approach as [14] two distinct techniques.

➤ *Latent Dirichlet Allocation (LDA):*

For training the LDA model [15], the generated transcript was preprocessed using the python genism library and converted the cleaned text into two fractions of vectors as bigrams and term-document frequency. The trained model then was stunned properly to increase the accuracy. Predicted topics were then pushed into a vector for further analysis

➤ *NLTK rake library:*

It is used to extract keywords from the transcript and as mentioned above method it will be stored in another vector and be used in the video segmentation process.

Finally, OpenCV was used to read the lecture video and the extracted frame was pre-processed using two image processing techniques such as Hue Saturation Value (HSV) and masking to highlight the topic from the frame like shown below,

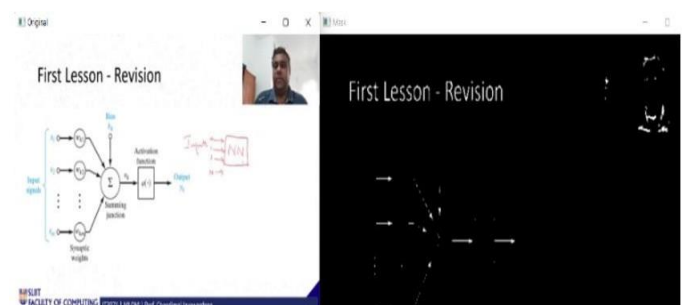


Fig 1:- Comparison of Original and HUE mask frame

Once processed, the topic will be extracted by using a text detection mechanism called an Optical Recognition Model (OCR). In order to make the function more efficient similarity of each frame is calculated using Oriented FAST and Rotated BRIEF (ORB) in open cv [16]. Rather extracting each frame, similarity of 2 frames is checked and the frame which is not similar is sent for processing to make the segmentation process faster shown in Table 1.

	Similarity	Result
Frame1 and Frame 2	Sim <= 0.90	Pass
Frame1 and Frame 2	Sim > 0.90	Ignore

Table 1:- Similarity Table

Extracted words will be analyzed with the topic vector and keyword vector parallelly. Identified segment boundary then will be used for the segmentation of the video.

To minimize user wait period, all of the aforementioned processes will be executed in the background process, and the user will be alerted by an automatic email when they are completed.

B. Generate transcription and lecture note

Before starting the process of generating transcription have to upload lecture videos by the lecturer.

➤ Extract audio and get transcription.

Using moviepy library extract the audio from the uploaded lecture video. [17] Separate into several audio chunk files to minimize the noisy data. Get the transcription text files by using speech_recognition library which were separated audio files.

➤ Grammar correction.

Above extracted transcription is Grammatically incorrect. So that "Create_MY_course" use the `vennify/t5-base-grammar-correction` pre-trained model which is provide by happy transformers.

➤ Summarization.

Text summarizing is a strategy for producing an accurate, succinct summary of lengthy texts while concentrating on the sections that provide relevant information and keeping the overall meaning intact. Long texts are intended to be condensed into manageable chunks; this can be difficult and expensive to accomplish manually. Automatic text summarization accomplishes this. After preprocessing the data and create the table of words frequency. Using NLTK tokenizer, tokenize the textual data in to sentence wise. Get weighted frequencies to the tokenize sentences and calculate the threshold values. Finally based on the threshold values summarize the sentences

➤ Translate to Sinhala and Tamil.

Translations of the Tamil and Sinhala languages will be generated for "Create-My-Course." The Google Translation Library was applied for that in this. After the transcription is created, it will be translated into Tamil and Sinhala. The transcription can then be downloaded by the user based on their preferences.

C. Generate transcription and lecture note

Fill in the blanks (FBQ), multiple choice questions (MCQ), and WH type questions are the four main question types that our system generates. Below is a description of how the questions mentioned above are created. [18]

➤ MCQ.

