MACHINE LEARNING

(PREDICTION OF ACCEPTANCE OF ADMISSION INTO A UNIVERSITY)

summer Internship Report Submitted in partial fulfillment of the requirement for undergraduate degree of

Bachelor of Technology

In

Computer Science Engineering

By

M. Srikar

221710312030

Under the Guidance of

Assistant Professor

Department Of ComputerScience and Engineering

GITAM School of Technology

GITAM (Deemed to be University), Hyderabad-502329

JULY-2020

DECLARATION

I submit this industrial training work entitled “PREDICTION OF ACCEPTANCE OF ADMISSION INTO A UNIVERSITY” to GITAM (Deemed To Be University), Hyderabad in partial fulfilment of the requirements for the award of the degree of “Bachelor of Technology” in “Computer Science Engineering”. I declare that it was carried out independently by me under the guidance of , Asst.professor, GITAM (Deemed To Be University), Hyderabad, India.

The results embodied in this report have not been submitted to any other University or Institute for the award of any degree or diploma.

Place: HYDERABAD **M.Srikar**

Date:13-07-2020 **221710312030**

CERTIFICATE

This is to certify that the Industrial Training Report entitled "PREDICTION OF ACCEPTANCE ADMISSION IN TO A UNIVERSITY" is being submitted by Madhu Srikar Reddy(221710312030) in partial fulfilment of the requirement for the award of Bachelor of Technology in Computer Science Engineering at GITAM (Deemed To Be University), Hyderabad during the academic year 2019-20..

It is faithful record work carried out by her at the Computer Science Engineering Department, GITAM University Hyderabad Campus under the guidance and supervision.

Prof. S. Phani Kumar

Assistant Professor

Department of CSE

Professor and HOD

Department of CSE

ACKNOWLEDGEMENT

Apart from my effort, the success of this internship largely depends on the encouragement and guidance of many others. I take this opportunity to express my gratitude to the people who have helped me in the successful competition of this internship.

I would like to thank respected **Dr. N. Siva Prasad**, Pro Vice Chancellor,GITAM Hyderabad and **Prof.N.Seetha Ramaiah,** Principal, GITAM Hyderabad.

I would like to thank respected **Prof.S.Phani Kumar**, Head of the Department of Computer Science Engineering for giving me such a wonderful opportunity to expand my knowledge for my own branch and giving me guidelines to present a internship report. It helped me a lot to realize what we study for.

I would like to thank the respected faculties who helped me to make this internship a successful accomplishment.

I would also like to thank my friends who helped me to make my work more organized and well-stacked till the end.

M.Srikar

221710312030

ABSTRACT

In today's era we see a lot of students pursuing their education away from their home countries. The main country targeted by these international students is The United States of America. Majority of the international students in the United States of America are from India and China. In the past decade the number of Indian students pursuing post graduate education from the USA has rapidly increased. With the increase in the number of international students studying in the USA, each applicant has to face a tough competition to get admission in their dream university. Generally as the students don't have much idea about the procedures, requirements and details of the universities in the USA they seek help from the education consultancy firms to help them successfully secure admission in the universities which are best suitable for their profile, for this they have to invest huge amounts of money as consultancy fees. Apart from these the education consultancy firms there are few websites and blogs that guide the students on the admission procedures. The drawback of the currently available resources is that they are very limited and also they are not truly dependable taking into consideration of their accuracy and reliability. The aim of this research is to develop a system using machine learning algorithms, we will name it as Student Admission Predictor (SAP). It will help the students to identify the chances of their application to a university being accepted. Also it will help them in identifying the universities which are best suitable for their profile and also provide them with the details of those universities. A simple user interface will be developed for the users to access the SAP system. Keywords: Student Admission Predictor; Machine Learning.

M.Srikar

221710312030

Table of Contents

List of Figures:

CHAPTER 1

MACHINE LEARNING

1.1 INTRODUCTION:

Machine Learning(ML) is the scientific study of algorithms and statistical models that computer systems use in order to perform a specific task effectively without using explicit instructions, relying on patterns and inference instead. It is seen as a subset of Artificial Intelligence(AI).

1.2 IMPORTANCE OF MACHINE LEARNING:

Consider some of the instances where machine learning is applied: the self-driving Google car, cyber fraud detection, online recommendation engines—like friend suggestions on Facebook, Netflix showcasing the movies and shows you might like, and “more items to consider” and “get yourself a little something” on Amazon—are all examples of applied machine learning. All these examples echo the vital role machine learning has begun to take in today’s data-rich world.

Machines can aid in filtering useful pieces of information that help in major advancements, and we are already seeing how this technology is being implemented in a wide variety of industries.

With the constant evolution of the field, there has been a subsequent rise in the uses, demands, and importance of machine learning. Big data has become quite a buzzword in the last few years; that's in part due to increased sophistication of machine learning, which helps analyze those big chunks of big data. Machine learning has also changed the way data extraction, and interpretation is done by involving automatic sets of generic methods that have replaced traditional statistical techniques.

The process flow depicted here represents how machine learning works

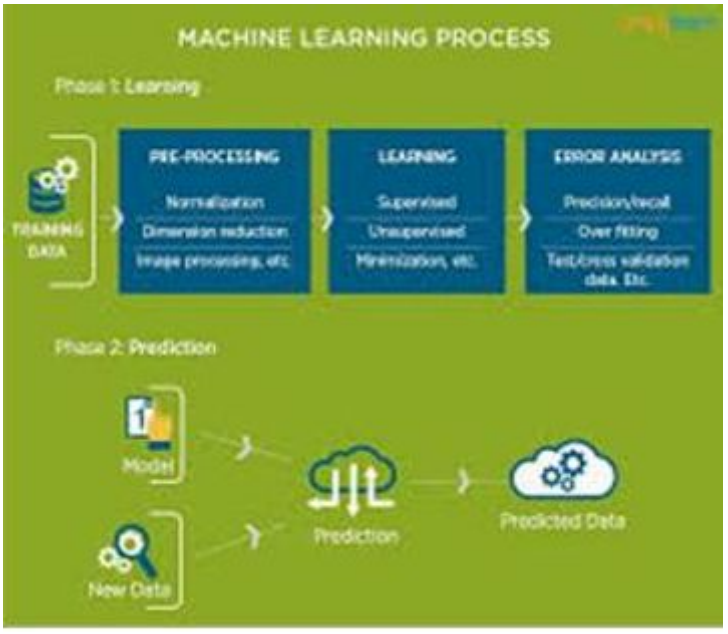


Figure 1 : The Process Flow

1.3 USES OF MACHINE LEARNING:

Earlier in this article, we mentioned some applications of machine learning. To understand the concept of machine learning better, let's consider some more examples: web search results, real-time ads on web pages and mobile devices, email spam filtering, network intrusion detection, and pattern and image recognition. All these are by-products of applying machine learning to analyze huge volumes of data

