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AI- Learning Style Prediction in Online Learning for Primary Education

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ABSTRACT: Because of advancements in information technology, online learning has been extensively used. Primary school kids, on the other hand, have less relevant assessments and applications. All learning innovation activities are aimed at enhancing educational quality by establishing an active learning environment for students. Students' engagement in the teaching-learning process may be increased by choosing learning resources that are suited for the student's learning style. The study's goal is to create and assess the effect of an AI-based learning style prediction model in an online learning portal for primary school children. The topics were drawn from Indonesian elementary school pupils in grades four through six. The AI model in the online learning portal was created to propose learning resources that fit students' learning styles, in order to meet the notion of individualised learning. We developed a novel AI technique that allows collaborative filtering-based AI models to be powered by learning style prediction. Using this AI system, the online learning portal may deliver content suggestions suited particularly to each student's learning style. The AI model performance test yielded acceptable results, with an average RMSE (Root Mean Squared Error) of 0.9035 on a scale of 1 to 5. Furthermore, the findings of a t-test study on 269 individuals between pre-test and post-test scores increased students' learning performance.

Keywords *–Online learning, learning style prediction, artificial intelligence, personalized learning, primary school.*

1. INTRODUCTION

More effort is needed to enhance education quality in elementary schools for effective learning. Various research approaches are used in elementary schools to improve motivation and autonomous learning via an interactive learning environment. Previous studies concluded that active student participation in the learning process, such as the adoption of the Team-Based Learning (TBL) approach, developments in

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Vol-13, Issue-11, November 2023

information technology, and online learning, would result in successful learning. As a learning manager, the instructor must be able to creatively choose the proper learning technique so that students may participate in the learning process. This may be accomplished by using technology improvements to enhance the results of the learning process. Teachers may also foster and sustain student motivation and self-directed learning by using technology such as online learning, which promotes an active learning environment. Online learning is now being created in response to improvements in information technology. Students may access numerous learning materials produced by the instructor via the use of online learning. Learning via video lectures, animated videos, presentations, e-books, and Internet articles are examples of learning materials. Teachers may arrange these learning materials on an online Learning Management System (LMS) portal, such as Moodle, to make them more available to students. Consideration of individual characteristics in pupils is one of the benefits of integrating online learning [13]. In the subject of education, customised learning refers to a learning paradigm that takes into account variations in pupils. Personalized learning may be defined as a full integration of these principles throughout schools and an intensification of these ideas across all values and areas of study. This technique has lately become more practicable due to the availability of technological assistance [14]. Personalized learning enables pupils to get instruction and guidance when they need it [15]. Personalized learning may also provide a more detailed analysis of subject covering and a more flexible route to student achievement. Rather of taking a course in mathematics, statistics, or accounting, mastery-based systems might enable students to study specific sections of each topic, according to the student's interests or the needs of the intended career path [14].

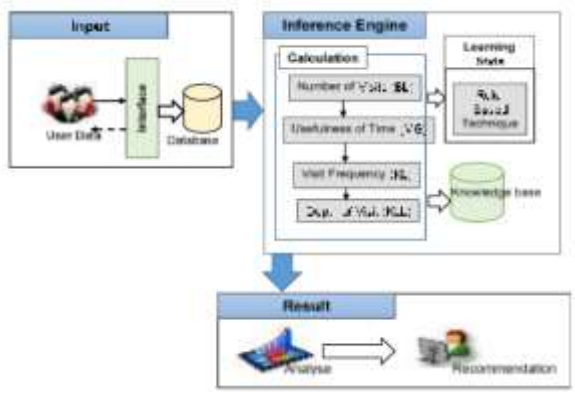

Fig.1: Example figure

Personalized learning, particularly digital personalised learning with pre-packaged courses, assessment, and continuous data collecting, has emerged as a distinct field of student learning progress. Artificial Intelligence may be used to provide personalised learning on a digital platform (AI). One of them is utilised to ascertain the learning style of the student in question. Learning styles are the proclivity or manner in which pupils acquire and express knowledge efficiently, as shown in speaking patterns, learning techniques, how to complete tasks, how to interact to others, and other favoured activities.