"Create-My-Course" makes the assumption that words taken out of the text, which was produced via the "Generate transcription and lecture notes automatically" component, will produce excellent responses to MCQ questions. The pre-trained algorithms "T5ForConditonalGeneration" and "T5Tokenizer" are used by "Create-My-Course" to create Multiple Choice Questions and their associated answers. Complete Text-to-text-transfer transformer (T5) model to generate multiple choice questions concurrently by just providing the sentence. Extracted nouns, verbs and pronouns

b using define functions. "Create-My-Course" use the wordnet to extract distractors. After the training of the model, E-pod uses discriminators to turn sentences into questions that have the proper and incorrect answers.

➤ Fill in the blanks

Same as Fill in the blanks questions generating use that words taken out of the text, which was produced via the "Generate transcription and lecture notes automatically" component. Separate into words and generate TF_IDF score for each and every word in the input text. Get average TF_IDF score and then Get sentences for given depth.

➤ WH questions

Also, when making short questions (WH questions), utilize transcription that has already been prepared. Use the Qgen library under `questgen` to generate questions. Short answer questions will be generated by calling the `predict_shortq` function.

➤ Boolean questions

Use the transcription that was generated as input here as well. For question generation, the BoolQGen library will be utilized. The "predict boolq" method is used to create Boolean questions, while the "predict answer" method returns the correct answers.

D. Answer Evaluation

This component's objective is to evaluate student answers in the format of essays and short answers applying NLP techniques. The evaluation method is based on contrasting the students' answers with the lecturer's sample answers and evaluating the accuracy of the students' answers based on how similar both resemble each other. The concept of text similarity is utilized in this comparison.

E. Past Paper suggestion

"Create-My-Course" comes with past paper question suggestion technique give support to the students. Before the past paper suggestion process begins, the past paper must be uploaded by the lecturer, and by using the uploaded past paper pdf files, the text file will be transferred from the uploaded pdf files. Question.csv dataset is used and, in order to suggest the most suitable past paper questions which are related to video part. Implemented the three models. Used Word2vec, Spacy library and SentenceTransformer models and get the outputs. As well as. In here Extract best indices using cosine similarity.

F. AI Chat bot

Create-My-course comes with AI based chat bot that assists the students to evaluate their questions based on the lecture contents and which is capable to works as an open domain chat bot that can answer the day-to-day questions involved in human conversations using NLP Methods. In here chat bot responses depends on the two different models based on the inputs where Create-My-course enables the user to input different types of user inputs and those are as follows,

➤ Text similarity model

➤ Text identification model

Create-My-course consists of a question bank of MCQ and WH questions. The Question evaluation related to the academic content is based on the comparing the student question with the question bank based on their similarities and provide the best suitable answer as an output. This comparison is done using the concept of Text similarity which is a combination of semantic similarity and lexical similarity. Prior to the comparison, based on the user input as an image, text is extracts from the image using an OCR module which is consists of sub-processes as text localization, character segmentation, character recognition and post preprocessing to identify as accurately as possible. As the Create-My-course bot can assist in open domain, bot understands the requirement of the user, based on theintents and the entities of the user input and response with accurate answer based on the similarity using the LSTM model [19]. Therefore, under both close domain and open domain responses of bot depends on the two features of term weighing and the semantic vector similarity taken into consideration.

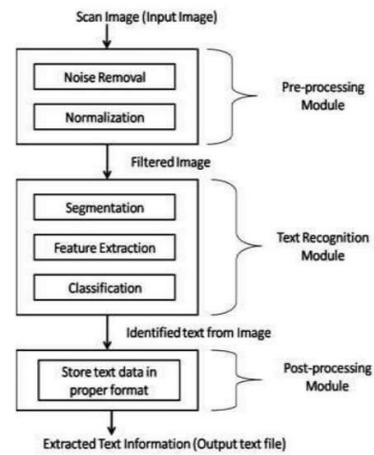


Fig 3:- Text recognition architecture: . sourced from [7]

