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Academic Matcher- The College Predictor

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Abstract: The College Predictor is a windows application where, students can look for CET cut-off for previous year of engineering colleges across Maharashtra, India. However, some students may not understand and are confused which college to prefer. Several factors are considered to get selected in engineering colleges. Academic matcher is an important construct which help students to search colleges according to their CET exam score, caste category and region preference. The aim of Academic Matcher is to help students with their college shortlisting. Students spend a lot of money on admission consultants. This application gives an instant prediction on possible engineering colleges a student can get an admit according to the student's input and save their time. This Academic Matcher helps students save time and money. The college admission of a student will be predicted using the best machine learning algorithm.

Keywords: SVM, Support Vector Machine Algorithm, Decision Tree, Random Forest.

I. INTRODUCTION

Prediction of college admission became an urgent desire in most of educational bodies and institutes. That is essential in order to help at-risk students and assure their retention, providing the excellent learning resources and experience, and improving the university's ranking and reputation. However, that might be difficult to be achieved for start-up to mid-sized universities, especially those which are specialized in graduate and post graduate programs, and have small students' records for analysis. So, the main aim of this project is to prove the possibility of training and modeling a small dataset size and the feasibility of creating a prediction model with credible accuracy rate. Throughout the experiment, we will implement SVM classifiers, decision tree, random forest; on the student dataset to predict the achievement of the student at graduation year.

II. LITERATURE SURVEY

1) Paper Name: A Robust Performance Degradation Modeling Approach Based on Student's t-HMM and Nuisance Attribute Projection.

Author: HUIMING JIANG 1, JING YUAN 1, QIAN ZHAO 1, HAN YAN 2, SEN WANG3, AND YUNFEI SHAO

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.

2) Paper Name: A Review: Predicting Student Success at Various Levels of their Learning Journey in a Science Program.

Author: Judith Goodness Khanyisa Mabunda, Ashwini Jadhav, Ritesh Ajoodha

Abstract: This paper examines how features affect student persistence or dropout at South African higher education institutions, based on three previous studies.

3) Paper Name: Data-driven Student Support for Academic Success by Developing Student Skill Profiles. Author: Ritesh Ajoodha, Shalini Dukhan, Ashwini Jadhav

Abstract: In this paper, we attempt to provide a data-driven solution to the data congested environment of attributes related to student success and contribute towards preventing the increased dropout rates at South African higher education institutions.

4) Paper Name: Creating a Recommender System to Support Higher Education Students in the Subject Enrollment Decision.

Author: ANTONIO JESUS FERN ´ ANDEZ-GARC ´ ´IA 1, ROBERTO RODR´IGUEZECHEVERR´IA 2, JUAN CARLOS PRECIADO

Abstract: Higher Education plays a principal role in the changing and complex world of today, and there has been rapid growth in the scientific literature dedicated to predicting students' academic success or risk of dropout thanks to advances in Data Mining techniques.

5) Paper Name: Academic Success Prediction based on Important Student Data Selected via Multi-objective Evolutionary Computation

Author: Nobuhiko Kondo, Takeshi Matsuda, Yuji Hayashi, Hideya Matsukawa

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Abstract: This paper proposes an academic success prediction modeling approach that can be used for student advising.

6) Paper Name: Influence Factors in Academic Performance among Electronics Engineering Student: Geographic Background, Mathematics Grade and Psychographic Characteristics

Author: Tuan Norjihan Tuan Yaakub, Wan Rosmaria Wan Ahmad, Yusnira Husaini, Norhafizah Burham Abstract: A study was conducted to investigate the influence factors of the performance in mathematics during secondary education level to student's academic performance in electrical engineering study.

7) Paper Name: Application of Fuzzy logic for performance evaluation of academic students Author: Seyyed Hossein Jafari Petrudi, Maryam Pirouz, Behzad Pirouz

Abstract: In educational institutions the success is measured by academic performance, or how well a student meets standards set out by governmental educational policies and/or the institutional rules and regulations.

8) Paper Name: Perception of Academic Self-efficiency and Academic hardiness in Taiwanese university students

Author: shr-kai Jang

Abstract: This study aims to explore the relation between Taiwanese university students' academic hardiness (USAH) and their academic self-efficacy (USASE).

9) Paper Name: Predicting the Probability of Student's Academic Abilities and Progress with EMIR and Data from Current and Graduated Students

Author: Kunihiko TAKAMATSU*, Kenya BANNAKA

Abstract: In 2016, Kobe Tokiwa University constructed an office for institutional research (IR) promotion. The purpose of this office is to propose, manage, arrange, and collect information on students at the university not only as a general management strategy, but also to support enrollment management.

