Academic Performance Prediction Based on Multisource, Multifeature Behavioral Data

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ABSTRACT

In the current era of digital education, analysing student feedback effectively is vital for enhancing the quality of the teaching and learning process. Predicting academic performance is critical in educational data mining, as it can help identify and address students early and support personalised learning interventions. It is a study that investigates opinion mining through the application of supervised learning techniques to detect and classify sentiment in student feedback. The primary role is to understand the emotional tone of student responses and derive meaningful insights to support the same in academic settings. And also focuses on academic performance prediction using multi-source, multi-feature behavioural data collected from students across various digital platforms and learning environments. Unlike traditional approaches that rely solely on demographic or historical grade data, this research integrates Aviator's range of behavioural indicators, including attendance records, online learning activity logs, assignment submission patterns, participation in discussions, library usage and even social interactions with academic systems. The dataset used in the study comprises student feedback collected from the module evaluation service conducted at Dr. Paul Raj Engineering College, Yetapaka. The feedback includes both structured and unstructured a reflecting students' views on teaching methodologies, learning outcomes, assessment procedures and overall course delivery. To process this data, a combination of Artificial Intelligence(AI) and Natural Learning Process(NLP) techniques has been employed. The study emphasises the use of Python, an open source programming language, along with relevant libraries such as Scikit-learn, NLTK, and Pandas, to implement the sentiment analysis model. Various supervisor learning algorithms, including Naive Bayes, Support Vector Machines(SVM) and decision trees, have been applied to classify the sentiments as positive, negative and neutral. These models are evaluated based on standard performance metrics such as accuracy, precision, recall and F1-score. The experiment results show that combining multiple source behavioural features significantly improves prediction accuracy compared to using single source data alone. The proposed model employs advanced learning techniques to process and analyse the heterogeneous data collection from multiple sources of learning management system institutional databases and campus infrastructure. This research provides valuable insights into how different aspects of student behaviour influence academic success. It also highlights the potential of data-driven decision-making in academic settings and enables educators to design more effective and personalised intervention strategies. By leveraging multiple-source multiple-feature institutions in North only academic outcomes can but also enhance overall student support services.

Keywords: Intervention, Artificial Intelligence(AI), Natural Learning Process(NLP), Structured, Unstructured, Scikit-learn, NLTK, Pandas, Sentiment, Influence, Decision Trees, Naive Bayes, Support Vector Machines(SVM).

INTRODUCTION

In the current era of digital education, analysing student feedback effectively is vital for enhancing the quality of the teaching and learning process. Predicting academic performance is critical in educational data mining, as it can help identify and address students early and support personalised learning interventions. This research provides valuable insights into how different aspects of student behaviour influence academic success. It also highlights the potential of data triangulation in academic settings and enables educators to design more effective and personalised intervention strategies. Leveraging multiple-source, multi-feature institutions in a

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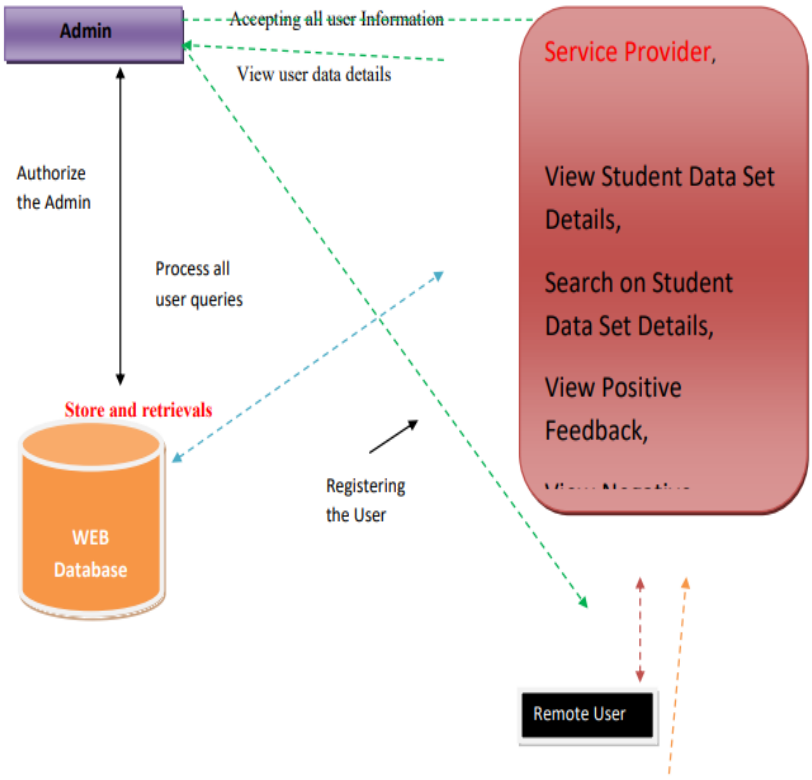
North only improves academic outcomes but also overall student support services. Studying analytics can be a discipline of information analytics that involves procedures, analyses, reviews, and predicting facts regarding learners for the aim of optimising coaching and studying. On the opposite side, it is essential to recognise the outline generated utilising the information, like scholar feedback, to correctly develop the overall routine of the established order and to form plans to reinforce institutions' coaching and understanding. Among the numerous systems for aggregating pupil comments, surveys play a vital role, and most establishments commence surveys in several ways.