Traditionally, data analysis was always being characterized by trial and error, an approach that becomes impossible when data sets are large and heterogeneous. Machine learning comes as the solution to all this chaos by proposing clever alternatives to analyzing huge volumes of data. By developing fast and efficient algorithms and

data-driven models for real-time processing of data, machine learning can produce accurate results and analysis.

1.4 TYPES OF LEARNING ALGORITHMS:

The types of machine learning algorithms differ in their approach, the type of data they input and output, and the type of task or problem that they are intended to solve.

1.4.1 Supervised Learning :

When an algorithm learns from example data and associated target responses that can consist of numeric values or string labels, such as classes or tags, in order to later predict the correct response when posed with new examples comes under the category of supervised learning. Supervised machine learning algorithms uncover insights, patterns, and relationships from a labelled training dataset – that is, a dataset that already contains a known value for the target variable for each record. Because you provide the machine learning algorithm with the correct answers for a problem during training, it is able to "learn" how the rest of the features relate to the target, enabling you to uncover insights and make predictions about future outcomes based on historical data.Examples of Supervised Machine Learning Techniques are Regression, in which the algorithm returns a numerical target for each example, such as how much revenue will be generated from a new marketing campaign.Classification, in which the algorithm attempts to label each example by choosing between two or more different classes. Choosing between two classes is called binary classification, such as determining whether or not someone will default on a loan.Choosing between more than two classes is referred to as multiclass classification.

1.4.2 Unsupervised Learning:

When an algorithm learns from plain examples without any associated response, leaving to the algorithm to determine the data patterns on its own. This type of algorithm tends to restructure the data into something else, such as new features that may represent a class or a new series of uncorrelated values. They are quite useful in providing humans with

insights into the meaning of data and new useful inputs to supervised machine learning algorithms.

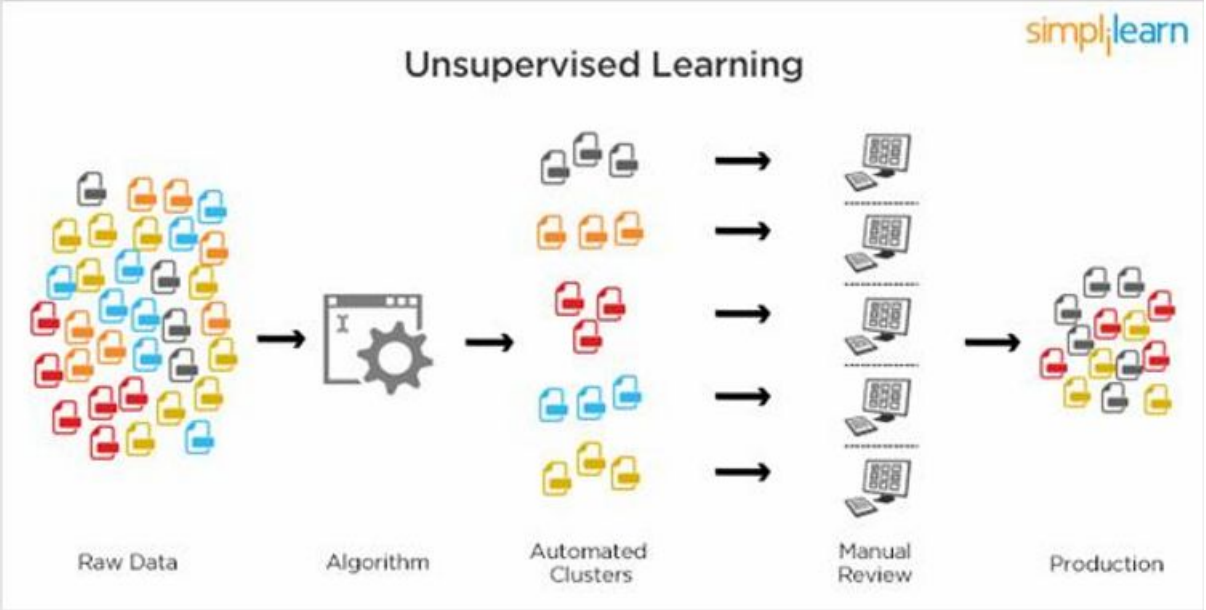


Figure 2 : Unsupervised Learning.

Popular techniques where unsupervised learning is used also include self-organizing maps, nearest neighbor mapping, singular value decomposition, and k-means clustering. Basically, online recommendations, identification of data outliers, and segment text topics are all examples of unsupervised learning.

1.4.3 Semi Supervised Learning:

As the name suggests, semi-supervised learning is a bit of both supervised and unsupervised learning and uses both labeled and unlabeled data for training. In a typical scenario, the algorithm would use a small amount of labeled data with a large amount of unlabeled data.