10) Paper Name: Object Detection Technique for Malaria Parasite in Thin Blood Smear Images Author: P.A. Pattanaik, Tripti Swarnkar

Abstract: The infected red blood cell pixel count in thin blood smear image plays a vital role in malaria parasite detection analysis. This paper proposes three stage object detection procedure of computer vision with Kernel- based detection and Kalman filtering process to detect malaria parasite.

III. METHODOLOGY

1) Requirement Analysis – Requirement Analysis is the most important and necessary stage in SDLC. The senior members of the team perform it with inputs from all the stakeholders and domain experts or SMEs in the industry. Planning for the quality assurance requirements and identifications of the risks associated with the projects is also done at this stage. Business analyst and Project organizer set up a meeting with the client to gather all the data like what the customer wants to build, who will be the end user, what is the objective of the product. Before creating a product, a core understanding or knowledge of the product is very necessary.

2) System Design - The next phase is about to bring down all the knowledge of requirements, analysis, and design of the software project. This phase is the product of the last two, like inputs from the customer and requirement gathering.

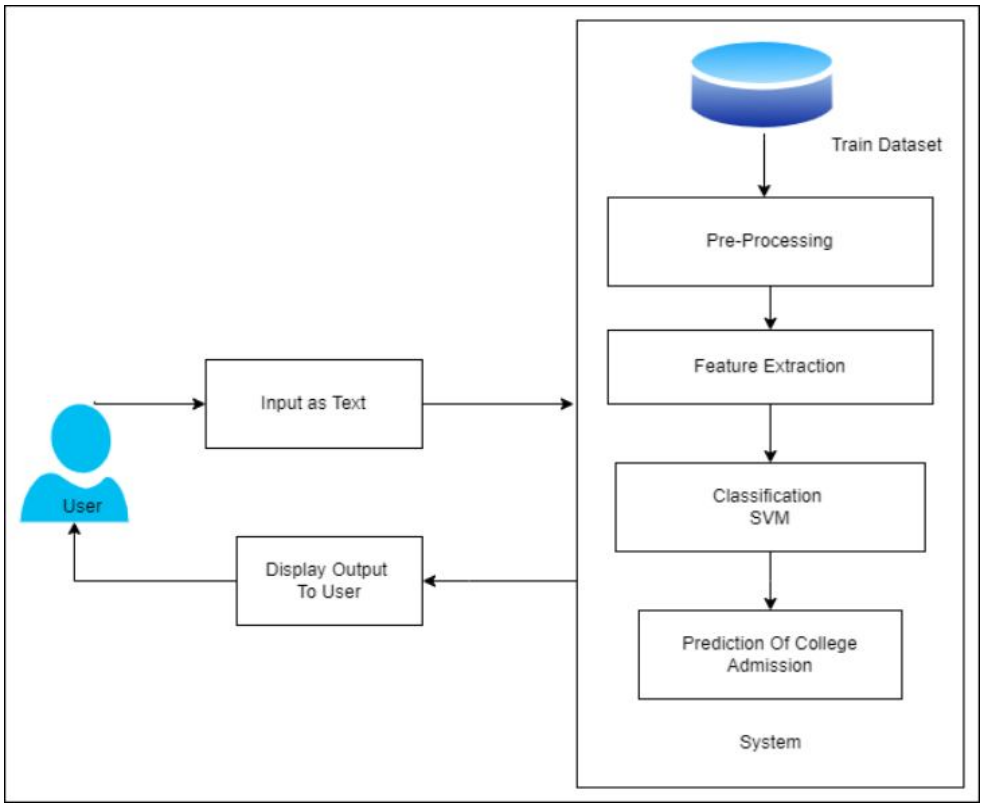
3) Implementation - In this phase of SDLC, the actual development begins, and the programming is built. The implementation of design begins concerning writing code. Developers have to follow the coding guidelines described by their management and programming tools like compilers, interpreters, debuggers, etc. are used to develop and implement the code.

4) Testing - After the code is generated, it is tested against the requirements to make sure that the products are solving the needs addressed and gathered during the requirements stage. During this stage, unit testing, integration testing, system testing, acceptance testing is done.

5) Deployment - Once the software is certified, and no bugs or errors are stated, then it is deployed. Then based on the assessment, the software may be released as it is or with suggested enhancement in the object segment. After the software is deployed, then its maintenance begins.

