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Early Prediction of Student's Performance

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Abstract: Performance degradation assessment (PDA) is of great significance to ensure safety and availability of mechanical equipment. As an important issue of PDA, the robustness of the trained model directly affects the assessment efficiency and restricts its application in practice. This paper proposes a robust modeling approach based on Student's *t*-hidden Markov model (Student's *t*-HMM) and nuisance attribute projection (NAP). NAP can remove nuisance attributes caused by individual differences from the feature space. Student's *t*-HMM utilizes the finite Student's *t*-mixture models (SMMs) to describe the observation emission densities associated with each hidden state, which can be more tolerant towards outliers than conventional HMMs. Based on these two techniques, the proposed method is supposed to be more robust and can assess the performance degradation process of new objects based on data of tested objects.

The prediction of students' academic achievement is crucial to be conducted in a university for early detection of students at risk. This paper aims to present data mining models using classification methods based on Decision Trees (DT) algorithms to predict students' academic achievement after preparatory year, and to identify the algorithm that yields best performance. The students' academic achievement is defined as High, Average, or Below Average based on graduation CGPA.

Keywords: Prediction, Academic Achievement, Decision Tree (DT), J48, Random Tree, REPTree.

I. INTRODUCTION

Employment of graduates students is a problem in Saudi Arabia; only 48% of them are employed [1]. This rate is even larger for technical fields like CS and IT. While this is certainly a multi-dimensional problem, feedback from stakeholders (e.g. Aramco employees that are members of the College Board), and potential employers (workplaces where our students perform their COOP) acknowledged that unemployment is more spread among students with low CGPA. This study uses Data Mining (DM) tools to analyze available data from past batches of students at the College of Computer Science & IT (authors' institution) and extract useful information to explain the phenomena of low CGPA. Machine learning systems offer a lot of potential for assisting instructors in detecting poor student performance by providing an early warning system. As a result, instructors can devote more time to such struggling pupils in order to prepare them for summative tests. To determine the prediction accuracy, we used different machine learning algorithms on the historical results of a course given in a bachelor's in computer information systems programme. These models will be utilised on future students' formative exams, and if the model predicts that a student is more likely to fail a course, alternative educational tactics will be applied to improve his or her learning experience. The following part discusses relevant work, followed by a problem statement, explanation of the experiment specifics and findings, and finally, a conclusion.

Employment of graduates students is a problem in Saudi Arabia; only 48% of them are employed [1]. This rate is even larger for technical fields like CS and IT. While this is certainly a multi-dimensional problem, feedback from stakeholders (e.g. Aramco employees that are members of the College Board), and potential employers (workplaces where our students perform their COOP) acknowledged that unemployment is more spread among students with low CGPA. This study uses Data Mining (DM) tools to analyze available data from past batches of students at the College of Computer Science & IT (authors' institution) and extract useful information to explain the phenomena of low CGPA. The student-centered learning method advocates for ensuring that students have a positive learning experience. As a result, it's vital for instructors to keep track of their students' progress and adjust their instructional tactics accordingly. As a result, formative assessments have become an important tool for teachers to evaluate the efficiency of the learning process.

II. OBJECTIVE

- 1) Calculate Student Performance using Machine learning algorithm
- 2) Need of keeping track of user search results to enhance the process.
- 3) To Predict Student performance using Machine learning Technique.
- 4) To classify dataset using Support vector machine Algorithm.

- 5) To increase the Academic achievement level of each students.
- 6) To the our System provide performance in early.
- 7) Easy to use or handle
- 8) To examine the impact of sport on academic

III. LITERATURE REVIEW

| Sr No | Publish-cation details | Year | Author | Key Points | Research gap identified |
|-------|--|-----------------|---|---|-----------------------------------|
| 1. | A Robust Performance Degradation Modeling Approach Based on Student's t-HMM and Nuisance Attribute Projection | 11 March 2020 | HUIMING JIANG 1 , JING YUAN 1 , QIAN ZHAO 1 , HAN YAN 2 , SEN WANG3 , AND YUNFEI SHAO | Robustness, performance degradation assessment, student's t-HMM, nuisance attribute projection, bearings. | Use Degardation modeling approach |
| 2. | Using Machine Learning Techniques to Earlier Predict Student's Performance | 31 January 2019 | Evawaty Tanuar; Yaya Heryadi; Lukas; Bahtiar Saleh Abbas; Ford Lumban Gaol | The techniques used in this experiment are Generalized Linear Model, Deep Learning and Decision Tree | In this paper use Decision Tree |
| 3. | Mulyankan: A prediction for student's performance using Neural Network | 04 May 2015 | Pooja Pathak; Neha Bansal; Shivani Singh | Artificial Neural Networks ,ML | Use ANN algorithm |
| 4. | Data Mining Analysis on Student's Academic Performance through Exploration of Student's Background and Social Activities | 11 March 2020 | Ching-Chieh Kiu | Student Performance, Educational Data Mining, Decision Tree, Naïve Bayesian, Neural Network | Use Data Mining |