ISSN: 2278-4632
Vol-13, Issue-11, November 2023

2. LITERATURE REVIEW

The role of teacher in web enhanced learning activities in primary school information technologies lesson: A case study:

The study discusses the role of the instructor in actively engaging primary school children in Web Enhanced Learning Activities (WELA) in terms of motivation, feedback, and engagement. The research lasted ten weeks and was conducted in an information technology (IT) session during the second semester of the 2007-2008 school year. The research included 120 seventh-grade students from three different elementary schools. The levels of student involvement in WELA were assessed using course logs and learning management system data. For qualitative data collection, forums, questionnaires, and researcher observations were employed. Students who were led by face-to-face and Unknown Online Teacher (UOT) participated in the WELA much more. According to the findings, elementary school pupils should be instructed both face to face and online in WELA. mes.

The development of blended-learning teaching portfolio course using TBL approach

This article was intended to assist lecturers in maximising the advantages of blended learning, which is a mix of in-person and online learning, via the use of the Team-Based Learning (TBL) teaching and learning strategy. According to studies, TBL may give possibilities for improving collaborative skills and boosting active learning, both of which can help to mitigate the shortcomings of adopting blended learning. For an International Human Resource Management course, a blended teaching portfolio was created that included a course overview, graduate competency, a syllabus, course material resources, a teaching scenario, a reading assurance test, midterm/final exams, student assignments, assessment of learning outcomes, and a course quality improvement sheet. Each item was built around the course's peculiarities. The portfolio was seen as a useful tool for lecturers in managing a blended-learning course that may assist students in attaining better grades and encourage them to study course materials prior to class sessions.

'Team based learning as an instructional strategy: A comparative study

One option to enhance student learning results is to employ Team Based Learning (TBL) as an instructional technique in undergraduate health science programmes. However, comparative studies on the usage of TBL in business disciplines in other countries are uncommon. This study is the first step in providing comparative quantitative empirical evidence for the utility of TBL in promoting continuous improvement in the learning process. It examines the outcomes of two separate business courses taken by Indonesian and Australian students. The findings show that TBL may help improve student learning results in business topics.

ISSN: 2278-4632
Vol-13, Issue-11, November 2023

Enhancing the use of digital model with team-based learning approach in science teaching

This research covers the use of digital models and team-based learning (TBL) in the teaching of science, specifically the magnetic induction component of a physics curriculum. This new method encouraged students to actively generate knowledge as individuals and as a team. Students were instructed to begin their studies by watching digital models in videos through an online learning site. Camtasia Studio was used to create a video that includes class content and experiments as well as audio explanations from the instructor. During in-class sessions, the TBL technique was used as the teaching strategy. A fraction of class time was spent verifying that students understood the subject, and the great majority of class time was spent on team tasks that focused on problem-based learning and replicating challenging challenges that students would encounter as the course progressed. The use of digital models and TBL enhanced students' capacity to study autonomously and express their ideas coherently, changing them into more engaged, independent learners not just in science but also in their whole academic experience.

'Improving problem-solving skills through logo programming language

This research looked at the impact of the Logo programming language on problem-solving abilities. Eighty-five fifth-grade pupils were randomly allocated to one of two groups: experimental or control Logo. They were pre-tested to determine their baseline receptivity to figural and logical word problem-solving abilities. After eight weeks of instruction, the Logo experimental group outperformed the control group on problem-solving abilities assessments (assessing both figural and logical word problem-solving skills). Significant variations in figural problem-solving ability were seen between the Logo experimental and control groups. The inference was that the abilities developed via Logo programming are more significant and related to the figural problem-solving competence. Alternative theories and proposals for future study initiatives are presented.

