International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 10 Issue: 05 | May 2023 www.irjet.net p-ISSN: 2395-0072

AI-Learning style prediction for primary education

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Abstract - *The widespread use of online learning is a result of information technology advancements. For primary school children, there are, however, fewer pertinent evaluations and applications. The goal of any learning innovation project is to make learning more engaging for students while also raising the standard of instruction. By choosing instructional materials that complement each student's preferred learning style, teachers can increase their students' engagement in the teaching-learning process. The goal of the study is to create and assess the effectiveness of an AI-based learning style prediction model in an online learning environment for elementary school pupils. Grades 4 through 6 Indonesian elementary school kids were used as the subjects. The AI model in the online learning portal was created to offer educational materials that fit students' learning preferences in order to uphold the notion of personalized learning. We developed a novel AI strategy that enables learning style prediction to drive collaborative filtering-based AI models.*

***Key Words*: Learning Style, Strategy, Matrix, Students, Ability, Rating.**

1. INTRODUCTION

For primary school students to learn effectively, more work must be put into raising the standard of instruction. In primary schools, a variety of research techniques are used to create an engaging learning environment that will improve motivation and independent learning. According to the findings of earlier studies, active student participation in the learning process—such as through the implementation of the Team-Based Learning (TBL) approach, advancements in information technology, and online learning—would result in successful learning. In order for students to actively participate in the learning process, the teacher, who serves as the learning manager, must be able to select the best teaching strategy. This can be accomplished by utilizing technological advancements to enhance the results of the educational process. With the use of technology, such as online learning, which promotes an interactive learning environment, teachers can also develop and maintain student motivation and independent learning. Online education is now being developed in response to information technology advancements. Students have access to a variety of learning tools that have been produced by the teacher through the use of online learning. The several kinds of learning resources mentioned include slideshows, e- books, animated films, video lectures, and online articles. Teachers can arrange these learning resources in an online learning management system (LMS) portal like Moodle to make them easier for students to access. One benefit of using online learning is that individual student peculiarities are taken into account.

1.1 Existing System

Learning enhancement as a specific topic of study has given rise to tweaked learning, particularly mechanized modified learning with pre-packaged courses, assessment, and constant data collection. Artificial Intelligence (AI) on a digital platform can deliver personalized learning. To choose the understudy's preferred learning method, one of them is used. Speaking styles, learning systems, how to complete obligations, how to assist others, and other embedded works out are examples of learning styles, which are the preference or method by which students successfully acquire and impart information.

1.2 Proposed System

The goal of this work is to plan and assess the effects of deploying a synthetic intelligence-based internet learning gateway in order to boost student engagement and benefit from data technology advancements. The artificial intelligence model for the electronic learning entry was developed to suggest suitable learning materials depending on the student's preferred learning methods. To do this, we developed a novel strategy that enabled the coordination of a viable isolating-based AI model based on the supposition of learning style. The technique enables the AI model to work autonomously as a learning style assumption plan model at this time. Our suggested computation differs from earlier artificial intelligence-based methods in that it is independent of the learning strategy chosen by people. The inert learning material vectors in the practical filtering structure are layered with a softmax assumption layer to create the suggested strategy's independence. The proposed assessment limits the human propensity to take the understudy's learning style into account while identifying assets because of its autonomy. The online learning entrance could make use of this artificial intelligence framework to provide resources that are tuned to each student's preferred learning methods and learning styles.

2. LITERATURE SURVEY

Using the Team-Based Learning (TBL) teaching and learning strategy, this article was created to help lecturers establish a

teaching portfolio that helps them maximize the advantages of blended learning, which combines in-person and online learning [2]. According to studies, TBL can help students learn how to work together effectively and can improve active learning, two things that could help to make up for the shortcomings of blended learning implementation [6]. The creation of a blended teaching portfolio for an international human resource management course included a course overview, graduate competency, syllabus, course resources, teaching scenario, reading assurance test, midterm/final exams, student assignments, assessment of learning outcomes, and a course quality improvement sheet.[1] The course's attributes were used to build each item. This study is a first step to provide comparative quantitative empirical evidence for the usefulness of TBL for leading to continuous improvement in the learning process, which has been identified as one way to improve student learning outcomes in undergraduate health science curriculam [10].

3. IMPORT LIBRARIES:

The appropriate libraries and frameworks must be installed before we can begin the model-building process. The following libraries are necessary for this project to run.