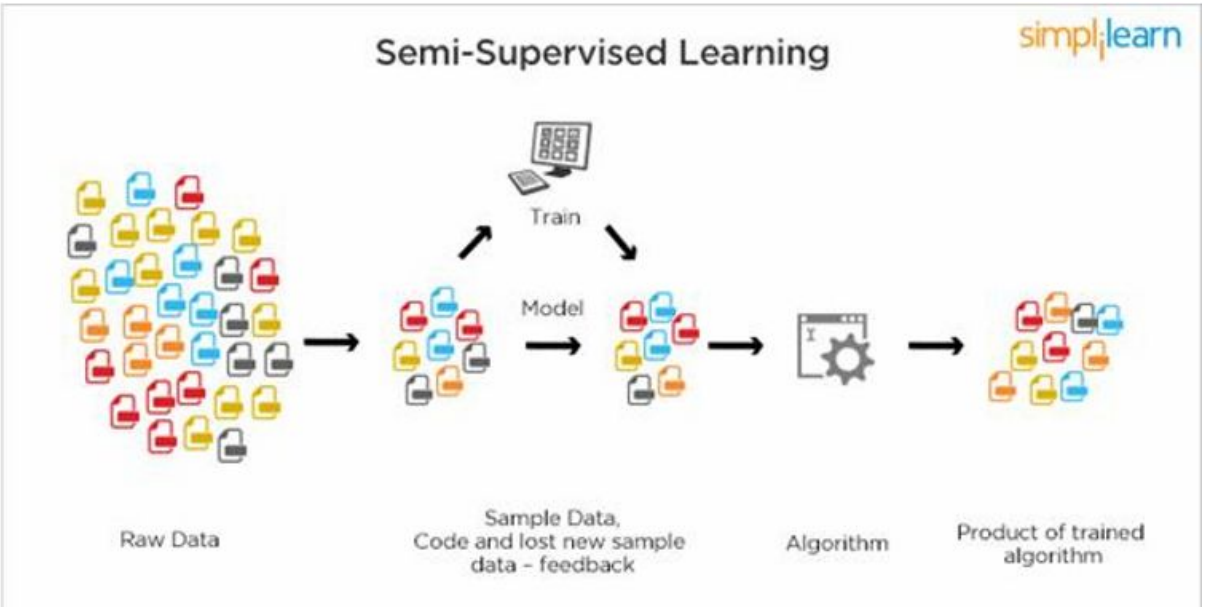


Figure 3 : Semi Supervised Learning

1.5 RELATION BETWEEN DATA MINING,MACHINE LEARNING AND DEEP LEARNING:

Machine learning and data mining use the same algorithms and techniques as data mining, except the kinds of predictions vary. While data mining discovered previously unknown patterns and knowledge, machine learning reproduces known patterns and knowledge—and further automatically applies that information to data, decision-making, and actions.Deep learning, on the other hand, uses advanced computing power and special types of neural networks and applies them to large amounts of data to learn, understand, and identify complicated patterns. Automatic language translation and medical diagnoses are examples of deep learning.

CHAPTER -2

PYTHON

Basic programming language used for machine learning is : PYTHON

2.1 INTRODUCTION TO PYTHON:

- Python is a high-level, interpreted, interactive and object-oriented scripting language.
- Python is a general purpose programming language that is often applied in scripting roles
- Python is Interpreted: Python is processed at runtime by the interpreter. You do not need to compile your program before executing it. This is like PERL and PHP.
- Python is Interactive: You can sit at a Python prompt and interact with the interpreter directly to write your programs.
- Python is Object-Oriented: Python supports the Object-Oriented style or technique of programming that encapsulates code within objects.

2.2 HISTORY OF PYTHON:

- Python was developed by GUIDO VAN ROSSUM in early 1990's.
- Its latest version is 3.7 , it is generally called as python3

2.3 FEATURES OF PYTHON:

- **Easy-to-learn:** Python has few keywords, simple structure, and a clearly defined syntax, This allows the student to pick up the language quickly.
- **Easy-to-read:** Python code is more clearly defined and visible to the eyes.

- **Easy-to-maintain:** Python's source code is fairly easy-to-maintaining.
- **A broad standard library:** Python's bulk of the library is very portable and cross-platform compatible on UNIX, Windows, and Macintosh.
- **Portable:** Python can run on a wide variety of hardware platforms and has the same interface on all platforms.
- **Extendable:** You can add low-level modules to the Python interpreter. These modules enable programmers to add to or customize their tools to be more efficient.
- **Databases:** Python provides interfaces to all major commercial databases.
- **GUI Programming:** Python supports GUI applications that can be created and ported to many system calls, libraries and windows systems, such as Windows MFC, Macintosh, and the X Window system of Unix.

2.4 HOW TO SETUP PYTHON:

- Python is available on a wide variety of platforms including Linux and Mac OS X. Let's understand how to set up our Python environment.
- The most up-to-date and current source code, binaries, documentation, news, etc., is available on the official website of Python.

2.4.1 Installation(using python IDLE):

- Installing python is generally easy, and nowadays many Linux and Mac OS distributions include a recent python.
- Download python from www.python.org
- When the download is completed, double click the file and follow the instructions to install it.
- When python is installed, a program called IDLE is also installed along with it. It provides a graphical user interface to work with python

