University Admit Eligibility Predictor

Problem Statement:

To develop an application that predicts a student's eligibility for admission to a university.

Need for Application:

In the prevailing social order where education is seen with utmost importance, many students try to seek admission to the creme de la creme of institutions. Tools built in this regard would have multifold benefits for the student community

A tool can be used to predict the admission of candidature for the given profile, which would help students to place a realistic goal.

This would also help students to less depend on third-party consultancy firms and not to fall prey to exorbitant amounts charged by these firms. This would give an edge to well-off students over the students who are from the lowest rung of society. A tool in this regard would forge a level playing field for all students.

Thus, the goal of this project is to create an application that employs machine learning-based algorithms to assess whether a given student's profile is likely to be accepted into a particular university. It would also facilitate reducing falling prey to education consulting firms. Additionally, limiting applications to universities where a student has a real possibility of acceptance would shorten the application process.

Literature Survey

For the purpose of the literature survey, the following three papers have been used:

1) Hybrid Model of Neural Network and Decision Tree Classifier for Predicting University Admission

2) College Admission Predictor and Smart List Generator (CAPSLG)

3) A University Admission Prediction System using Stacked Ensemble Learning

Hybrid Model of Neural Network and Decision Tree Classifier for Predicting University Admission

In order to predict which institution a student would most likely be admitted to based on the university's admission standards and background historical data, this study proposes a hybrid neural network and decision tree classifier model that analyses a student's academic accomplishments. Using real-time data from secondary school pupils in Macau, the prototype system that had been constructed was tested. Along with having a high rate of forecast accuracy, the model also offers flexibility, which is highly helpful in a prediction model where different colleges and various student profiles are involved. By using the approach, it is possible to predict the right colleges for the students' profiles as well as the right entryways for them.

Decision Trees

The decision tree algorithm can be used for solving classification and regression problems. It splits the dataset based on the output class label and attributes' values for the records. It assigns class labels for each leaf node and internal nodes contain test conditions on particular attributes.

Neural Network

Neural networks use a method akin to the method the human brain uses to look for patterns in the underlying data. It is made up of neurons arranged in a number of layers, all of which together make up the artificial neural network. To achieve the best results, the number of layers, the number of neurons in each layer, and the activation function are all empirically determined. The individual student's scores and the necessary university identifier are given into the input layer. The probability of admission is limited to the range of 0 to 1 in the output layer of a series of layers where the data is processed.

CAPSLG:

The authors of the paper "**College Admission Predictor and Smart List Generator**" have discussed an app that aids students in selecting the right universities. There are two key parts to this application. A smart list generator and a college eligibility predictor

The college eligibility predictor

Input: Past cut-off records of the colleges

What it does:

- examines a student's academic achievements, history, and requirements for college admission
- trains on input data to determine which college the student is likely to get admission to.

Output: forecasts the chances of getting into university college based on the student's profile.

Smart List Generator

Additionally, depending on the aforementioned criteria, the application produces a list of colleges, which will help students narrow down their alternatives and more properly complete their admissions applications.

User input would also be sent to the system, which would help with performance factor improvement and prediction evaluation.

In the work, the authors have analyzed different machine learning (ML) algorithms, including Random Forest, AdaBoost, and Decision Tree, by evaluating the accuracy of their categorization on datasets for breast cancer, iris, and wine. The Ensemble AdaBoost Classifier from the Python scikit-learn module is used to classify the data once it was determined that the Adaboost model performed the best.

The input is split into two classes via the AdaBoost algorithm (binary classifier). It sorts the incoming data into categories based on the categorization from several decision trees. The bulk of the categorization generated by the number of decision trees selected is produced by the algorithm. The AdaBoost algorithm is therefore more accurate. It also isolates the elements that are more crucial for forecasting results. Actually pre-trained and pickled, the model. The model is then utilized for prediction tasks after being loaded from the pickle that was previously saved, increasing time efficiency.

The web application is built on top of the Python-based Django web page rendering framework. Python variables and the user interface can be combined due to the Django framework. The user interface, which managed the application's flow based on user interaction, was built and styled using HTML and CSS.

A University Admission Prediction System using Stacked Ensemble Learning

Dynamic application can be hard for students to shortlist universities as Students frequently worry if their backgrounds align with those needed by a particular university. Students can utilize a university admission prediction system to figure out their odds of admittance to a particular institution. Data on prior applicants to other colleges and their acceptance or rejection status may be used by the system. Early versions of these prediction systems had a number of flaws, such as failing to take into account crucial factors like GRE (Graduate Record Exam) results or research experience. Furthermore, older models' stated accuracy is likewise insufficiently low. They proposed to use **the Stacked ensemble model** to predict the chances of admission of a student to a particular university.

Information collected by the user (as mentioned in the paper)

Person Attribute	Name, UserProfile
Program Details	Program, Department, Term and year, University name
Scores	CGPA, Topper CGPA, TOEFL, GRE Q, GRE V, GRE A, IELTS
Undergraduate details (if any)	College name, Major, Specialization, CGPA Scale
Academic experience	Research experience, Journal publications, Conference publications
Experience	Industry experience, Intern experience

Multilayer Perceptron

The Perceptron is the most fundamental neural network component that is based on a single neuron. Several perceptrons (or neurons) are linked to one another in layers to form a multilayer perceptron (MLP) [12]. The input layer receives the input data, while the output layer receives the output data. The hidden layers are those layers that exist between the input layer and the output layer. According to convenience, both the total number of hidden layers and the number of neurons in each hidden layer may be changed. The degree of a model's intricacy and accuracy will vary depending on this. It is typical to use a trial-and-error approach to choose the best neural network design for a given issue.

Stacked Ensemble learning

In general, ensemble methods are used to combine weak models in order to construct a model which is very strong. In contrast, a stacked ensemble model is an ensemble model that utilizes a meta-machine learning model to mix many machine learning models. The features of this

meta-model are the predictions from several sub-models, which increases the predictive accuracy. It was shown that the suggested strategy produced much better outcomes than earlier university admission prediction systems.

There are two types of Ensemble Modeling:

       1. Model Averaging Ensemble

       2. Stacked Generalization

1. Model Averaging

       To generate a more precise result, the forecasts from many models are integrated. The various models' predictions are combined. This might also be viewed as a flaw in the model as there may be instances where one model outperforms the other while receiving equal weight. Each model has weights set in order to address this issue. Each model is given a weight, and the model with the better performance is given more weight than the model with the worse performance. The forecast is then finalized after calculating a weighted average.

2. Stacked Generalization

       Stacked Generalization, also known as stacking, is an ensemble technique that combines the results of many classification algorithms to produce a more precise forecast. The various models are combined using a meta-classifier.

It was found that the ensemble model outperformed a traditional neural network.

References:

[1]   S. Fong, Y. -W. Si and R. P. Biuk-Aghai, "Applying a hybrid model of neural network and decision tree classifier for predicting university admission," 2009 7th International Conference on Information, Communications and Signal Processing (ICICS), 2009, pp. 1-5, doi: 10.1109/ICICS.2009.5397665.

[2] CAPSLG: College Admission Predictor and Smart List Generator By Kiran Kumari, Meet Kataria, Viral Limbani, Rahul Soni

[3]   S. Sridhar, S. Mootha and S. Kolagati, "A University Admission Prediction System using Stacked Ensemble Learning," 2020 Advanced Computing and Communication Technologies for High Performance Applications (ACCTHPA), 2020, pp. 162-167, doi: 10.1109/ACCTHPA49271.2020.9213205.