IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
Impact Factor: 7.53
Volume 4, Issue 2, May 2024

AI Based IT Training System

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Abstract: *Retaining learner engagement is a major challenge in online learning environments, which is even more intensified with learning spaces increasingly built by combining resources from multiple independent sources. Narrative-centric learning experience has been found to improve learner engagement by several researchers. Towards this end, we propose an AI-based approach that generates auxiliary learning content called narrative fragments which are interspersed into the learning pathways to create interactive learning narratives. The proposed approach consists of the automatic generation oftwo types of narrative fragments– overviews of the learning pathway segments and reflection quizzes or formative assessments from learning resources in any format including open educational resources. Thepipeline for the generation of the narrative fragments consists of various components based on different semantic models and a natural language generation (NLG) component based on a pre- trained languagemodel GPT-2 (Generative Pre-trained Transformer 2). Automation enables the generation of narrative fragments on the fly whenever there are changes in the learning pathway due to the need for reiteration of concepts, pre-requisite knowledge acquisition, etc., enabling adaptability in the learning pathways. The proposed approach is domain agnostic which makes it easily adaptable to different domains. The NLG model is evaluated using ROUGE scores against several baselines. Automatically generatednarrative fragments are evaluated by human evaluators. We obtained encouraging results in both cases.*

Keywords: Personalized Learning Paths, Adaptive Content Delivery, Interactive Learning Tools,Real-time Feedback and Support, Predictive Analytics for Learning Outcome

I. INTRODUCTION

AI plays a huge role in e-learning. Artificial intelligence is becoming more aware of what users think and do. It can analyze what kind of content users prefer and consume. Moreover, today, it is able to processdata and provide tailored-made solutions. For example, some AI-powered AI based training model (ATM)platforms advise users what course to take to fill in the knowledge gap, providing needed content on the given topic.E-learning can be significantly enhanced with Artificial Intelligence. Learners and educators have been increasingly relying on the Internet for education. The prevalence of the COVID-19 pandemic has increased this reliance even more. While ubiquitous online learning platforms such as MOOCs (Massive Open Online Courses) have massively benefited the student community . AI plays a huge role in e-learning. Artificial intelligence is becoming more aware of what users think and do. It can analyze what kind of content users prefer and consume. Moreover, today, it is able to process data and provide tailored-made solutions. For example, some AI-powered AI based training model (ATM) platforms adviseusers what course to take to fill in the knowledge gap, providing needed content on the given topic. E- learning can be significantly enhanced with Artificial Intelligence. The AI-based approach for the generation of learning content enables adaptive learning by generating content dynamically according tothe learner driven changes.

II. LITERATURE REVIEW

In this section, we discuss existing approaches in the area of engagement in large scale learning environments and automatic learning content generation.

2.1 Engagement in learning environments

Various approaches are proposed to increase learner engagement by adding external interventions to the learning pathways based on the learners' activities (Anderson et al., 2014; Borrella et al., 2019; Ortega-Arranz et al., 2018).

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Borrella et al. (2019) propose anapproach to identify learners at risk of dropping out from a course and send out tailored encouragement emails to at-risk learners. Anderson et al. (2014) study different ways of characterising students' engagement with MOOCs and propose the design and deployment of badges to produce incentives for activity and contribution. Ortega-Arranz et al. (2018) present a proposal of a system supporting the design, implementation and enactment of redeemable rewards. While these approaches provide interventions to increase learner engagement, they are independent of the learning content. Whereas our proposed suite ofAI-based approaches generates learning content based on the text of the learning resources and adds themto the learning pathways, thereby creating interactive learning narratives which help in increasing studentengagement (Laurillard et al., 2000; Plowman et al., 1999). Recently, there have been studies in the direction of integrating learning analytics based student models of ITS into MOOCs to increase learner engagement (Aleven et al., 2015; Baneres et al., 2016). However, constructing pedagogically effective tutoring systems has been widely recognised as a challenging problem (Murray, 2003; Sottilare et al., 2012). The complexity increases manifold when the large scale of MOOCs is considered.