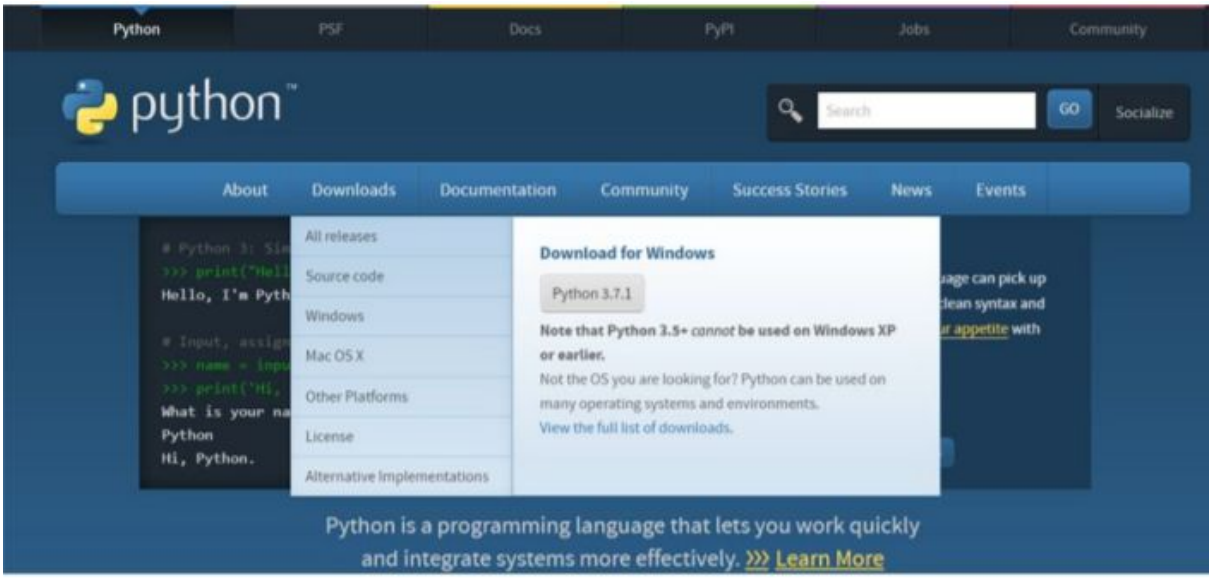


Figure 4 : Python download

2.4.2 Installation(using Anaconda):

- Python programs are also executed using Anaconda.
- Anaconda is a free open source distribution of python for large scale data processing, predictive analytics and scientific computing.
- Conda is a package manager that quickly installs and manages packages.
- In WINDOWS:
- Step 1: Open Anaconda.com/downloads in a web browser.
- Step 2: Download python 3.4 version for (32-bits graphic installer/64 -bit graphic installer)
- Step 3: select installation type(all users)
- Step 4: Select path(i.e. add anaconda to path & register anaconda as default python 3.4) next click install and next click finish
- Step 5: Open jupyter notebook (it opens in default browser)

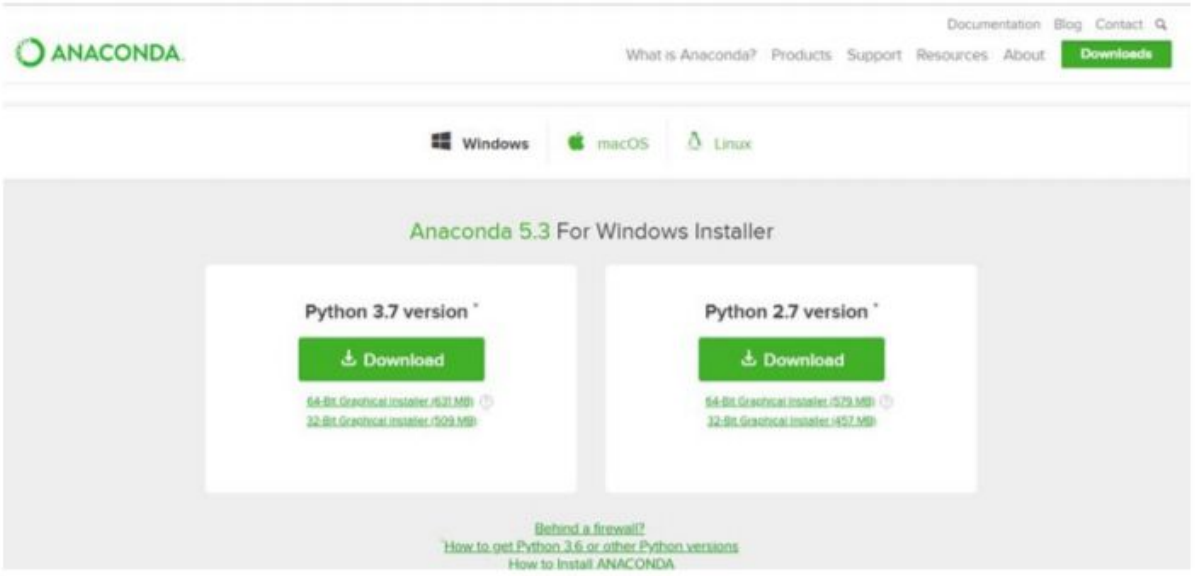


Figure 5 : Anaconda download

Figure 6 : Jupyter notebook

2.5 PYTHON VARIABLE TYPES:

- Variables are nothing but reserved memory locations to store values. This means that when you create a variable you reserve some space in memory.
- Variables are nothing but reserved memory locations to store values.
- Based on the data type of a variable, the interpreter allocates memory and decides what can be stored in the reserved memory.
- Python variables do not need explicit declaration to reserve memory space. The declaration happens automatically when you assign a value to a variable.

- Python has various standard data types that are used to define the operations possible on them and the storage method for each of them.
- Python has five standard data types –
    - Numbers
    - Strings
    - Lists
    - Tuples
    - Dictionary

2.5.1 Python Numbers:

- Number data types store numeric values. Number objects are created when you assign a value to them.
- Python supports four different numerical types − int (signed integers) long (long integers, they can also be represented in octal and hexadecimal) float (floating point real values) complex (complex numbers).

2.5.2 Python Strings:

- Strings in Python are identified as a contiguous set of characters represented in the quotation marks.
- Python allows for either pairs of single or double quotes.
- Subsets of strings can be taken using the slice operator ([ ] and [:]) with indexes starting at 0 in the beginning of the string and working their way from -1 at the end.
- The plus (+) sign is the string concatenation operator and the asterisk (*) is the repetition operator.

2.5.3 Python Lists:

- Lists are the most versatile of Python's compound data types.

- A list contains items separated by commas and enclosed within square brackets ([]).
- To some extent, lists are similar to arrays in C. One difference between them is that all the items belonging to a list can be of different data types.
- The values stored in a list can be accessed using the slice operator ([ ] and [:]) with indexes starting at 0 in the beginning of the list and working their way to end -1.
- The plus (+) sign is the list concatenation operator, and the asterisk (*) is the repetition operator.

2.5.4 Python Tuples:

- A tuple is another sequence data type that is similar to the list.
- A tuple consists of a number of values separated by commas. Unlike lists, however, tuples are enclosed within parentheses.
- The main differences between lists and tuples are: Lists are enclosed in brackets ([ ]) and their elements and size can be changed, while tuples are enclosed in parentheses (( )) and cannot be updated.
- Tuples can be thought of as read-only lists.
- For example − Tuples are fixed size in nature whereas lists are dynamic. In other words, a tuple is immutable whereas a list is mutable. You can't add elements to a tuple. Tuples have no append or extend method. You can't remove elements from a tuple. Tuples have no remove or pop method.

