Visvesvaraya Technological University

Belagavi-590014, Karnataka

An Internship Report on

"Artificial Intelligence & Machine Learning"

Submitted in partial fulfillment of the requirements for the award of

Bachelor of Engineering

in

Computer Science and Engineering

Submitted By

AKASH BHANGI **2JI19CS005**

Under the Guidance of

Prof. PRATIK J. DESHPANDE

Internship Carried Out at

"AQMENZ Automation Pvt. Ltd.,
Bengaluru"

Department of Computer Science and Engineering

Sri Bhagawan Mahaveer Jain Educational & Cultural Trust's

Jain College of Engineering

Belagavi- 590014

Academic Year 2022-2023

Sri Bhagawan Mahaveer Jain Educational & Cultural Trust's

Jain College of Engineering

Belagavi- 590014

Department Of Computer Science and Engineering

Certificate

This is to certify that the Internship entitled **"Artificial Intelligence & Machine Learning"** is carried out at **Aqmenz Automation Pvt. Ltd., Bengaluru** by **AKASH BHANGI (2JI19CS005)** bonafide student of **Jain College of Engineering, Belagavi**, in partial fulfillment for the award of **Bachelor of Engineering** in **Computer Science and Engineering** from **Visvesvaraya Technological University, Belagavi**, during the academic year **2022-2023.** It is certified that all corrections/suggestions indicated for internal assessment have been incorporated in the report. The Internship report has been approved as it satisfies the academic requirements in respect of Internship work prescribed for the said degree.

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Prof. Pratik J. Deshpande	**Dr. Uttam Patil**
Guide	**HOD, CSE**

External Viva-Voce

Examiner 1	Examiner 2
Name: _____	Name: _____
Signature:_____	Signature:_____
Date: _____	Date: _____

Aqmenz Automation Private Limited

CIN: U74999KA2018PTC117612

INDOSKILL
FOR SKILL INDIA

CERTIFICATE

OF COMPLETION

THIS CERTIFICATE IS PROUDLY PRESENT TO

Akash Arjun Bhangi

2JI19CS005

Has successfully completed **Internship** on **"Artificial Intelligence & Machine Learning"** at **Aqmenz Automation Pvt. Ltd.** for a period of one month from 22.08.2022 to 22.09.2022.

CERTIFICATE ISSUE NO: IN / **9689** / FY2022

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DECLARARTION BY THE STUDENT

I, **AKASH BHANGI (2JI19CS005)**, hereby declare that the internship report entitled **"Artificial Intelligence And Machine Learning"** submitted by me to Jain College of Engineering, Belagavi, in partial fulfillment of the Degree of **Bachelor of Engineering in Computer Science & Engineering** is arecord of the internship carried out at **"Aqmenz industry Pvt. Ltd Bengaluru"**. This report is for the academic purpose.

I further declare that the report has not been submitted and will not be submitted, either in part or full, to any other institution and University for the award of any diploma or degree.

Place: Belagavi AKASH BHANGI (2JI19CS005)

Date: 22/08/2022

ACKNOWLEDGEMENT

The satisfaction and euphoria that accompany the successful completion of any task would be incomplete without the mention of the people who made it possible, whose constant guidance and encouragement crowned the efforts with success.

I would like to profoundly thank management of **Jain College of Engineering, Belagavi** for providing such a healthy environment for the successful completion of Internship work.

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I would also like to thank Internship Coordinator of our department **Prof. Shweta Mugalihal**, Assistant Professor, Department of Computer Science & Engineering for his constant support and guidance throughout the Internship work.

I would also like to thank all other teaching and non-teaching staff of Computer Science Department who has directly or indirectly helped me in the completion of the Internship work.

Last, but not the least, I would hereby acknowledge and thank my parents who have been a source of inspiration and also instrumental in the successful completion of the Internship work.

-AKASH BHANGI

[2JI19CS005]

ABSTRACT

In the 30 days of Internship we study about the emerging technologies ie. Artificial intelligence and machine learning using python programming language, python is used since it is easy to manage, and due to its popularity in machine learning and its libraries used. I got the opportunity to do the internship in Aqmenz automation Pvt ltd. First we learnt about the python basics and its applications, then going to machine learning its types, steps involved in data filtering, cleaning and training the data to predict the future.