2.2. Automatic learning content generation

In this work, we propose the automatic generation of twotypes of learning content: Overviews and Reflection Quizzes. We discuss related work around both these areas in the remaining part of the section. Our proposed approach of Overview generation might resemble with that of summarisation (El-Kassas et al., 2021; Gupta & Gupta, 2019; Lewis et al., 2019; Paulus et al., 2017; Radford et al., 2019; Raffel et al., 2020) or multi-document summarisation (Haghighi&Vanderwende, 2009; Kumar & Salim, 2012; Lebanoff et al., 2018; Liu &Lapata, 2019), since both Overview generation and summarisation shorten and abstract out information from a substantial sized input source. However, Overviews have a different purpose. They provide an outline of what the learner can expect to learn in the learning pathway. Unlike summaries, Overviews need not be complete in their coverage but should be able to provide important bits of information or glimpses of the upcoming learning pathway. As far as we know, the Overview generation of the learning pathways or a sequence of learning resources is a unique concept and is unexplored. Most of the works on learning content generation discuss automatic question generation. Automatic question generation is itself a well studied topic, however, it is still a challenge toautomatically generate good quality questions from a given text, more so, when the text is non standardised or noisy as could be the case with the open educational resources. Approaches to automaticquestion generation that are neural network based (Chan & Fan, 2019; Liu et al., 2020; Pan et al., 2019; Steuer et al., 2020) and graph based (Chen et al., 2019; Lukovnikov et al., 2019), use various methods such as pre-trained transformers over knowledge graphs (Lukovnikov et al., 2019), Reinforcement Learning and Graph Neural Networks (Chen et al., 2019), answer identification techniques (Steuer et al.,2020) and GPT-2 (Liu et al., 2020) for sentence or span selection. The sequence to sequence model usingBERT proposed in (Chan & Fan, 2019) implicitly identifies question-worthy spans within the passage using the attention mechanism (Pan et al., 2019). The selected span or sentences are then converted to questions. The disadvantage of sentence or span extraction from the learning resources is that whenever there is no "question appropriate sentence" in the learning resource, there is no question generation. Steueret al. (2020) claim that only a fraction of such statements can generate a question. This is an even biggerproblem in open learning resources such as ours, which may have text with a lot of noise and in a non- standard format. Another advantage of our method of generating definitions for question formation is thatthe generated definitions may have a different vocabulary and a different way of defining the same conceptas compared to the text in the learning resources, which is an important aspect in generating assessments.

III. EXISTING SYSTEM

The existing system is designed to generate definitions for key-phrases by creating multiple options andselecting one based on probabilities. It employs semantic similarity to extract key-phrases and determinethe most suitable definition. In terms of question generation, the system utilizes neural network and graph- based methods to automatically create high-quality questions from diverse text sources. Human evaluations play a critical role in assessing the quality and effectiveness of the generated content, ensuringthe accuracy and relevance of the Natural Language Generation (NLG) system. The system's focus on producing informative and engaging learning materials underscores its potential to enhance educational experiences through automated content creation noising schemes. Learners and educators have

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been increasingly relying on the Internet for education. The prevalence of the COVID-19 pandemic has increased this reliance even more. While ubiquitous online learning platforms such as MOOCs (Massive Open Online Courses) have massively benefited the student community at large online learning also suffers from issues such as high dropout rates, dearth of learner motivation, and lack of engagement. WhileMOOCs generalise on the familiar experience of classroom lectures in the online space, there are severalattempts to rethink and reinvent learning experiences for online learning. Technologies like ITS (Intelligent Tutoring System) recognise the potential for enhancing learner engagement by curating personalised learning pathways.

Fig 1. Learning Management System

IV. PROPOSED SYSTEM

In our work, we propose a Natural Language Generation model to generate a question worthy sentence instead of relying on selecting a sentence that can be transformed into a question. As far as we know, thisis a unique method of question generation and has not been studied in the literature. The advances made in NLG with language models such as GPT-2 have opened up the possibility of generating text in the desired format, thus enabling content generation for any given educational resource. In our proposed approach of narrative fragment generation, the learning resources can be in any format that can be converted to text such as videos, PDFs, presentations, notes, blogs, interactive web etc. They need not be in a particular/standard format or need any additional meta-data, unlike many AI-based learning environments which require learning resources in a particular format. Automatic question generation for a specific domain is more prevalent than generating questions in a domain-agnostic manner.