III. RESULTS AND DISCUSSIONS

A. Cleaning audio and video segmentation

To demonstrate the results and techniques presented in this study for segmenting lecture videos based on topics utilizing our suggested system, which demonstrates a better and more successful strategy than previous ways. The noise reduction method employs the parameter tuning approach to minimize ambient noise without harming the speaker's voice. There are various video segmentation algorithms available around the globe, and one of the more successful approaches is to identify the segmentation borders using speaker audio. However, because of the significant computer resources required for the algorithm to function, this approach was not used in this study. In this example, an OCR approach with minimal resource utilization was chosen for video segmentation. Although the OCR methodology for video segmentation can get the job done, the aforementioned method takes longer to finish the operation. To solve this problem, two techniques were taken. They are also lowering the video's frame rate and employing the ORB similarity technique in OpenCV. These two strategies contributed to a 70% reduction in time. The outcomes of these proposed remedies are depicted in the figures below,

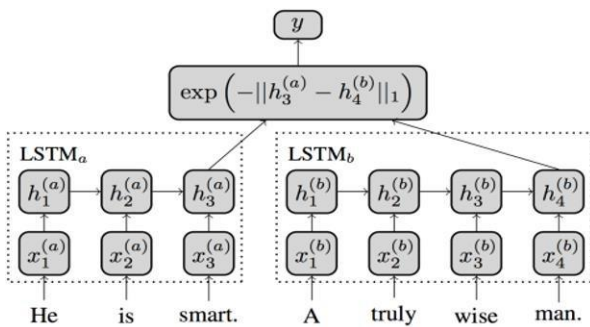


Fig 2:- MaLSTM model

Create-My-course bot accepts user inputs in two different structures as text and image. For the user inputs as images, OCR model [20] is uses to extract the text in the image using the tesseract python library which consists of Convolutional Neural Network to recognize an image containing characters. The noise present in the input image is removed using the gaussian filter to increase the probability of accurate text recognition as it is a vital aspect when generating an accurate output.

Normalization is then performed to generate characters with identical size, alignment, and slant. Afterwards The scanned document is then turned into a grayscale image to complete the binarization process that transforms grayscale photos into binary ones to easy ease the analysis process. After the image completes its preprocessing, filtered image feed into LSTM model which is a sub form of RNN model to recognize sequence of characters accurately from the vital data retrieved from the raw. Finally, categorization was accomplished by identifying each character and assigning it to the appropriate character class, so turning the text to a machine-readable format using the support vector machine

```

[
  {
    "topic": "Introduction",
    "start_time": 0.0,
    "end_time": 12.8
  },
  {
    "topic": "First Lesson Revision",
    "start_time": 12.8,
    "end_time": 254.5
  },
  {
    "topic": "Classification Problems",
    "start_time": 254.5,
    "end_time": 447.0
  },
  {
    "topic": "Linear Separability",
    "start_time": 447.0,
    "end_time": 941.3
  },
]
    
```

Fig 4:- Video segments boundaries

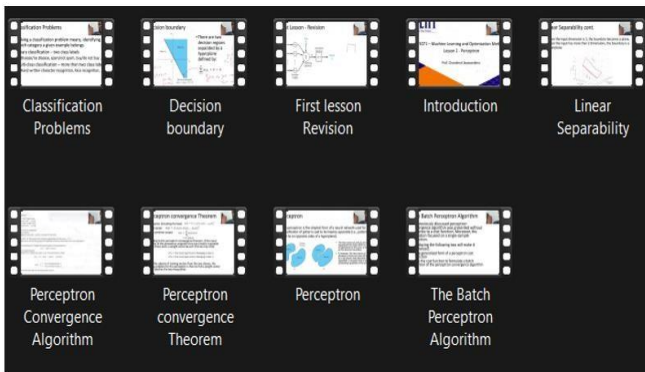


Fig 5:- Video segments according to topics

B. Generate transcript and lecture note

The functionality of automatic transcript generation and summary generation is provided by "Create-My-Course" using moviepy and Tf-Idf methods, which have been trained to an accuracy of 93%. Additionally, grammar correction is also done through this part. The produced transcription was then translated into Tamil and Sinhala.