Python Numpy TensorflowPython Pandas Python Matplotlib Scikitlearn

4. METHODOLOGIES:

4.1 Matrix Factorization

A group of cooperative filtering methods used in recommender systems is called matrix factorization [7]. The user-item interaction matrix is broken down into the product of two rectangular matrices with lesser dimensions by matrix factorization methods. As noted by Simon Funk in his blog post from 2006, where he shared his findings with the research community, this family of techniques gained notoriety during the Netflix prize challenge due to its efficacy. [8]By allocating various regularization weights to the latent components based on the popularity of the items and the level of user activity, the prediction outcomes can be enhanced. Consider LDA as an example of nonnegative matrix factorization.

4.2 Support Vector Machine

An approach for supervised machine learning called the Support Vector Machine (SVM) is utilized for both classification and regression. Even if we also refer to regression issues, classification is the best fit. Finding a hyperplane in an N-dimensional space 36 that categorizes the data points clearly is the SVM algorithm's goal.

4.3 Random Forest

An incredibly well-liked supervised machine learning approach called the Random Forest approach is utilized to solve classification and regression issues. We are aware that a forest is made up of countless trees, and the more trees there are, the more robust the forest will be.

4.4 Decision Tree

The non-parametric supervised learning approach used for classification and regression applications is the decision tree. It is organized hierarchically and has a root node, branches, internal nodes, and leaf nodes.

4.5 Voting Classifier

Kagglers frequently employ the machine-learning algorithm voting classifier to improve the performance of their model and move up the rank ladder. Voting Classifier has various restrictions but can be used for real-world datasets to enhance performance.

5. ALGORITHM:

In order to assist students' mastery of the subject matter and self-learning, personalized learning is a teaching strategy based on individual learning styles, aptitudes, and interests. In accordance with the demands and preferences of the students, the learning system also offers instructions and suggestions to enhance students' abilities.

A certain area of student learning growth is currently personalized learning, particularly digital personalized learning with pre-packaged courses, testing, and ongoing data collection. Currently, the digital platform makes personalized learning convenient by utilizing a variety of media in the form of animated images, videos, and audio that support preschool and primary school students' preferred learning styles. [3] Additionally, using AI to assist learners, such as figuring out the concerned student's learning style, personalized learning on a digital platform can be realized. [4]A student's inclination to efficiently absorb and transmit information can be characterized by their learning style, which also includes how they complete assignments, interact with others, and engage in other favored activities. Students with diverse talents and habits in monitoring learning settings are thought to benefit from learning styles depending on personality, which may help them develop their cognitive skills. According to Cassidy's study, learning styles that are predicted using modules and assessments that take into account cognitive personality style performance are those that are consistent with the interests and routines of pupils in primary schools.

6. MODULES

The module will enable us to incorporate data into the system. Data analyses include.

Responsible: We'll look at the details required to use this module to manage things.

Data separation for testing and preparation: Using this module, information will be divided into train and test groups.

Model development:

constructing the model:

MF, LDA, SVM, Decision Tree, and Voting Classifier are examples of (SVC + RF + DT).

correctness of the calculation algorithm

Client data trading and login: To use this module, you must register and authenticate.

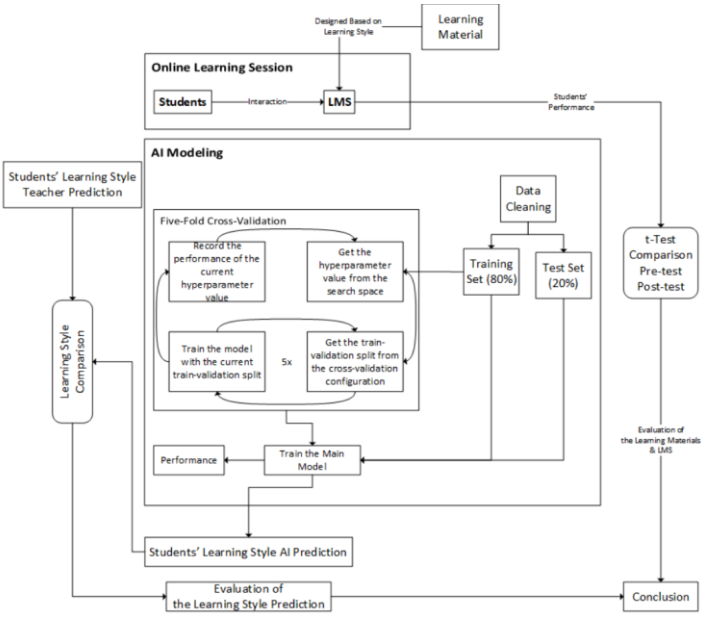
Customer feedback: This module will elicit the desired answer.