Artificial intelligence is the key to all the computer systems to learn themselves by the given set of data set. Deep learning which is based on neural networks is the brain of computer that programs to deal with all the applications used in our day-to-day life ie. Image analysis, self-driven cars, NLP etc. Then after all the concepts covered we implemented the project on individual basis I predicted Employee salary based on experience using random forest classifier for next 30 days on the analysis of the previous yearly dataset. To conclude with we got to learn how the predictions are made on what basis and how are they implemented with the help of algorithms, statistical data and programming languages.

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CHAPTER 1

ABOUT THE ORGANIZATION

Fig1.1 Company Logo

1.1. Formation of company

Aqmenz Automation Private Limited is a private incorporated on 15th October 2018. It is classified as Non-Gov. Company and is registered at Registrar of companies, Bangalore.

1.2. Brief history of company

Future jobs academy was started in 2010. Later in October 2018 it is named as Aqmenz Automation Private Limited. It is situated in northern part of Bangalore, RT Nagar, and Karnataka. We do industrial projects on automation and robotics. We are also into training business from the year 2010 predominantly we are conducting skill and personality development industrial automation training, entrepreneurship, jobs hands on experience oriented workshops various institutions across Karnataka.

1.3. Objectives

- The utmost priority is to add skill to the young Generation and make them profitable and productive for the nation.
- Providing industrial automation training skill module kits to Institution, University's & college lab facilities with lowest possible price for the benefits of technical students.
- Identifying young entrepreneurs and motivate, training them to establish start-up to create employment as well as prosperity for the nation.
- Providing low cost & precise industrial automation solutions. Very eager to fetch solution for most complex industrial problems in a modest way.

1.4. Vision and mission

Our Motto and Vision are to create awareness & training young generation to current and future jobs demands and also help to current and future jobs demands; meanwhile help the students and employees to meet the mandatory necessities of future human resources and skill demands. We are in the 4th industrial revolution. The technological revolution is catastrophic like never before, hence continues awareness for the up-gradation environment is much essential. Aqmenz Automation Pvt. Ltd. Is working to help and enhance the potential of students and employees. So that future human resources will be very beneficial, purposeful and profitable to the nation.

1.5. Major Milestones

We have under gone many industrial projects. Our major clients are BIAL (Bangalore International Airport Limited), GE (General Electric) and Amics technologies.

1.6. Service offered

- All type of automation projects to companies using PLC's, SCADA embedded systems.
- We provide robots and robotic solutions to small and medium scale companies Embedded solutions to companies like GE
- We conduct technical skill oriented training programs to engineering colleges.
- We also provide robotics and automation lab equipments for colleges.

1.7. Ongoing projects

- Low cost 3D Printing
- SCADA and Cartesian robots
- Automation related projects
- Articulated Robot

1.8. Introduction to the task performed

The tasks offered by this institution are as follows:

- PLC: they are based on Boolean logic operations some models use timers and some have continuous control.
- DCS (Distributed Control System): DCS consists of decentralized elements and all the process are controlled by these elements. Human interactions are minimized so the labour cost and injuries can be reduced.
- Embedded control: in this control system small parts are attached to industrial computer system with the help of a network and control is exercised.
- SCADA (Supervisory Control and Data Acquisition): it refers to centralized system and this system is composed of various sub-systems like remote telemetry units, human machine interface, programmable logic controller and communication

1.9. Scope of work:

- To minimize the leading work-time and accuracy.
- It helps in managing and controlling variety of processes within the industry

1.10. Objective

- Industrial automation is one of the thriving and job providing sector in current scenario. There are huge requirements of highly skilled multidisciplinary and multi-tasking engineers.
- To train young generation engineers and technicians to meet global job market skill demands by providing skill courses, workshops and hands on experiencing industrial live projects.

1.11. Achievements made by the company in the field

We have under gone many industrial projects. Our major clients are BIAL (Bangalore International Airport Limited), GE (General Electric) and Amics technologies.

CHAPTER 2

INTERNSHIP ACTIVITIES

At the very first, introduction to the course in detail and installation of the required software to work on the necessary problem statements, basic important concepts of the python programming language, indexing and decision make statements with real time examples and applications in python programming language, application in car parking lot. String operations in python programming language, structured data types, arrays, and packages like pandas in python programming language, introduction and road map for machine learning using python programming language, data exploration techniques, map function, apply function, lambda function in pandas. Data cleaning, Data processing, Data visualisation and various data analysis. Feature engineering and methods to perform feature engineering, Data processing with types of encoding, data processing, features and methods of scaling, standardization and normalization. Linear regression and a real time example project on experience based salary prediction using machine learning, linear regression, multi linear regression, project on insurance expense prediction using linear regression, and training the model using ML, classification models in machine learning, the Kernel tricks for support vector machines, deep learning, perception or neutron, neural networks and project on handwritten digits recognition .Convulsion neural network.