The focal point is on utilizing the Opinion Mining approach for categorizing the students' feedback received throughout the component estimate survey that is conducted each semester to understand the comments of scholars in regards to several aspects of coaching and knowledge, like module, teaching, assessments, and so forth. The mined and pre-processed datasets are subjected to several supervised opinion mining methods like Support Vector Machine (SVM), Naive Bayes (NB), Artificial Neural Networks (NN) the usage of Python, an open source accessible for opinion mining. The proportional effectiveness of the algorithms in the selected utility circumstance is evaluated by exploiting accuracy, taking into account and accuracy measures. Accurateness is outlined because of the quantitative relation of entire classifications that place a unit specifically to the entire style of knowledge set. Accuracy is the quantitative relation of true positives to the total number of positives that the vicinity unit foretold, while keeping in mind that the quantitative relation of actual positives is calculated using the complete positives inside the dataset.



ARCHITECTURE

Service Provider: In this module, the Service Provider has to log in by using a valid user name and password. After logging in successfully, he can do some operations such as View Student Data Set Details, Search on Student Data Set Details, View Positive Feedback, View Negative Feedback, View Neutral Feedback, View Attendance Results, and View All Remote Users.

View and Authorize Users: In this module, the admin can view the list of users who all registered. In this, the admin can view the user's details, such as user name, email, and address, and the admin authorizes the users.

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Remote User: In this module, there are n number of users present. The user should register before doing any operations. Once the user registers, their details will be stored in the database. After registration is successful, he has to log in by using his authorized user name and password. Once Login is successful user will do some operations like Add Student Data Sets, Search On Student Data Set Details, And View Your Profile.

Preliminary Investigation: The first and foremost strategy for the development of a project starts from the thought of designing a mail-enabled platform for a small firm, in which it is easy and convenient to send and receive messages, there is a search engine, an address book, and also includes some entertaining games. When it is approved by the organization and our project guide, the first activity, i.e., preliminary investigation, begins. The activity has three parts:

- Request Clarification
- Feasibility Study
- Request Approval

Request Clarification: After the approval of the request to the organization and project guide, with an investigation being considered, the project request must be examined to determine precisely what the system requires. Here, our project is meant for users within the company whose systems can be interconnected by the Local Area Network(LAN). In today's busy schedule, men need everything should be provided in a ready-made manner. So, taking into consideration the vast use of the net in day-to-day life, the corresponding development of the portal came into existence.

Feasibility Analysis: An important outcome of preliminary investigation is the determination that the system request is feasible. This is possible only if it is feasible within limited resources and time. The different feasibilities that have to be analysed are

- Operational Feasibility
- Economic Feasibility
- Technical Feasibility

Operational Feasibility: Operational Feasibility deals with the study of the prospects of the system to be developed. This system operationally eliminates all the tensions of the Admin and helps him in effectively tracking the project progress. This kind of automation will surely reduce the time and energy, which previously consumed in manual work. Based on the study, the system is proven to be operationally feasible.

Economic Feasibility: Economic Feasibility or Cost-Benefit is an assessment of the economic justification for a computer-based project. As hardware was installed from the beginning & for lots of purposes thus the cost on the project of hardware is low. Since the system is network-based, any number of employees connected to the LAN within that organization can use this tool at any time. The Virtual Private Network is to be developed using the existing resources of the organization. So the project is economically feasible.