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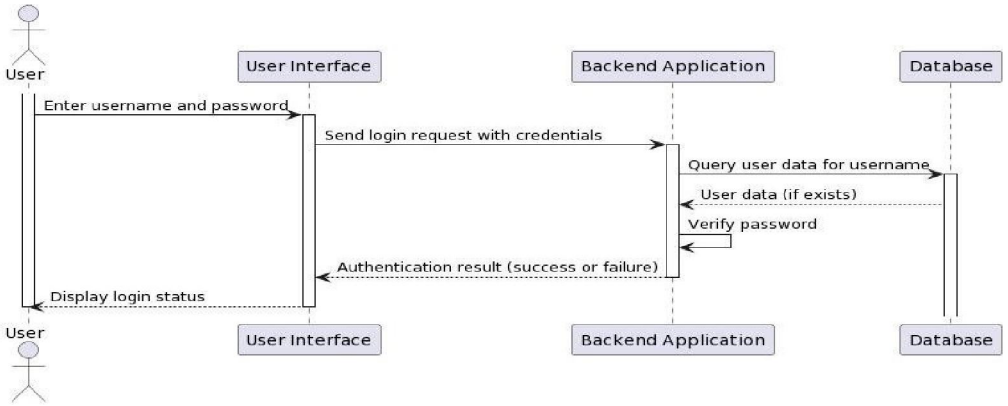

Fig 2. Detailed User log in and processes

Objectives:

- Implement a Natural Language Generation (NLG) component based on the pre- trained language model to facilitate the generation of linguistically coherent and contextually relevant Quiz questions.
- Ensure that the automated generation of narrative questions that occurs in real-time, allowing for adaptability in learning pathways in response to changes, reiterations of concepts, or the acquisition of prerequisite knowledge.
- Assess the NLG model's performance using ROUGE scores as a metric, comparing it against several baseline models to demonstrate its effectiveness in generating high- quality quiz.
- Integrate adaptive quiz components into the learning pathways, dynamically adjusting the difficulty and content based on the user's performance to assess their understanding.
- To Implement an algorithm that analyzes the user's quiz performance and suggests suitable courses based on the number of questions answered correctly, tailoring recommendations to individual learning needs.

V. METHODOLOGY

In our work, we propose a Natural Language Generation model to generate a question worthy sentence instead of relying on selecting a sentence that can be transformed into a question. As far as we know, this is a unique method of question generation and has not been studied in the literature. The advances made in NLG with language have opened up the possibility of generating text in the desired format, thus enabling content generation for any given educational resource.