2.5.5 Python Dictionary:

- Python's dictionaries are a kind of hash table type. They work like associative arrays or hashes found in Perl and consist of key-value pairs.

A dictionary key can be almost any Python type, but are usually numbers or strings. Values, on the other hand, can be any arbitrary Python object.

- Dictionaries are enclosed by curly braces ({ }) and values can be assigned and accessed using square braces ([]).
- You can use numbers to "index" into a list, meaning you can use numbers to find out what's in lists. You should know this about lists by now, but make sure you understand that you can only use numbers to get items out of a list.
- What a dict does is let you use anything, not just numbers. Yes, a dict associates one thing to another, no matter what it is.

2.6 PYTHON FUNCTION:

2.6.1 Defining a Function:

You can define functions to provide the required functionality. Here are simple rules to define a function in Python. Function blocks begin with the keyword def followed by the function name and parentheses (i.e.()).

Any input parameters or arguments should be placed within these parentheses. You can also define parameters inside these parentheses The code block within every function starts with a colon (:) and is indented. The statement returns [expression] exits a function, optionally passing back an expression to the caller. A return statement with no arguments is the same as return None.

2.6.2 Calling a Function:

Defining a function only gives it a name, specifies the parameters that are to be included in the function and structures the blocks of code. Once the basic

structure of a function is finalized, you can execute it by calling it from another function or directly from the Python prompt.

2.7 PYTHON USING OOPs CONCEPTS:

2.7.1 Class:

- Class: A user-defined prototype for an object that defines a set of attributes that characterize any object of the class. The attributes are data members (class variables and instance variables) and methods, accessed via dot notation.
- Class variable: A variable that is shared by all instances of a class. Class variables are defined within a class but outside any of the class's methods. Class variables are not used as frequently as instance variables are.
- Data member: A class variable or instance variable that holds data associated with a class and its objects.
- Instance variable: A variable that is defined inside a method and belongs only to the current instance of a class.
- Defining a Class: o We define a class in a very similar way how we define a function. o Just like a function ,we use parentheses and a colon after the class name(i.e. ():) when we define a class. Similarly, the body of our class is indented like a function body is.

Figure 7 : Defining a Class

2.7.2 __init__ method in Class:

- The init method — also called a constructor — is a special method that runs when an instance is created so we can perform any tasks to set up the instance.
- The init method has a special name that starts and ends with two underscores:__init__().

CHAPTER- 3

CASE STUDY

3.1 PROBLEM STATEMENT:

Prediction of acceptance of admission into a university.

3.2 DATA SET:

The given dataset contains following parameters:

The **dataset** consists of 400 rows and 8 columns where chance of admit is the target variable we have to predict the target variable from other columns by finding the relationship between the dataset.

CHAPTER-4

MODEL BUILDING

4.1 Environment and tools

1. scikit-learn
2. seaborn
3. numpy
4. pandas
5. matplotlib

4.1.1 Import the libraries

```
import numpy as np
import pandas as pd
#import os
from matplotlib import pyplot as plt
from sklearn import preprocessing
from sklearn.preprocessing import StandardScaler
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.tree import DecisionTreeRegressor
from sklearn.ensemble import RandomForestRegressor
import seaborn as sns
sns.set(style='white')
sns.set(style='whitegrid', color_codes=True)
```

The columns in the dataset are Serial Number, GRE score, TOEFL score, University Rating, SOP, LOR, CGPA, Research and Chance of Admit read_csv is a pandas function to read csv files.head() method is used to return top n (5 by default) rows of a DataFrame or series.I removed the Serial Number column as that does not seem relevant to the context here. The first five rows of the dataset are shown below.

4.1.2 Read the file

```
df = pd.read_csv("Admission_Predict.csv")
df.head()
```

	Serial No.	GRE Score	TOEFL Score	University Rating	SOP	LOR	CGPA	Research	Chance of Admit
0	1	337	118	4	4.5	4.5	9.65	1	0.92
1	2	324	107	4	4.0	4.5	8.87	1	0.76
2	3	316	104	3	3.0	3.5	8.00	1	0.72
3	4	322	110	3	3.5	2.5	8.67	1	0.80
4	5	314	103	2	2.0	3.0	8.21	0	0.65

4.1.3 describe the dataset

describe() method computes a summary of statistics like count, mean, standard deviation, min, max and quartile values pertaining to the DataFrame columns.