2.1. MACHINE LEARNING STEPS:

Machine learning is one of the most important subsets of artificial intelligence. Machine learning is a machine model that is designed to learn and act on a set of real or simulated examples and data, using algorithms without explicitly planning and dictating individual actions. The goal of machine learning is for computers and systems to be able to perform the desired task gradually and with increasing data. The range of machine learning research is very wide. Theoretically, researchers are trying to create new learning methods and study the feasibility and quality of learning for their methods, and on the other hand, some researchers try to apply machine learning methods to new issues. Of course, this spectrum is not discrete and the researches have components of both approaches. The steps of analyzing machine learning processes include data collection and preparation, model selection and training, and setting and predicting super parameters.

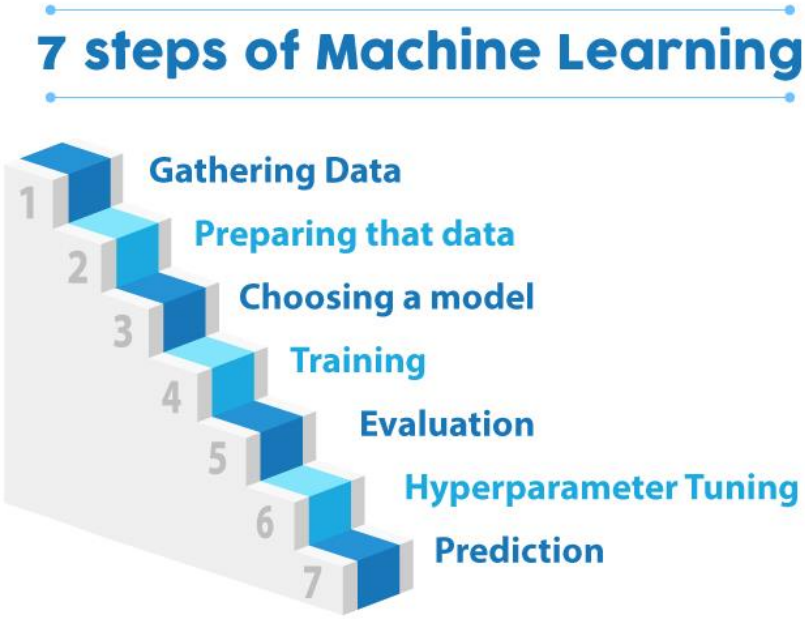

Fig2.1. Steps in Machine Learning

2.1.1. Data Gathering

The first step in the machine learning process is to provide the knowledge and data needed for the machine. This data is divided into two groups. The first group is used to train the system and the second group is used to test the system. It should be noted that the selected data represent the entire population. The data is usually divided into 20/80 or 70/30, to ensure that the model can be tested later after adequate training.

2.1.2. Data Cleaning

Data cleaning is one of the important parts of machine learning. It plays a significant part in building a model. It surely isn't the fanciest part of machine learning and at the same time, there aren't any hidden tricks or secrets to uncover. However, the success or failure of a project relies on proper data cleaning. Professional data scientists usually invest a very large portion of their time in this step because of the belief that "Better data beats fancier algorithms". If we have a well-cleaned dataset, there are chances that we can get achieve good results with simple algorithms also, which can prove very beneficial at times especially in terms of computation when the dataset size is large. Obviously, different types of data will require different types of cleaning. However, this systematic approach can always serve as a good starting point.

2.1.3. Data Visualisation

Data visualization is the graphical representation of information and data in a pictorial or graphical format (Example: charts, graphs, and maps). Data visualization tools provide an accessible way to see and understand trends, patterns in data, and outliers. Data visualization tools and technologies are essential to analyzing massive amounts of information and making data-driven decisions. The concept of using pictures is to understand data that has been used for centuries. General types of data visualization are Charts, Tables, Graphs, Maps, Dashboards.

2.1.4. Data Processing

Data Processing is the task of converting data from a given form to a much more usable and desired form i.e. making it more meaningful and informative. Using Machine Learning algorithms, mathematical modeling, and statistical knowledge, this entire process can be automated. The output of this complete process can be in any desired form like graphs, videos, charts, tables, images, and many more, depending on the task we are performing and the requirements of the machine. This might seem to be simple but when it comes to massive organizations like Twitter, Facebook, Administrative bodies like Parliament, UNESCO, and health sector organizations, this entire process needs to be performed in a very structured manner.