3. METHODOLOGY

Personalized learning, particularly digital personalised learning with pre-packaged courses, assessment, and continuous data collecting, has emerged as a distinct field of student learning progress. Artificial Intelligence may be used to provide personalised learning on a digital platform (AI). One of them is utilised to ascertain the learning style of the student in question. Learning styles are the proclivity or manner in which pupils acquire and express knowledge efficiently, as shown in speaking patterns, learning techniques, how to complete tasks, how to interact to others, and other favoured activities.

Disadvantages:

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1. It is ineffective to communicate information.
2. Poor performance.

This project intends to design and assess the effect of establishing an AI-based online learning portal in order to promote student involvement and take use of advancements in information technology. The AI model placed in the online learning portal was developed to propose appropriate learning material depending on the learning style of the learner. We developed a unique strategy to this end, allowing a collaborative-filtering-based AI model to be guided by learning style prediction. Simultaneously, the technique allows the AI model to function as an unsupervised classification model for learning style prediction. Unlike prior AI-based techniques, our proposed algorithm is not guided on the learning style chosen by humans. By layering a softmax prediction layer on top of the latent learning material vectors in the collaborative filtering framework, the suggested method is made unsupervised. The suggested algorithm, due to its unsupervised nature, minimises human bias in proposing resources based on the student learning style. Using this AI system, the online learning portal may provide suggested resources matched to each student's learning style, furthering personalised learning concepts.

Advantages:

1. The AI model performance test produced acceptable results, with an average RMSE of 0.
2. The learning performance was enhanced.

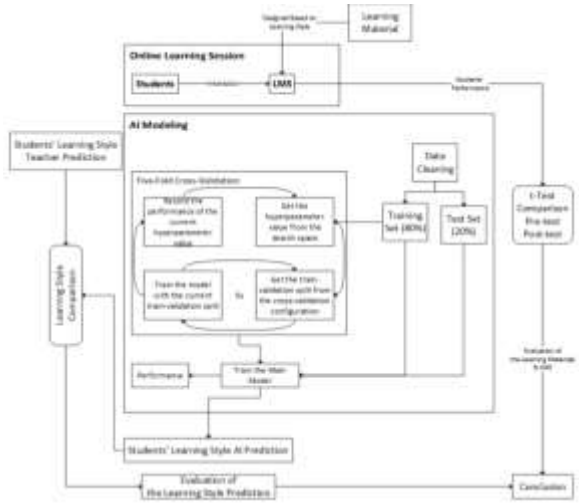

Fig.2: System architecture

MODULES:

To carry out the aforementioned project, we created the modules listed below.

- Data exploration: we will put data into the system using this module.
- Processing: we will read data for processing using this module.
- Using this module, data will be separated into train and test groups.
- Model generation: Building the model - MF - LDA - SVM - Random Forest - Decision Tree - Voting Classifier - (SVC

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Vol-13, Issue-11, November 2023

+ RF + DT). Calculated algorithm accuracy.

- User signup and login: Using this module will result in registration and login.
- User input: Using this module will result in predicted input.
- Prediction: final predicted shown

4. IMPLEMENTATION

ALGORITHMS:

MF: Matrix factorization (MF) is a collaborative filtering process that is used in recommender systems. The user-item interaction matrix is decomposed into the product of two smaller dimensionality rectangular matrices via matrix factorization methods. Because of its success, this family of methodologies became well recognised during the Netflix reward challenge, as recounted by Simon Funk in his 2006 blog post, where he shared his results with the research community. By giving varying regularisation weights to the latent components depending on item popularity and user activity, the prediction outcomes may be improved. LDA is a probabilistic model that may be regarded of as an example of nonnegative matrix factorization.

SVM: Support Vector Machine (SVM) is a supervised machine learning technique that may be used for classification and regression. Though we call them regression issues, they are best suited for categorization. The SVM algorithm's goal is to identify a hyperplane in an N-dimensional space that clearly classifies the input points.