Figure 6 depicts the English transcription, whereas Figure 7 depicts the translated Tamil transcription. Figure 8 illustrates the translated Sinhala transcription. The system enables instructors to check automatically generated summaries for accuracy.

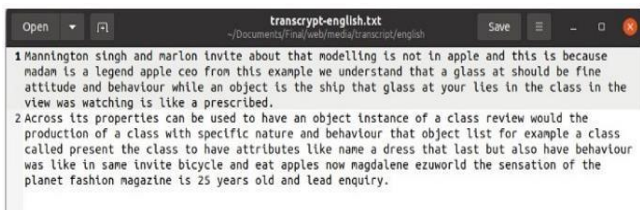


Fig 6:- English Transcription



Fig 7:- Tamil Transcription



Fig 8:- Sinhala Transcription

C. Question generation and past paper suggestion

➤ Question generation

MCQ, FBQ, True-False, and short answer questions are all included in the "Create-My-Course" question bank. A constructed models were trained to obtain an accuracy between 90-92% for FBQ and MCQ keyword identification. The questions will be generated based on the transcription that was produced. A generated MCQ with distractions is shown in Fig. 9, whereas generated Boolean questions are shown in Fig. 10. FBQ-style questions that were developed are shown in Figure 11; short answer questions were generated in Figure 12. Using "Create-My-Course," lecturers can edit and revise previously prepared quizzes before publishing them.

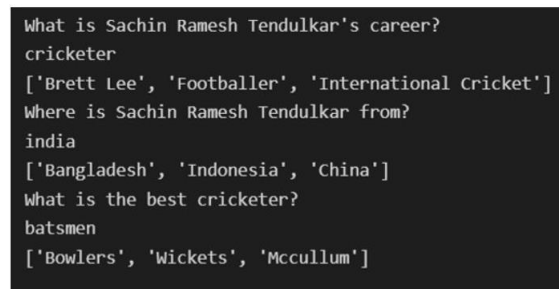


Fig 9:- MCQ Questions

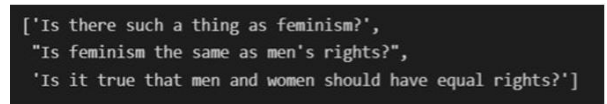


Fig 10:- Boolean Questions

	sentences	avg tfidf per word	answer	score
6	Machine _____ (ML) is a field of inquiry de...	0.063703	learning	0.024095
7	Machine _____ (ML) is a field of inquiry de...	0.063039	learning	0.023844
10	Machine learning (ML) is a field of inquiry de...	0.063703	machine	0.019276
11	Machine learning (ML) is a field of inquiry de...	0.063039	machine	0.019075
3	Machine _____ (ML) is a field of inquiry de...	0.047690	learning	0.018038
0	Machine _____ (ML) is a field of inquiry de...	0.045388	learning	0.017167
4	Machine _____ (ML) is a field of inquiry de...	0.044498	learning	0.016831
15	Machine learning (ML) is a field of inquiry de...	0.063703	data	0.014457
8	Machine learning (ML) is a field of inquiry de...	0.047690	machine	0.014431
1	Machine _____ (ML) is a field of inquiry de...	0.037823	learning	0.014306
5	Machine _____ (ML) is a field of inquiry de...	0.035599	learning	0.013465
9	Machine learning (ML) is a field of inquiry de...	0.044498	machine	0.013465
2	Machine _____ (ML) is a field of inquiry de...	0.027811	learning	0.010519

Fig 11:- Fill in the blanks Questions

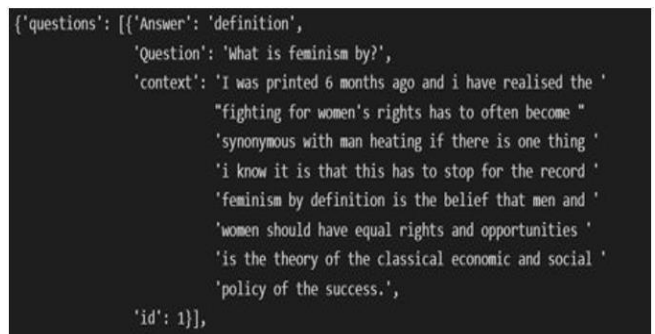


Fig 12:- Short Answer Questions

D. Past Paper Suggestion

The strategy of suggesting past paper questions is used to assist students with their tasks and to encourage them to complete the past papers. A built-in model was trained to achieve a 93.67% average accuracy for past paper question suggestion. The questions will be suggested based on the generated questions that was produced. It was completed after comparing generated questions with past exam questions. The output of suggested past paper questions is displayed in Fig. 13.