2.1.5. Training and Testing

Train/Test is a method to measure the accuracy of your model. It is called Train/Test because you split the data set into two sets: a training set and a testing set. 80% for training, and 20% for testing. Train the model using the training set and test the model using the testing set.

2.1.6. Predictive Model

In simple words, predictive modeling is usually practiced statistical technique to foretell future outcomes, these are solutions in terms of data mining technology to analyze past and recent data and produce a model to identify future behaviour from data.

2.1.7. Super Parameters

In machine learning terms, super parameters are parameters that cannot be estimated by the model itself, but need to be considered because they play a very important role in increasing the performance of the model. If we want to provide a definition, super parameters in machine learning are parameters that must be specified by the user to run the algorithm. Classic parameters are taught by data, while super parameters may learn from data. A model can have a large number of super parameters, and the process of selecting the best possible combination of super parameters is called super parameters setting. After completing the process of optimizing the super parameters, it can be said that the machine learning model has been built and depending on its success rate or its accuracy, its predictive ability, it can be implemented in the real world. Therefore, with the help of the above methods, a machine learning algorithm can be built.

2.2. ALGORITHMS AND PROBLEM SOLVING APPROACHES:

Various methods have been introduced for machine learning, the study of each of which requires the creation of separate manuscripts. In the following, we will introduce some very practical cases

2.2.1. Artificial neural networks (ANN)

These networks are designed based on the function of the human brain, and instead of neurons in the human brain, artificial neurons are used in a computer algorithm and can have an input or output, which is usually a number. The input of the same features of our data, such as area an-+d life, is given through the input neurons, and the output is the same as the price of the building. Figure 3 shows an image of a simple artificial neural network that wants to output y with the help of the m attribute x.

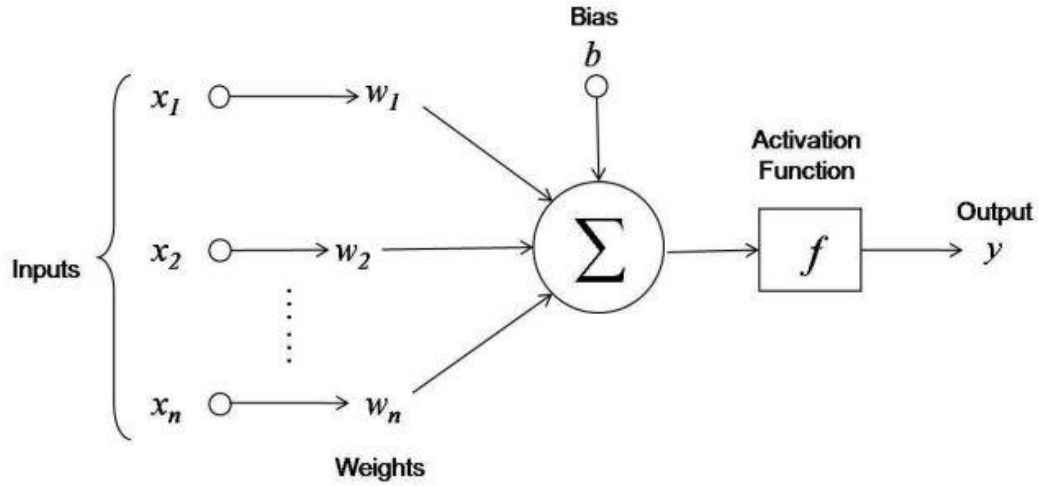

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Fig2.2.1. Artificial Neural Network Working

2.2.2. Deep Learning

These are the artificial neural networks to which we have added many neurons as intermediate layers. These networks are more powerful and more complex to learn. These networks also have their own classification, an example of which is called convolution neural networks. Figure shows an example of deep grids that have three middle and hidden layers