6) Maintenance - Once when the client starts using the developed systems, then the real issues come up and requirements to be solved from time to time. This procedure where the care is taken for the developed product is known as maintenance.

a) Modeling And Analysis



b) Admin

In this module, the admin has to log in by using valid user name and password. After login successful he can do some operations, such as View All Users and Authorize.

c) End User

In this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will best or to the database. After registration successful, he has to login by using authorized user name and password. Once Login is successful.

IV. ALGORITHMS USED

A. Support Vector Machine

Support Vector Machine or SVM is one of the most popular Supervised Learning algorithms, which is used for Classification as well as Regression problems. However, primarily, it is used for Classification problems in Machine Learning. The goal of the SVM algorithm is to create the best line or decision boundary that can segregate n-dimensional space into classes so that we can easily put the new data point in the correct category in the future. This best decision boundary is called a hyperplane.

SVM chooses the extreme points/vectors that help in creating the hyperplane. These extreme cases are called as support vectors, and hence algorithm is termed as Support Vector Machine. Consider the below diagram in which there are two different categories that are classified using a decision boundary or hyperplane:

B. Random Forest Algorithm

Random Forest is a popular machine learning algorithm that belongs to the supervised learning technique. It can be used for both Classification and Regression problems in ML.

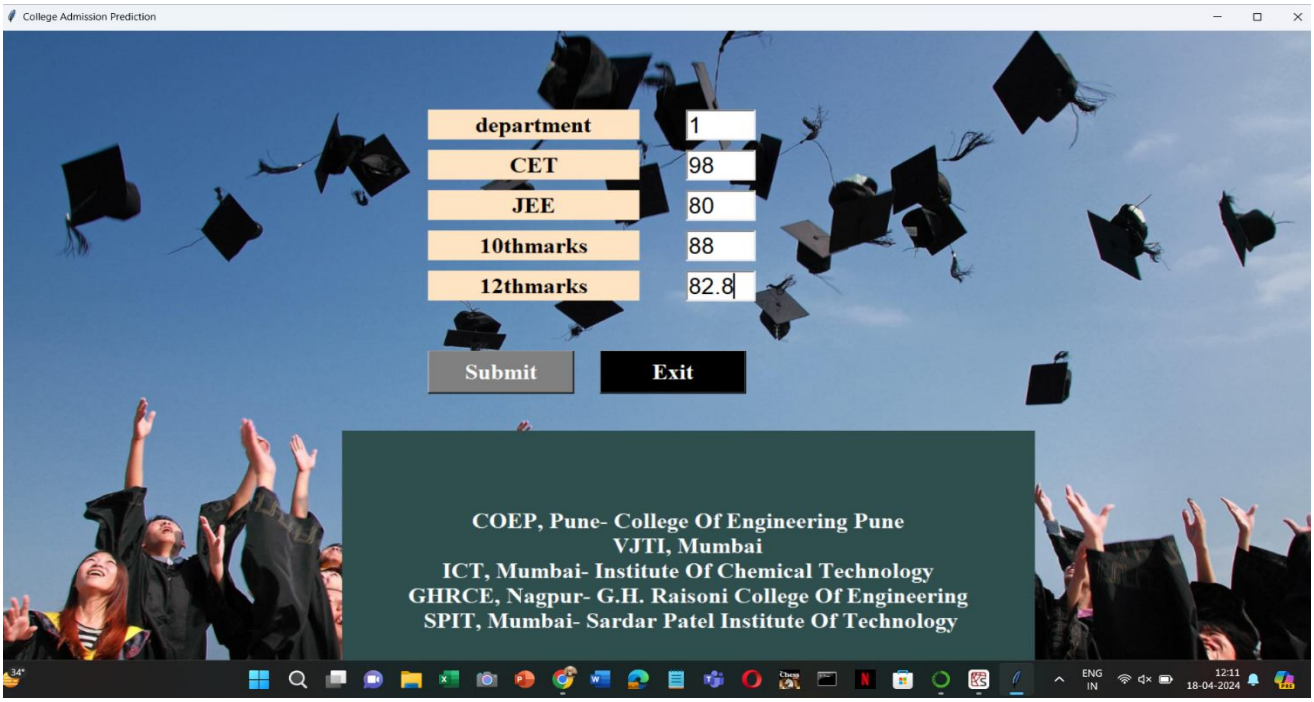
It is based on the concept of ensemble learning, which is a process of *combining multiple classifiers to solve a complex problem and to improve the performance of the model.*As the name suggests, *"Random Forest is a classifier that contains a number of decision trees on various subsets of the given dataset and takes the average to improve the predictive accuracy of that dataset."* Instead of relying on one decision tree, the random forest takes the prediction from each tree and based on the majority votes of predictions, and it predicts the final output.
The greater number of trees in the forest leads to higher accuracy and prevents the problem of overfitting.
The below diagram explains the working of the Random Forest algorithm:

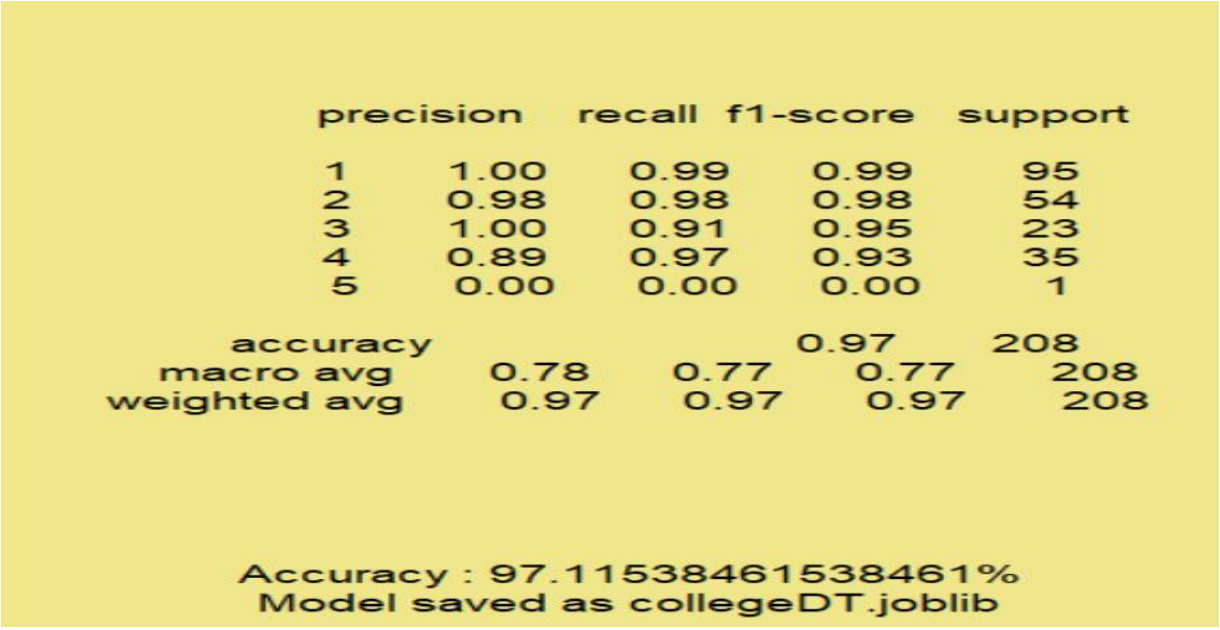
C. Decision Tree

Decision Tree is a Supervised learning technique that can be used for both classification and Regression problems, but mostly it is preferred for solving Classification problems. It is a tree-structured classifier, where internal nodes represent the features of a dataset, branches represent the decision rules and each leaf node represents the outcome.
In a Decision tree, there are two nodes, which are the Decision Node and Leaf Node. Decision nodes are used to make any decision and have multiple branches, whereas Leaf nodes are the output of those decisions and do not contain any further branches.
The decisions or the test are performed on the basis of features of the given dataset.
It is a graphical representation for getting all the possible solutions to a problem/decision based on given conditions.
It is called a decision tree because, similar to a tree, it starts with the root node, which expands on further branches and constructs a tree-like structure.
In order to build a tree, we use the CART algorithm, which stands for Classification and Regression Tree algorithm.
A decision tree simply asks a question, and based on the answer (Yes/No), it further split the tree into subtrees.
Below diagram explains the general structure of a decision tree:

V. RESULTS

Academic Matcher- The College Predictor application uses a combination of machine learning algorithms and data analysis to provide personalized college match recommendations based on your academic profile. So, the Academic Matcher- The College Predictor takes various academic factors into consideration such as the department you're interested in, CET marks, JEE, 10^{th} standard score and your 12^{th} score.
Based on the above factors, it will provide you a list of names of five colleges that you've high chances to get admitted to.
Below is the output:



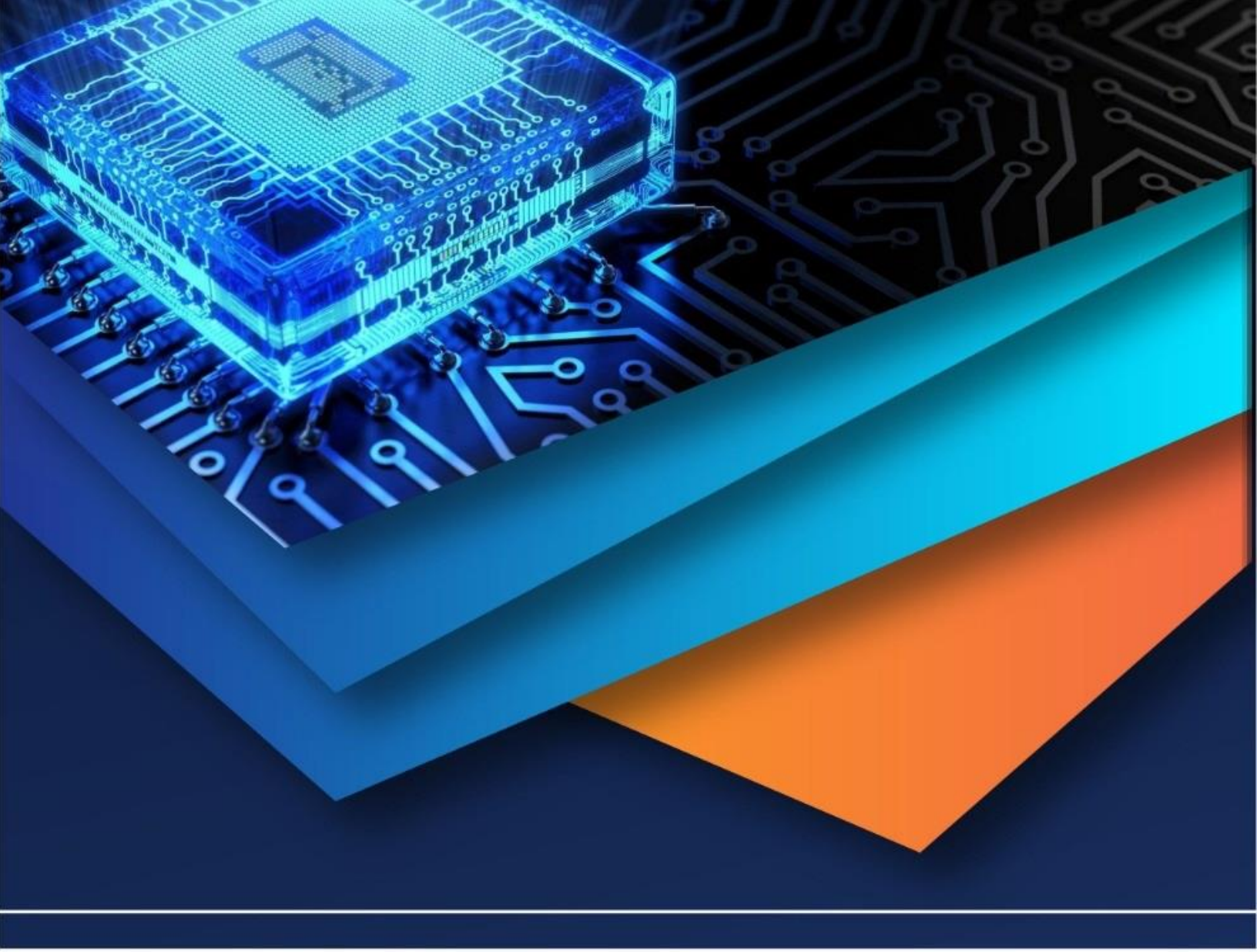


VI. CONCLUSION

This research focused on the predictive ability of Support Vector Machine algorithm, random forest and decision tree algortihms to predict students' college admission after 12th. The students' college admission is based on the CET marks defined as (high, average, or under average), JEE percentile, 10^{th} score and 12^{th} score. Throughout the experiment, we will implement SVM classification, random forest and decision tree the student dataset to predict the achievement of the student in 12th. The results obtained will help to predict students' college admissions early enough to take effective measures accordingly. Thus, the percentage of students who have high achievement can get admitted to a top college.

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