Random Forest: A Random Forest Method is a supervised machine learning algorithm that is widely used in Machine Learning for Classification and Regression issues. We know that a forest is made up of many trees, and the more trees there are, the more vigorous the forest is.

DT: A decision tree is a non-parametric supervised learning technique that may be used for classification and regression applications. It has a tree structure that is hierarchical and consists of a root node, branches, internal nodes, and leaf nodes.

Voting Classifier: Voting Classifier is a machine-learning method that Kagglers often employ to improve the performance of their model and move up the rank ladder. Voting Classifier may also be used to increase performance on real-world datasets, although it has significant limitations.

5. EXPERIMENTAL RESULTS

ISSN: 2278-4632
Vol-13, Issue-11, November 2023

Fig.3: Home screen

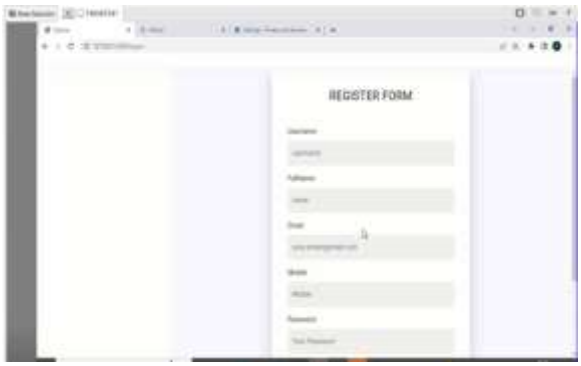

Fig.4: User registration

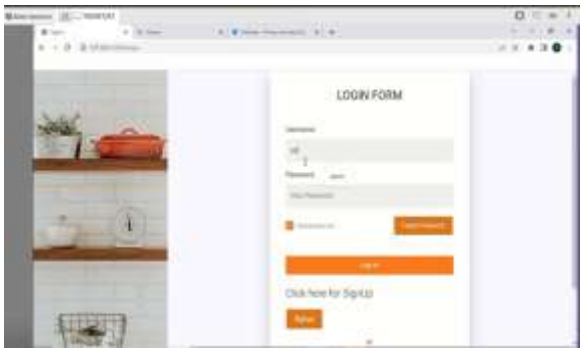

Fig.5: user login

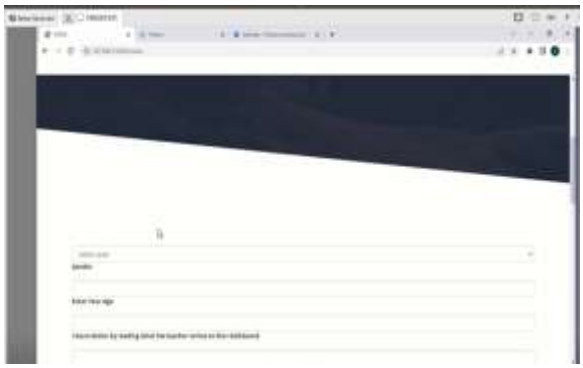

Fig.6: Main screen

Fig.7: User input

Fig.8: Prediction result

6. CONCLUSION

We employed a novel technique in this work that allows collaborative-filtering-based AI models to be guided by predictive learning styles. This AI model's testing performance was good, with an average RMSE of 0.9035 on a scale of 1 to 5. It outperformed the traditional MF-based model, with a 0.0313 lower RMSE value. Not only does it perform better, but the suggested technique removes the necessity for human learning style ground truth since it does not utilise supervised learning. We found a change in learning methods on application online learning in elementary school pupils as a consequence of this research.

ISSN: 2278-4632
Vol-13, Issue-11, November 2023

Teachers should be concerned about this transition due to changes in student learning settings. As a result, instructors must take a more active role in exploring learning resources tailored to students' learning styles, which may be aided by having teachers utilise the online learning platform established in this research. Not only is the online learning platform in this research good for instructors, but it is also excellent for students, as seen by the increase in student performance in this study.

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