Technical Feasibility: According to Roger S. Pressman, Technical Feasibility is the assessment of the technical resources of the organization. The organization needs IBM-compatible machines with a graphical web browser connected to the Internet and Intranet. The system is developed for platform platform-independent environment. Java Server Pages, JavaScript, HTML, SQL Server, and WebLogic Server are used to develop the system. The technical feasibility has been carried out. The system is technically feasible for development and can be developed with the existing facility.

Request Approval: Not all request projects are desirable or feasible. Some organization receives so many project requests from client users that only a few of them are pursued. However, those projects that are both feasible and desirable should be put into the schedule. After a project request is approved, its cost, priority,

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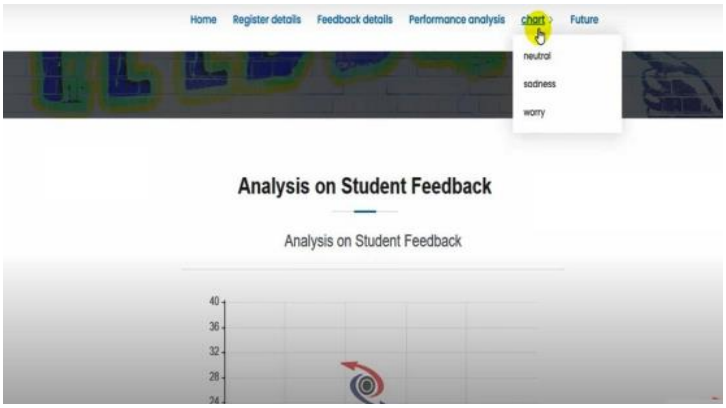
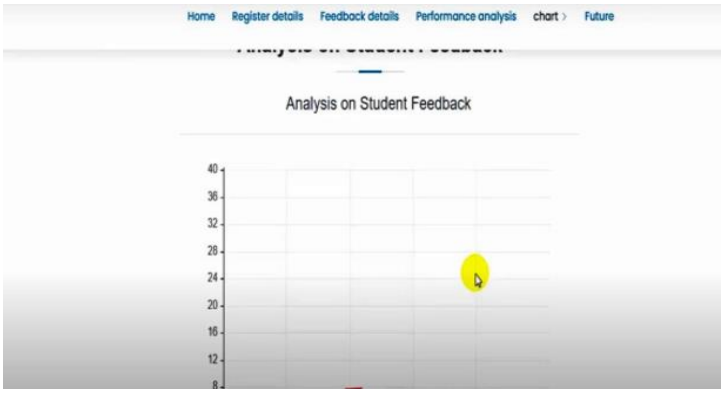
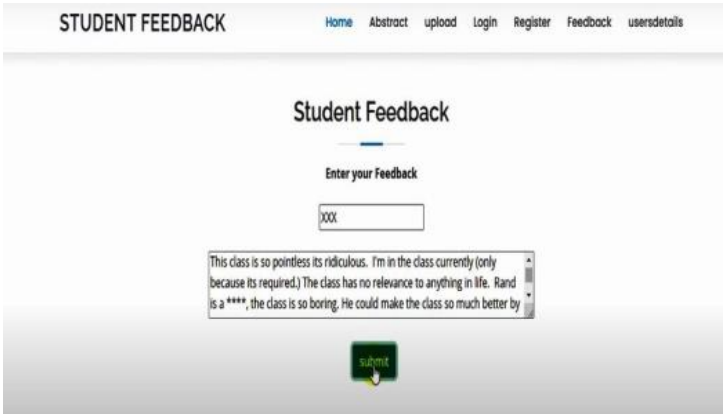
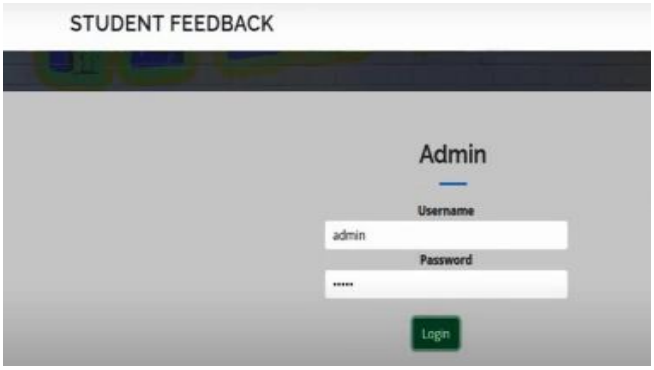
completion time, and personnel requirements are estimated and used to determine where to add it to any project list. Truly speaking, with the approval of those above factors, development works can be launched.