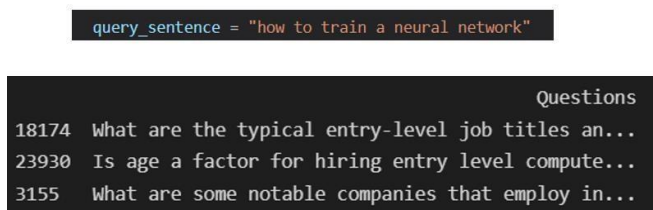


Fig 13:- Suggested Past Papers

E. AI Chat bot

To train the MaLSTM model used by the "Create-My-course" AI assistant, the Shard dataset was used. Using an NVIDIA GPU, we trained on 80% of the data and validated with 20%. After 500 epochs, the model attained an accuracy of 0.7985, a val loss of 0.1400, and a val accuracy of 0.7458. Table II shows some sample sentence pairings from the Shard test data, and the model is able to estimate the level of semantic similarity between them with an accuracy of 80.95%. Table 2 indicates MaLSTM predictions (ps) and genuine similarity (ts) (1–5).

Sentence 1	Sentence 2	ts	ps
How about the weather?	How is the weather today	4.5	4.7
What is step by step guide	What is the step-by-step guide to invest in share market	2.4	2.6

Table 2:- Results of the text localization algorithms

For text recognition of the image inputs in the create-my-course ai assistant, a TDM_IACS algorithm [21] and Text hunter algorithms were performed to localize the text embedded in the image. In almost all cases, precision was higher than recall and the highest performance were TDM_IACS algorithm that has a recall of 62.57 with 85.46 Precision. To fine tune the word recognition task, normalized edit distance was used. In Table 3, it presents the findings that obtained from both participating algorithms. It gives the findings in the form of the total edit distance, which is derived by adding together the normalized edit distance for each ground truth word and the recognition result that corresponds to it.

Method	TED	Recognition (%)
OCR	187.52	54.88
KAISE AIPR	258.92	30.74

Table 3:- Results of word recognition algorithms

IV. CONCLUSION AND FUTURE WORK

This research was done with the primary goal of fixing the issues inherent to the asynchronous e-learning format, most notably the lack of instructor-student communication. By delivering course materials, tracking students' attention in real time, and giving them exercises to complete when their focus wanders, the study was able to successfully boost student engagement in asynchronous e-learning.

"Create-my-course" uses a wide range of activities to accomplish the aforementioned goals, including the segmentation of lengthy recorded materials, the generation of automatically generated summaries that are available in English, Sinhala, and Tamil, the generation of multiple question types, Boolean question generation, and short answer generation, as well as an AI assistant that is available around the clock to answer students' questions without any delay. All of these activities collectively help to improve students' engagement while they are learning, which is In the course of this study, a number of OCR models, CNN models, LSTM models, and language models were deployed, and each of these models was put through its paces by being evaluated using data that had not been seen before. The solution that is suggested in this study is suitable for usage in asynchronous e-learning environments, such as those seen in secondary and postsecondary education settings. The accuracy of the models that were utilized in this research will continue to be enhanced as part of future work in order to achieve higher performance. In addition, the system will be improved by the addition of new features, which will result in a higher level of engagement among students and a more user-friendly presentation of content to students.