Expectation: The last expected respect is manifested.

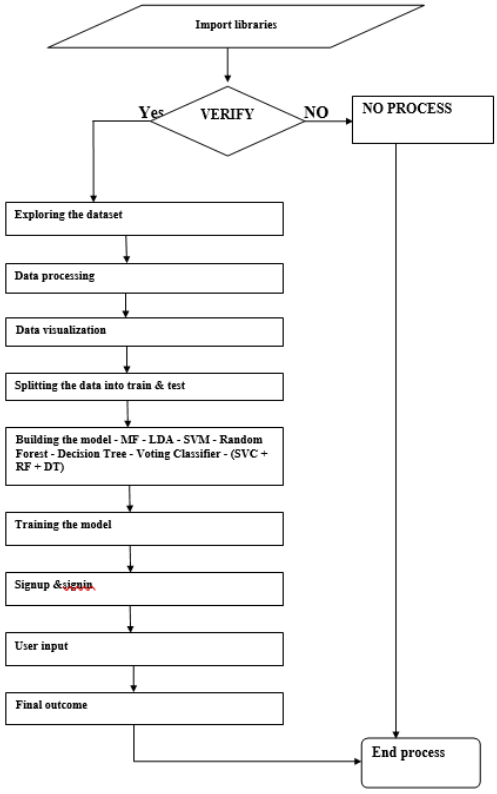
7. DATA COLLECTION:

A sample of 72 students from higher education institutions was randomly chosen to participate in our study. Four distinct learning styles—visual (V), auditory (A), reading/writing (R), and kinesthetic (K)—were found in the sample data using the VARK Inventory questionnaire [9]. The questionnaire has 16 questions that each address a different aspect of how students prefer to learn or present information. The questions are based on scenarios in which choices and decisions about what might happen are available. We created an online version using Microsoft Forms to make it simple to get the responses from the students. The responses are then imported as an Excel file, where each response is shown as a binary vector with the letters "A, V, K, R" in it. After that, the data is preprocessed (as explained in Section [5]) to make it suitable for the machine learning techniques being used. Here, we divided the entire dataset into four matrices, one for each type of learning. Each matrix has 16 columns that show whether a learning style is present or absent and 5 output columns (4 columns show the probability of the learning styles, and thelast column shows the label of the chosen learning style).

8. SYSTEM ARCHITECTURE



9. DATA FLOW DIAGRAM



10. OUTPUT

Launch the path of the code directory into the Anaconda prompt. Now execute the command python app.py to get the link of the running code. Now copy the command that has displayed on the screen and paste it in the google. Now you

can see the web pages that are needed for our model to predict the learning style of the student based on the given rating from 1 to 5 reading as shown in the figures fig-8.1, fig-8.2 , fig-8.3.