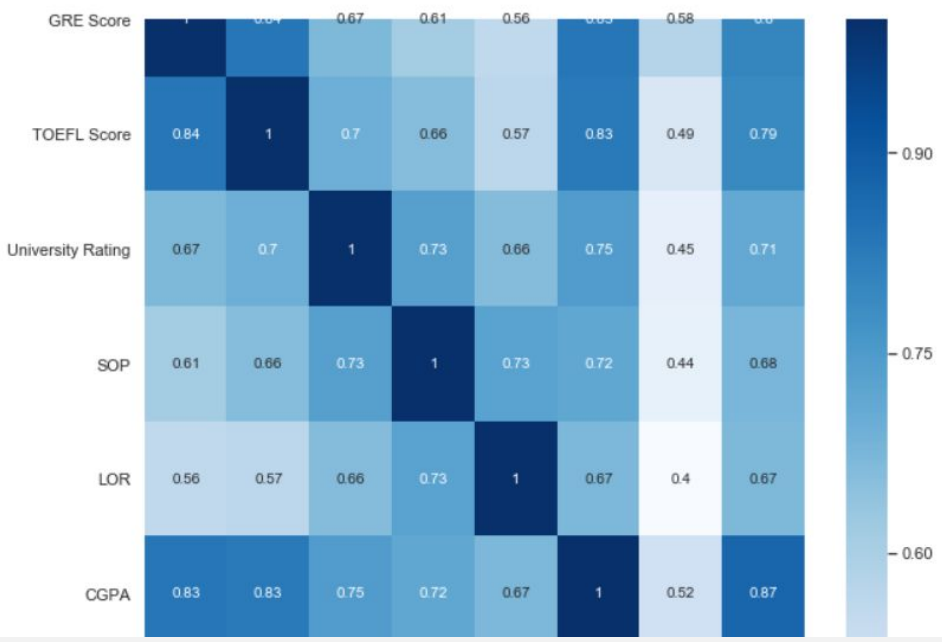
```
df.describe()
```

	Serial No.	GRE Score	TOEFL Score	University Rating	SOP	LOR	CGPA	Research	Chance of Admit
count	400.000000	400.000000	400.000000	400.000000	400.000000	400.000000	400.000000	400.000000	400.000000
mean	200.500000	316.807500	107.410000	3.087500	3.400000	3.452500	8.598925	0.547500	0.724350
std	115.614301	11.473646	6.069514	1.143728	1.006869	0.898478	0.596317	0.498362	0.142609
min	1.000000	290.000000	92.000000	1.000000	1.000000	1.000000	6.800000	0.000000	0.340000
25%	100.750000	308.000000	103.000000	2.000000	2.500000	3.000000	8.170000	0.000000	0.640000
50%	200.500000	317.000000	107.000000	3.000000	3.500000	3.500000	8.610000	1.000000	0.730000
75%	300.250000	325.000000	112.000000	4.000000	4.000000	4.000000	9.062500	1.000000	0.830000
max	400.000000	340.000000	120.000000	5.000000	5.000000	5.000000	9.920000	1.000000	0.970000

4.1.4 Heatmap

```
fig, ax = plt.subplots(figsize=(10,10))
sns.heatmap(df.corr(), annot=True, cmap='Blues')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x1a314530e88>
```



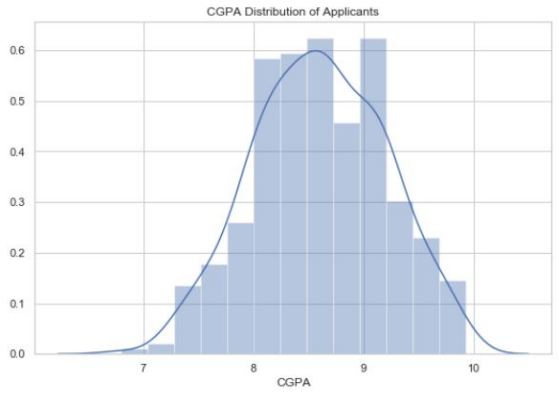
The heatmap is a way of representing the data in a 2-dimensional form. The data values are represented as colors in the graph. The goal of the heatmap is to provide a colored summary of information

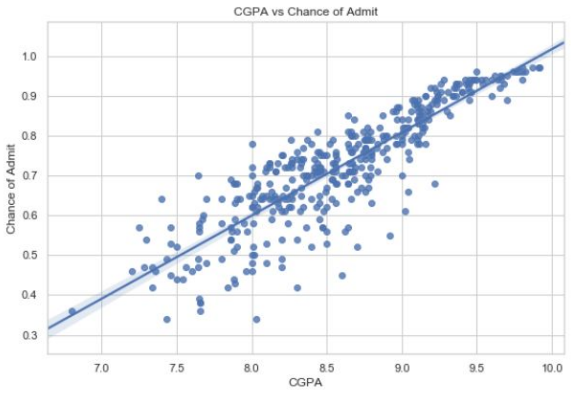
4.1.5 Plotting dist and regplot

```
plt.figure(figsize=(20,6))
plt.subplot(1,2,1)
sns.distplot(df['CGPA'])
plt.title('CGPA Distribution of Applicants')

plt.subplot(1,2,2)
sns.regplot(df['CGPA'], df['Chance of Admit'])
plt.title('CGPA vs Chance of Admit')
```

```
Text(0.5, 1.0, 'CGPA vs Chance of Admit')
```



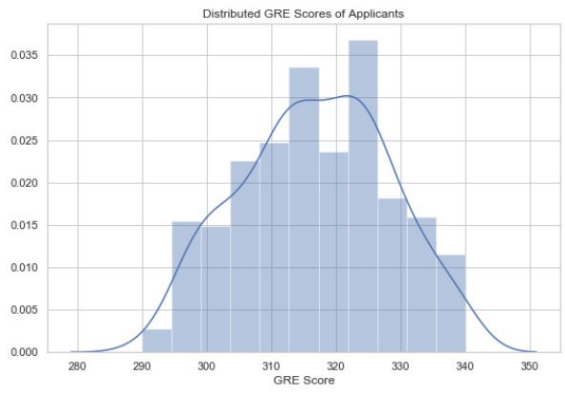


Plotting the distplot for cgpa and regplot for cgpa and chance of admit.Here in distplot we get a normalized curve

```
plt.figure(figsize=(20,6))
plt.subplot(1,2,1)
sns.distplot(df['GRE Score'])
plt.title('Distributed GRE Scores of Applicants')

plt.subplot(1,2,2)
sns.regplot(df['GRE Score'], df['Chance of Admit'])
plt.title('GRE Scores vs Chance of Admit')
```

```
Text(0.5, 1.0, 'GRE Scores vs Chance of Admit')
```