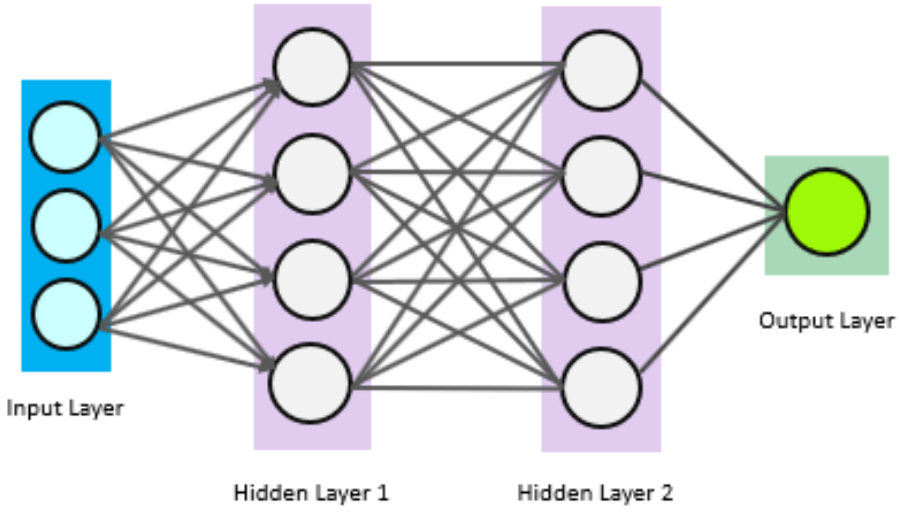

Fig2.2.2. Deep Learning

Deep learning is a subset of machine learning whose distinguishing feature is its problem-solving method. Machine learning requires a domain specialist to identify more functional features. Deep learning, on the other hand, gradually acquires features, thus eliminating the need for domain expertise. This makes deep learning algorithms take longer to train than machine learning algorithms that only take a few seconds to a few hours. However, when testing, the opposite is true. Deep learning algorithms take less time to perform Tests than machine learning algorithms that increase test time with data size.

Deep learning has many applications in industry; from automatic driving to technologies used in medical devices. One of the most popular types of deep neural networks is the Convolution Neural Network, also known as ConvNet or CNN for short. This method has had many successes; because at CNN, as the data and the size of the model increase, the neural network expands and adapts. It can also be trained in back propagation. CNN eliminates the need to extract features; this means that we do not need to specify its properties to categorize images. CNN automatically extracts image properties directly. CNN's features make it very accurate in machine vision tasks, such as sorting objects. CNNs learn to recognize the various features of an image using tens and hundreds of hidden layers of neural network. Each additional layer increases the complexity of the properties. For example, the first layer can learn to recognize the edges of objects; while the last layer learns to identify the complex shapes and curvatures of objects.