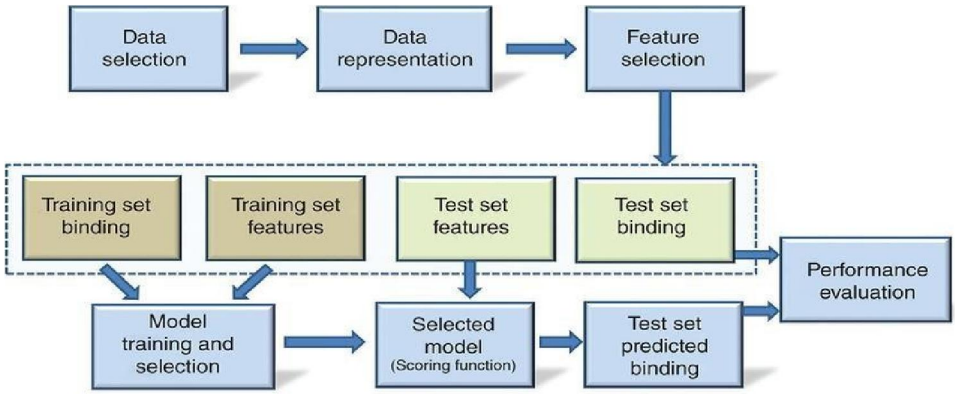

Fig 3. System Architecture

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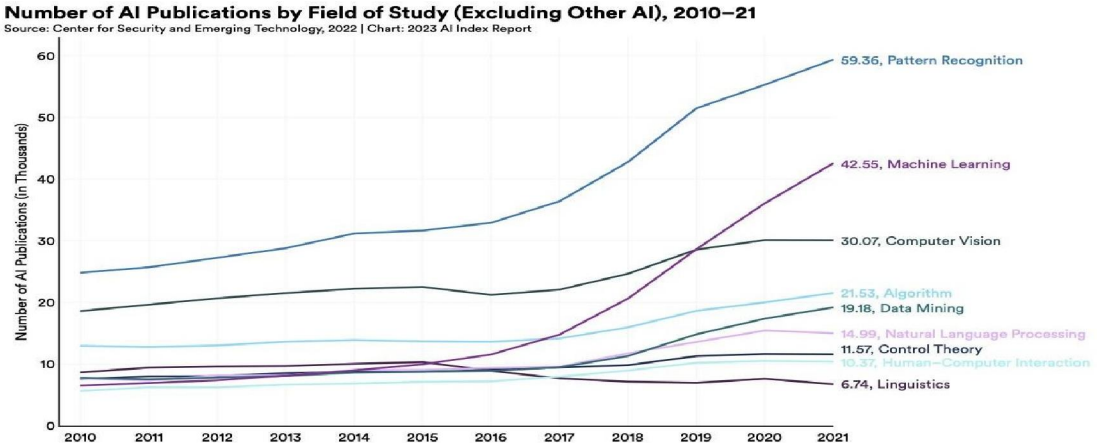

Fig 4 . Study Analysis

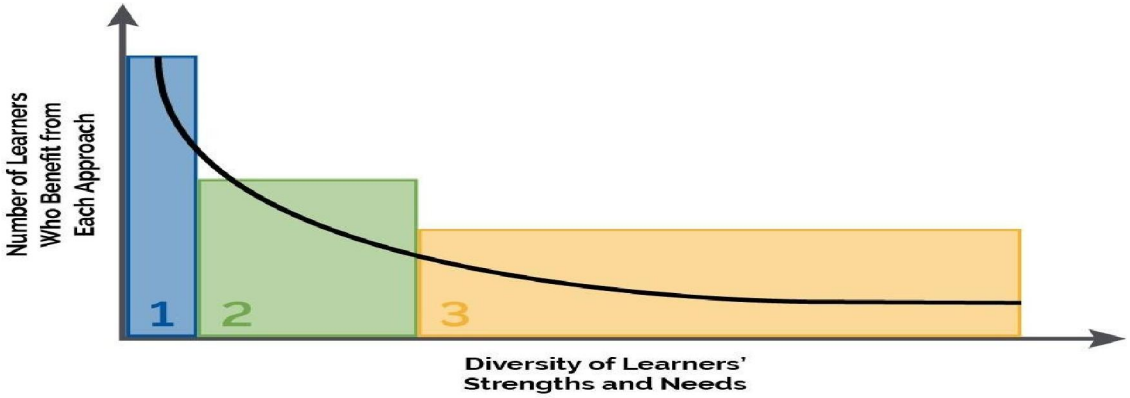

Fig 5. : The long tail of learner variability

5.1 Outcomes of the Proposed System

A. AI Provides Employees with Real-Time Assistance

AI can act as a virtual tutor, answering questions, thereby significantly easing the whole learningprocess. One of the main problems when learning is the inability to get rid of doubts as soon as they appear in our minds. Sometimes it may be "fear of looking stupid," so students cannot get advice from the teacher due to their insecurity. It is highly important students could ask questionsthat need to be quickly answered. Otherwise, it will only complicate the learning process.

By integrating AI into e-learning courses, it is possible to avoid the need to ask teachers or searchon the Internet for the right answer every time there is a little confusion or doubt during the learning. All that students have to do is to ask AI and get a needed answer.