SCREENSHOTS:









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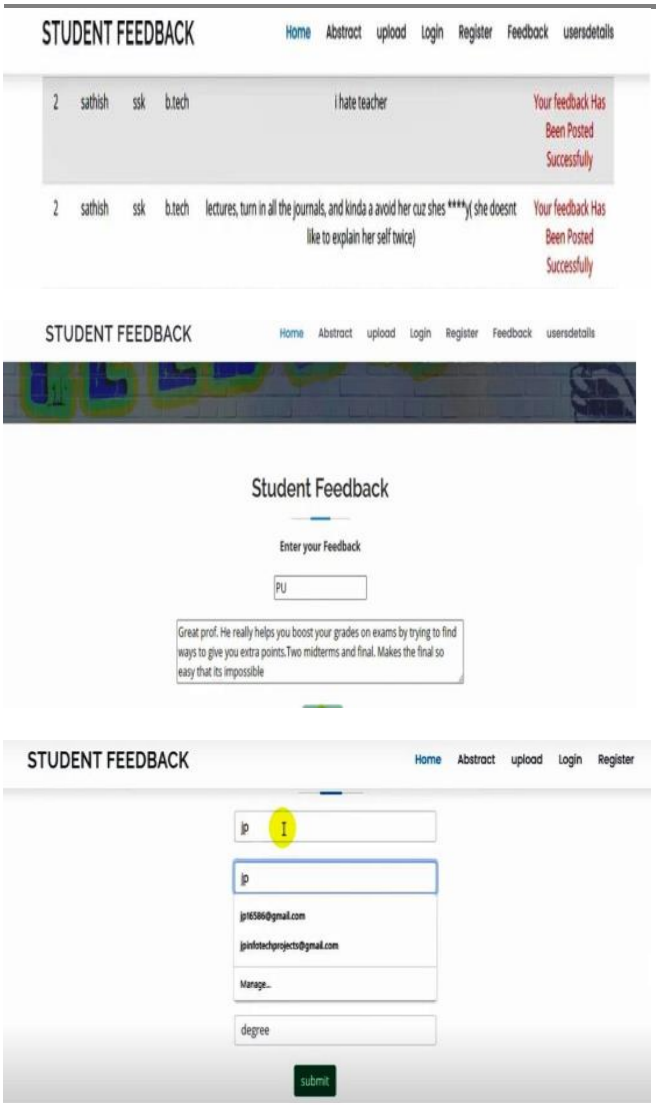

CONCLUSION

Sentence level sentiment mining become accustomed removes the remarked normal alternatives and evaluation words from the contribution dataset. A Student Feedback Mining System is work to inquire about points and their slants as of understudy produced criticism. This strategy will be useful to improve student knowledge and educator's process for conveyance. Automating the student's feedback may give several advantages together with saving price, time and creating economical report generation, etc. the utilization of opining mining will facilitate in summarizing the feedback report effectively and evaluating school performance in the type of a summarized read might be helpful for the establishments. The opinion mining is that the method of insights taking out that be procured to look into assessments of students for any examination. For the length of this, the conclusion mining at the code remarks created through reviews abuse managed gadget becoming acquainted with calculations upheld through Python. Several opinion mining systems are audited and referred to. Our results proved that the engineered Neural Networks algorithmic regular hit others as far as accuracy. In the future assessment, we resolve in broad absolute conclusion mining of student feedback gathered from web based life and moreover to investigate however the code sentiment changes misuse various socioeconomics like age sex, etc. We have a propensity to in addition look forward to to improve the effecting of conclusion mining system. The affordable opinion mining method resolve be arranged and consequences will be dissected as far as different parameters. We measure expecting to build up the arranged framework which would encourage organizations by assessing our framework and would without a doubt benefit the instructional exercise foundations. The arranged framework might be stretched out to various zones like amassing inputs for workshops and short-run courses.

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