REFERENCES

- [1]. B. Alojaiman, "Toward Selection of Trustworthy and Efficient E-Learning Platform," IEEE Access, pp. 9-10, 2021.
- [2]. D. Dwidienawati, S. B. Abdinagoro, D. Tjahjana and D. Gandasari, "E-Learning Implementation during The COVID-19 outbreak:The Perspective of Students and Lecturers," Journal of the Social Sciences, vol. 48, no. 4, pp. 1190-1199, 2020.
- [3]. T. Muthuprasad, S. Aiswarya, K. S. Aditya and K. Girish , "Students' perception and preference for online education in India during COVID -19 pandemic," Social Sciences & Humanities Open, vol. 3, no. 1, 2021.
- [4]. "QUESTIONING STRATEGIES," UNIVERSITY OF ILLINOIS URBANA, [Online]. Available: <https://citl.illinois.edu/citl-101/teaching-learning/resources/teaching-strategies/questioning-strategies>.
- [5]. D. Schaffhauser, "Survey: Most Students Say Online Learning Is as Good or Better Than Face-to-Face," Campus Technology, 2018.
- [6]. L. McKenzie, "Students Want Online Learning Options Post-Pandemic," Inside Higher Ed, 27 April 2021. [Online]. Available: <https://www.insidehighered.com/news/2021/04/27/sur>

- vey-reveals-positive-outlook-online-instruction-post-pandemic.
- [7]. B. d. Doreen , Study Skills For Dummies, John Wiley & Sons, 2009.
- [8]. KILIÇKAYA, Ferit ; ÇOKAL-KARADAŞ, Derya, "The effect of note taking on university students' listening comprehension of lectures," 2009.
- [9]. Xu, Chengpei ; Wang, Ruomei ; Lin, Shujin ; Luo, Xiaonan ; Zhao, Baoquan ; Shao, Lijie; Hu, Mengqiu, "Lecture2Note: Automatic Generation of Lecture Notes from Slide-Based Educational Videos," International Conference on Multimedia and Expo (ICME), 2019.
- [10]. Kasthuri, M.; Kumar, S. B. R.; "Rule Based Machine Translation System from English to Tamil," World Congress on Computing and Communication Technologies, pp. 158-163, 2014.
- [11]. Wijerathna, L; Somaweera, W L S L; S L , Kaduruwana; Wijesinghe, Y V ; De Silva, O I ; Pulasinghe, K ; Thellijagoda, S, "A Translator from Sinhala to English and English to Sinhala (SEES)," International Conference on Advances in ICT for Emerging Regions (ICTer2012), 2021.
- [12]. Ranoliya, . B. . R. N. and S. , "Chatbot for university related FAQs," 2017.
- [13]. W. R. and E. , "Parsing the Turing Test Philosophical and Methodological Issues in the Quest for the Thinking Computer," 2009.
- [14]. D. Galanopoulos and V. Mezaris, "Temporal Lecture Video Fragmentation Using Word Embeddings," in First Online: 11 December 2018, thermi, 2018.
- [15]. S. Louvigné, J. Shi, Y. Kato, N. Rubens and M. Ueno, "A corporal and LDA analysis of abstracts of academic conference papers," in Proceedings of the 2013 International Conference on Advanced Mechatronic Systems, Luoyang, 2013.
- [16]. V. R. K. K. a. G. B. Ethan Rublee, "Orb: an efficient alternative to sift or surf. In Computer Vision (ICCV)," in IEEE International Conference, Barcelona, 2011.
- [17]. N. Kross, "Editing Video with Python + MoviePy," Section, 2021. [Online]. Available: <https://www.section.io/engineering-education/video-editing-python-moviepy/>.
- [18]. Divate, Manisha ; Salgaonkar, Ambuja, "Automatic Question Generation Approaches and Evaluation Techniques.," 2017.
- [19]. j. Mueller and T. A, "Siamese recurrent architectures for learning sentence similarity," in 30th AAAI Conf. Artif. Intell. AAAI 2016., 2016.
- [20]. S. . K. Adyanthaya, "Text Recognition from Images," in INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY (IJERT) NCCDS, 2020.
- [21]. G. A. B. L. Y. J. B. and S. , "Text location in complex images," 2012.