B. AI Solves Problems with Content's Language

Natural Language Processing is a subfield of AI, which is focused on enabling computers to understand and process human languages. Often people learn something in a foreign language. The mother tongue depends on the country where the person has grown up, so it is impossible tocreate a learning course in all widespread languages. It takes too

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much time and effort. How often did people wish to talk to their tutors in their native language? Or to communicate with ane-learning platform in a language they prefer? AI can fulfill these desires.

Once you have integrated your e-learning courses with the AI assistant, people can ask questionsand clarify details in a preferred language. This will make learning much easier and save time, making learning even more attractive and effective. AI can provide users with content in the language they prefer.

C. AI Enhances Content Accessibility

AI also greatly assists people with disabilities. For example, Microsoft Seeing AI. This free application uses the power of AI to help blind people. It can read texts, recognize signs, describe scenes, define currencies, and identify people standing in front, even emotions on their faces.

AI can play a key role in the training of employees with disabilities. AI can convert spoken language into transcription, thus helping hearing-impaired people easily understand the subject of a discussion.

D. AI Helps Generate Unique Content

In AI, there are always new advances and achievements regarding new content generation. For example, the short sci-fi film Sunspring was fully written by AI, including the title and the wholesong. But this is nothing compared to what may happen in the next years.

Interestingly, AI is already being used to obtain responses using existing online learning resources. In the nearest future, AI will be applied to generate all content of an e-learning course,easing the teachers' work.

E. AI Helps Personalize Learning

Providing the same content to each learner is a very common approach in corporate learning. However, it may be quite time-consuming for an instructor to meet each learner's needs. But theprinciple of "one size fits all" does not work anymore, as everyone has their learning style and pace.

AI tracks a person's previous performance, analyzing constantly coming data to tailor current learning material. AI monitors learners' progress, identifying areas where each learner is lackingin skill and providing them with appropriate materials. In such a way, AI personalizes students'education.

VI. CONCLUSION

In conclusion, The AI Based training System aims to improve online learning by using artificial intelligence to create a more personalized and engaging experience. The combination of narrative fragments, adaptive quizzes, and course recommendations is designed to address common issues in online education. By using advanced language technology and adapting quizzes based on user performance, the system strives to make learning pathways more responsive and tailored to individual needs. The project's flexibility across different subjects ensures its usefulness in various learning contexts. The integration with existing learning systems makes deployment and management user-friendly. The adaptive quiz system and course recommendations empower learners to navigate their educational journey more effectively, receiving immediate feedback for continuous improvement. The project's success will be measured not only through metrics like ROUGE scores but also by considering human evaluations, ensuring that the generated content is not only technically effective but also meaningful and relevant to users. As the project evolves, user feedback will play a crucial role in refining and enhancing the system.In essence, this project envisions a future where online learning is not just about information transfer but a dynamic and personalized experience. By leveraging AI, the goal is to contribute to the ongoing improvement of online education, making it more adaptable, interactive, and beneficial for learners worldwide.

REFERENCES

[1.]Ackley, D. H., Hinton, G. E., & Sejnowski, T. J. (1985). A learning algorithm for Boltzmann machines. Cognitive Science, 9, 147–169.

[2.] Aldowah, H., Al-Samarraie, H., Alzahrani, A. I., & Alalwan, N. (2020). Factors affecting student dropout in moocs: A cause and effect decision-making model. Journal of Computing in Higher Education, 32, 429–454.

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[3.] Aleven, V., Sewall, J., Popescu, O., Xhakaj, F., Chand, D., Baker, R., Wang, Y., Siemens, G., Rose ,C., & Gasevic, D. (2015). The beginning of a beautiful friendship? Intelligent tutoring systems and moocs. In International conference on artificial intelligence in education (pp. 525–528). Springer.

[4.] Bennani-Smires, k.. Musal. C.. Hossmann. A.. Baeriswyl, M.. &Jaggi, M. (2018).Simple unsupervised keyphrase extraction using sentence embeddings. In Proceedings of the 22nd conference on computational Natural Language learning (pp. 221-229).

[5.]Baneres, D.. Caballe, S.. & Clariso, R. (2016). Towards a learning analytics suppoet for intelligent tutoring systems on mooc platforms. In 2016 10th international conference on complex, intelligent, and software intensive systems(cisis) (pp. 103-110). IEEE.