IV. SYSTEM DESIGN

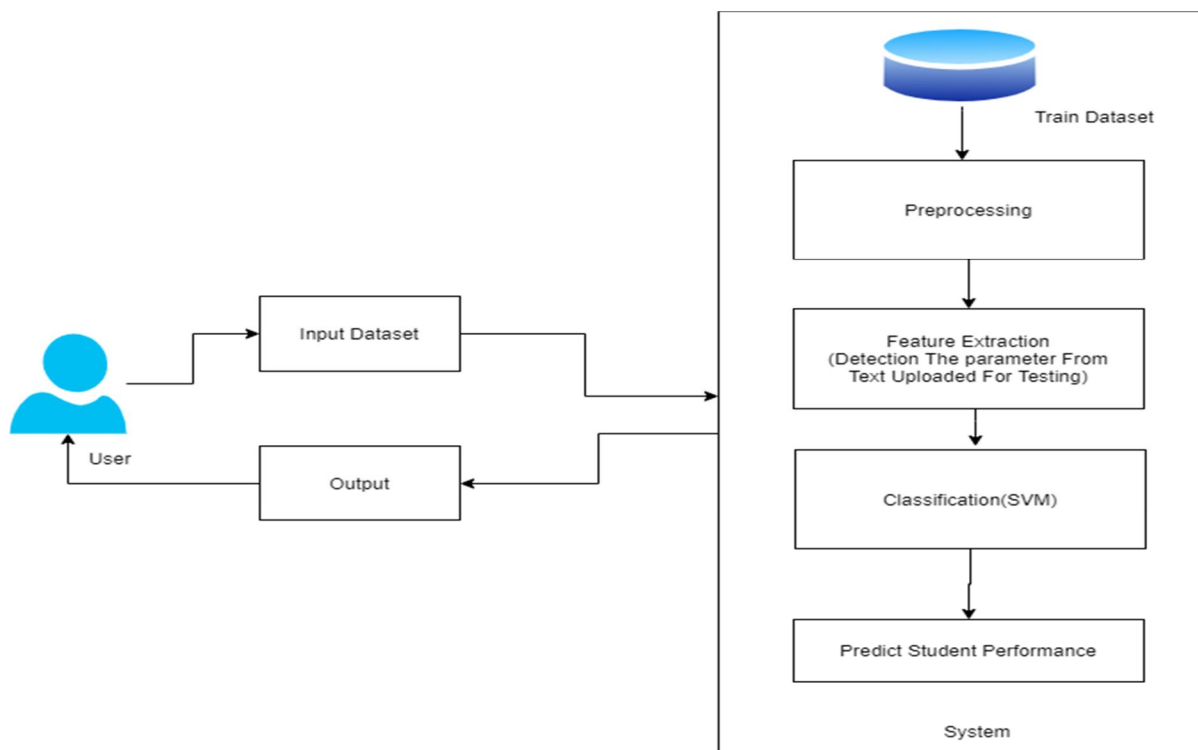


Fig 1: System Design

V. CONCLUSION

In conclusion, This research focused on the predictive ability of DM methods to predict students' achievement after preparatory year at the degree level in higher education. The students' achievement is based on the Grade Point Average (CGPA) defined as (high, average, or under average). Throughout the experiment, we have implemented three SVM classifiers; J48, RT on the student dataset to predict the achievement of the student at graduation year. The results showed that the J48 classifier outperforms predicting students' achievement with reasonable accuracy of 69.3%. Moreover, the important features that had a significant impact on predicting academic achievement of CCSIT students were; CGPA for Prep year, Computer Skills course, Communication Skills course, Mathematics course. The results obtained will help to predict students' final achievement early enough to take effective countermeasures by providing timely warnings to students. Thus, the percentage of students who have low achievement can be reduced providing the right counseling.

VI. ACKNOWLEDGMENT

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