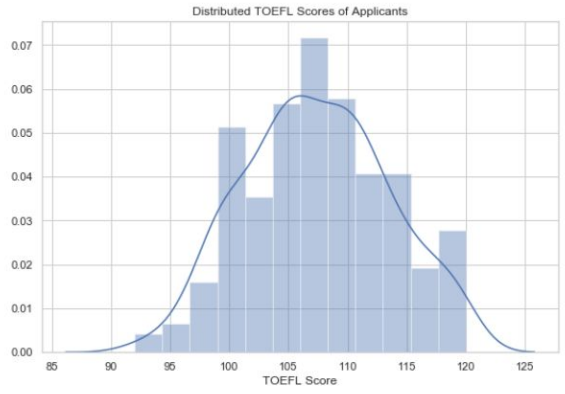


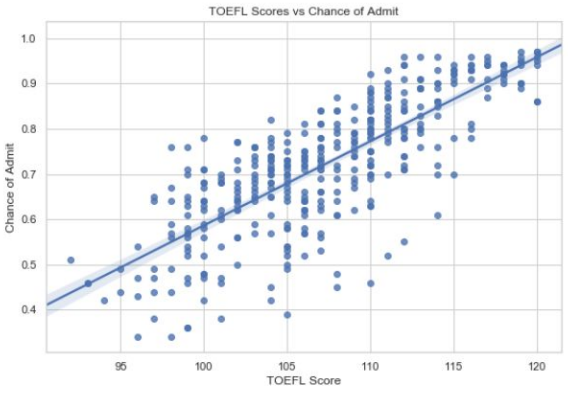
Plotting distplot for TOFELscor and regplot for TOEFL score and chance of admit

```
plt.figure(figsize=(20,6))
plt.subplot(1,2,1)
sns.distplot(df['TOEFL Score'])
plt.title('Distributed TOEFL Scores of Applicants')

plt.subplot(1,2,2)
sns.regplot(df['TOEFL Score'], df['Chance of Admit'])
plt.title('TOEFL Scores vs Chance of Admit')
```

```
Text(0.5, 1.0, 'TOEFL Scores vs Chance of Admit')
```



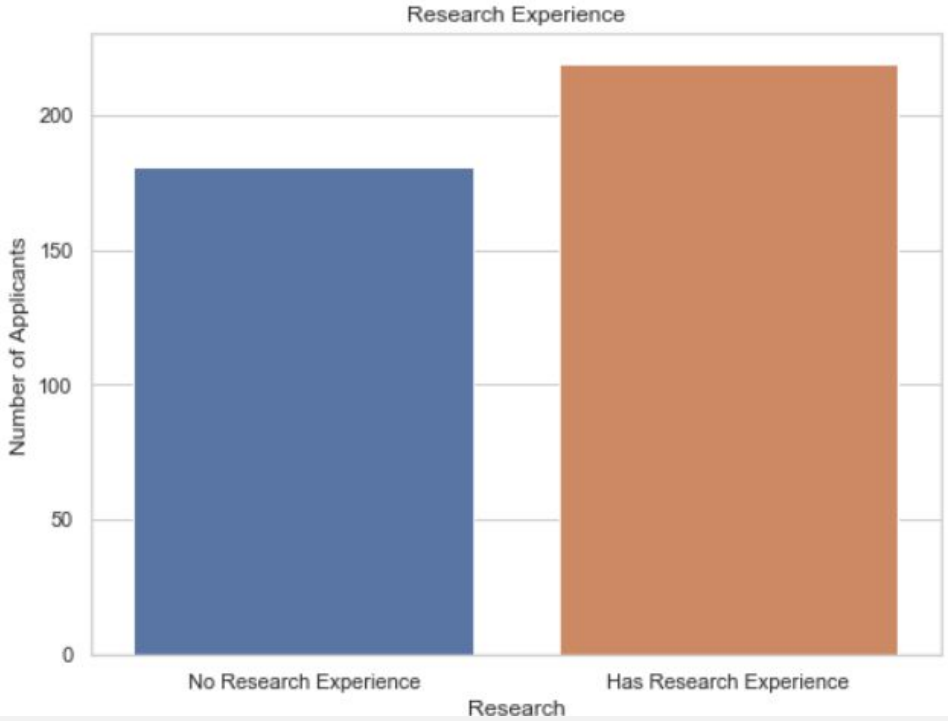


Plotting the countplot of research with title as research experience and ylabel as number of applicants and xtickle label as no research experience and has research experience

4.1.6 plotting countplot

```
fig, ax = plt.subplots(figsize=(8,6))
sns.countplot(df['Research'])
plt.title('Research Experience')
plt.ylabel('Number of Applicants')
ax.set_xticklabels(['No Research Experience', 'Has Research Experience'])
```

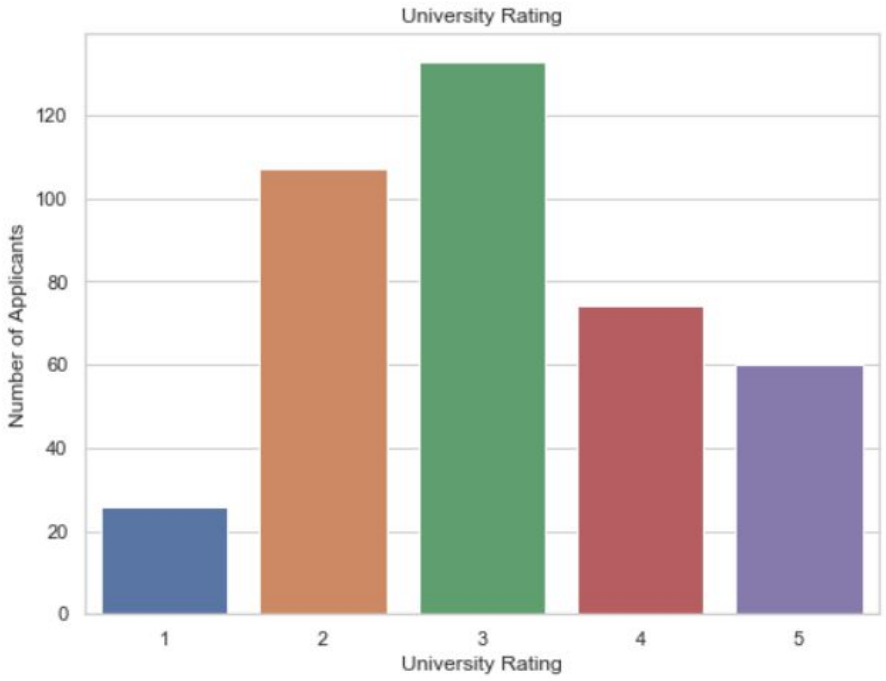
```
[Text(0, 0, 'No Research Experience'), Text(0, 0, 'Has Research Experience')]
```



Plotting the countplot of university with title as university rating and ylabel as number of applicants

```
fig, ax = plt.subplots(figsize=(8,6))
sns.countplot(df['University Rating'])
plt.title('University Rating')
plt.ylabel('Number of Applicants')
```

```
Text(0, 0.5, 'Number of Applicants')
```



I split the data into two different sets, one for the independent features — x, and one for the dependent variable — y (which is the last column). Next I split the dataset x into two separate sets — xTrain and xTest. Similarly, I splitted the dataset y into two sets as well — yTrain and yTest. The training set has 80% of data while the test has 20% of it.