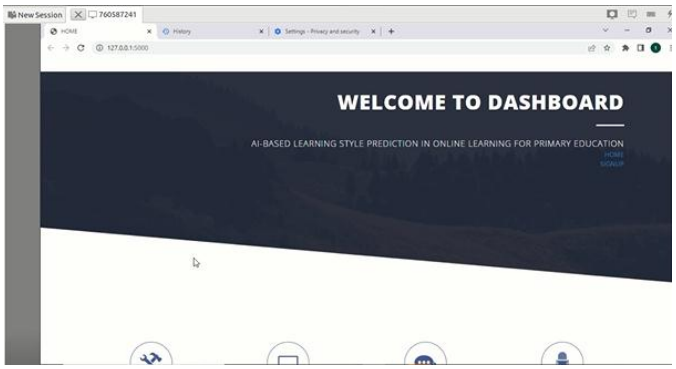


Fig 8.1

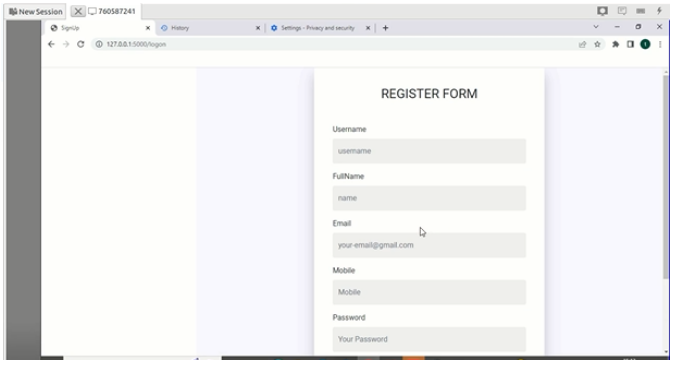


Fig-8.2

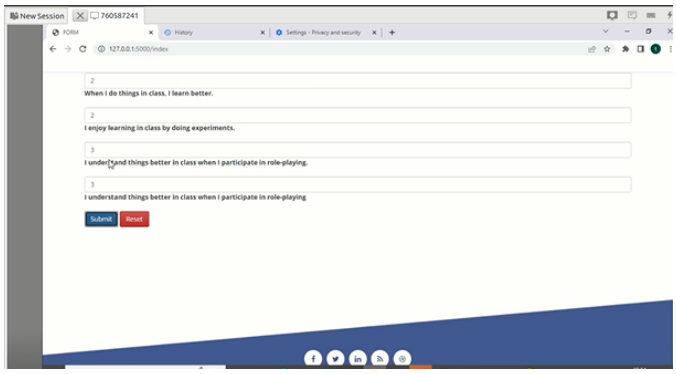


Fig-8.3

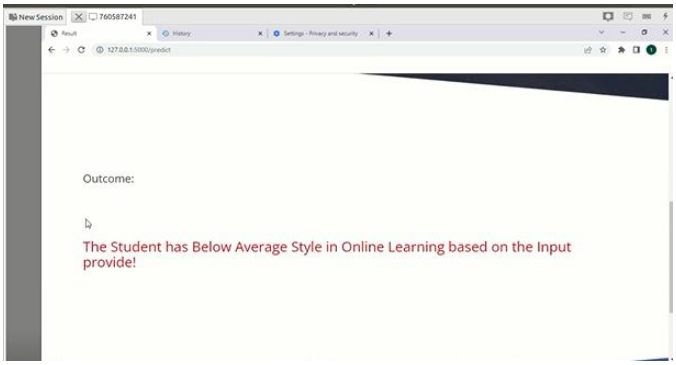


Fig-8.4

11. SYSTEM TESTING

System testing is a technique for quality assurance (QA) that looks at how different application components help create a structured foundation or request. There are other names for the foundation compromise experiment and the building experiment mix form level experiment. A program's construction tries to ensure that everything works, especially as desired. The ease of an insert request serves as the cornerstone of this foundation, which has some capabilities as a flight data recorder experiment. One foundation experiment, for instance, commits research to determine whether each customer recommendation further strengthens request killing.

System testing phases: a broadcast handbook for this test level. Structure testing examines every aspect of a request to ensure that it is complete overall. A QA team often conducts a scheme experiment after beneficial or customer account experiments of individual modules and blend experiments of each component have been completed.

If a part is constructed in accordance with building experiment requirements, it uses up its final assessment through profit experiment prior to moving on to invention, where customers will market the product. An improvement team examines all defects and determines which types and how many are acceptable.

12. CONCLUSIONS

With the new methodology we developed for this study, predictive learning styles can be used to drive collaborative-filtering-based AI models. With an average RMSE of 0.9035 on a scale of 1 to 5, the testing performance of this AI model was satisfactory. With a 0.0313 lower RMSE value than the typical MF-based model, it performed better. The proposed method not only performs better but also does away with the need for learning style ground truth from humans because it does not use supervised learning. As a result of this study, we noticed a potential change in primary school children' application online learning styles. Teachers should therefore take a more active role in exploring learning resources that are tailored to their students' learning

preferences. This can be facilitated by having them use the online learning platform that we created for this study. The online learning platform employed in this study is advantageous for both teachers and students, as seen by the improvement in the students' test scores.

13. ACKNOWLEDGEMENT

We would like to express our special thanks to our mentor Mr. Miryala Rama krishna who gave us a golden opportunity to do this wonderful project on this topic which also helped us in doing a lot of research and we came to know about so many new things. We are really thankful to them. Secondly, we would also like to thank my friends who helped us a lot in finalizing this project within the limited time frame.

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