4.2 Training the model

4.2.1 Splitting the data

```
targets = df['Chance of Admit']
features = df.drop(columns = {'Chance of Admit'})

X_train, X_test, y_train, y_test = train_test_split(features, targets, test_size=0.2, random_state=42)
```

4.3 Building the model

4.3.1 linear regression

```
linreg = LinearRegression()
linreg.fit(X_train, y_train)
y_predict = linreg.predict(X_test)
linreg_score = (linreg.score(X_test, y_test))*100
linreg_score
```

```
81.73867881114431
```

Linear Regression is a machine learning algorithm based on supervised learning. It performs a regression task. Regression models a target prediction value based on independent variables. It is mostly used for finding out the relationship between variables and forecasting.

In linear regression model we get the accuracy of 81.73

```
dec_tree = DecisionTreeRegressor(random_state=0, max_depth=6)
dec_tree.fit(X_train, y_train)
y_predict = dec_tree.predict(X_test)
dec_tree_score = (dec_tree.score(X_test, y_test))*100
dec_tree_score
```

```
73.99851580517213
```

```
forest = RandomForestRegressor(n_estimators=110,max_depth=6,random_state=0)
forest.fit(X_train, y_train)
y_predict = forest.predict(X_test)
forest_score = (forest.score(X_test, y_test))*100
forest_score
```

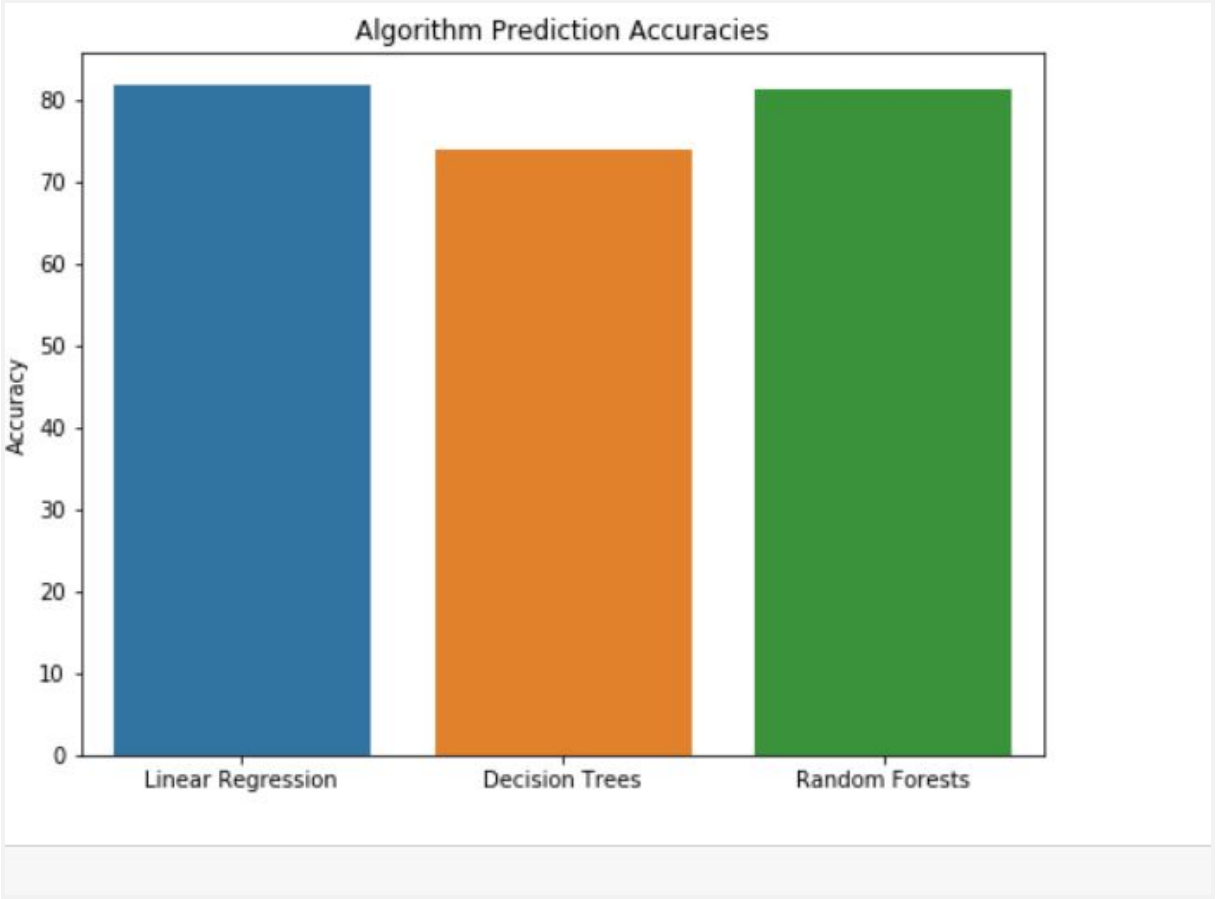
```
81.35407137081936
```

4.3.2 decision tree and random classifier

Decision Tree - Regression. Decision trees build regression or classification models in the form of a tree structure. It breaks down a dataset into smaller and smaller subsets while at the same time an associated decision tree is incrementally developed.
In decision tree algorithm we get the accuracy of 73.99

A **random regression forest** is an ensemble of randomized **regression** trees. Denote the predicted value at point by the -th tree, where are independent **random** variables, distributed as a generic **random** variable independent of the sample . random regression model we get the accuracy of 81.35

4.4 Bar plot of linear decision and random model




```
Displaying the barplot of accuracy of linear
regression decision tree and random forest
```

5.Conclusions:

As a quick summary,i used linear regression,random forest,decision tree algorithm to visualize the importance of each feature for graduate admission.I get more accuracy on random tree

6.References:

https://github.com/123-Msr/predection-of-acceptency-of-admission-into-a-university/upload