2.3. TYPES OF MACHINE LEARNING

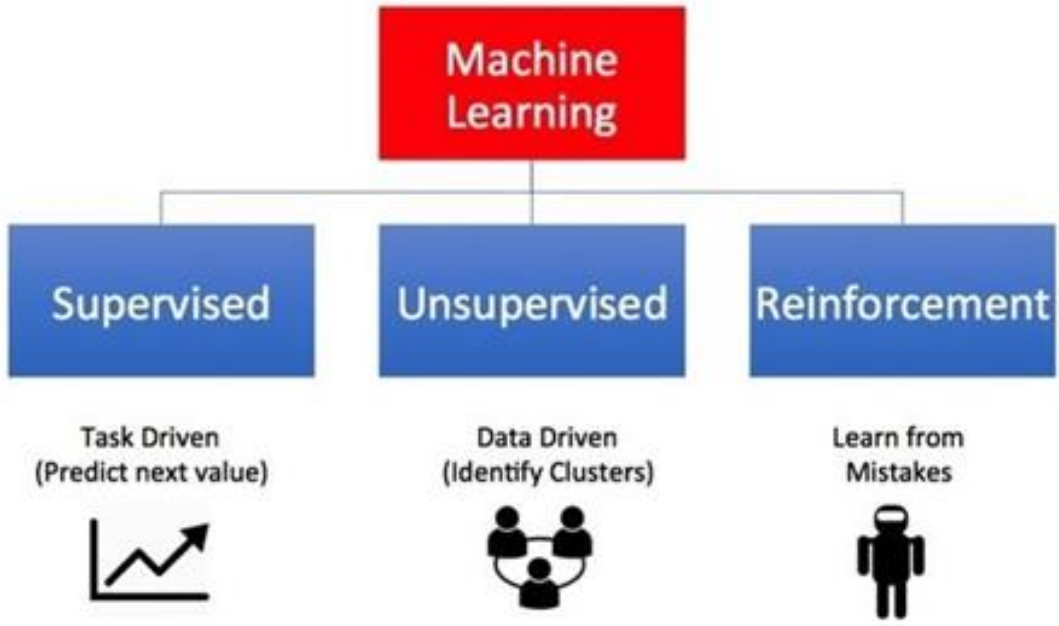

Fig2.3. Types of Machine Learning

2.3.1. Supervised learning

As its name suggests, Supervised machine learning is based on supervision. It means in the supervised learning technique, we train the machines using the "labelled" dataset, and based on the training, the machine predicts the output. Here, the labelled data specifies that some of the inputs are already mapped to the output. More preciously, we can say; first, we train the machine with the input and corresponding output, and then we ask the machine to predict the output using the test dataset.

2.3.2. Unsupervised learning

Unsupervised learning is different from the Supervised learning technique; as its name suggests, there is no need for supervision. It means, in unsupervised machine learning, the machine is trained using the unlabeled dataset, and the machine predicts the output without any supervision. In unsupervised learning, the models are trained with the data that is neither classified nor labelled, and the model acts on that data without any supervision.

2.3.3. Reinforcement learning

Reinforcement learning works on a feedback-based process, in which an AI agent (A software component) automatically explore its surrounding by hitting & trail, taking action, learning from experiences, and improving its performance. An agent gets rewarded for each good action and gets punished for each bad action; hence the goal of reinforcement learning agent is to maximize the rewards. In reinforcement learning, there is no labelled data like supervised learning, and agents learn from their experiences only.

2.4. MACHINE LEARNING APPLICATIONS

So far, the article has talked more about what and how to learn machine learning processes and its concepts. Now we want to look at the applications of artificial intelligence and the different areas in which artificial intelligence is used. Some of the basic applications of machine learning and artificial Intelligence

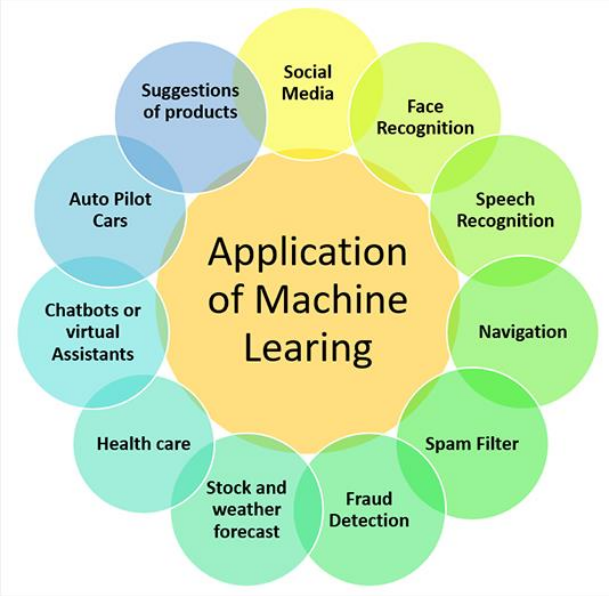

Fig2.4. Applications of Machine Learning

CHAPTER 3

INTERNSHIP OUTCOMES

3.1. SKILLS ACQUIRED:

- Basics to advance Python Programming
- Applications of Python
- Machine learning
- Artificial Intelligence
- Deep learning

3.2. TOOLS USED DURING INTERNSHIP:

The tools used for learning our internship course artificial intelligence & machine learning were:

1. Anaconda Software
2. Jupyter Notebook
3. Google Colab

Fig3.1. Jupyter and Google colab

3.2.1. Anaconda Software

Anaconda software is an open source distribution of the python and language for data science that aims to simplify package management and deployment.

3.2.2. Jupyter Notebook

Jupyter notebook allows you to create and edit documents that display the input and output of a python or R language script. Once saved which can be accessed and shared with others. Jupyter notebook is an open source web application that allows you to create and share documents that contain live code, equations, visualizations and narrative text. Its various uses are data cleaning and transformation, numerical simulation, statistical modeling, data visualisation, machine learning and much more.

3.2.3. Google Colab

Colab allows anybody to write and execute arbitrary python code through browser and is especially well suited to machine learning, data analysis and education. Colab is a free notebook environment that runs entirely in cloud.

3.3. TASK PERFORMED:

- At the very first we were introduced to the course in detail and installation of the required Software to work on the necessary problem statements, Basic important concepts of the python programming language, indexing and decision make statements with real time examples and applications in python programming language, application of car parking lot.
- String operations in python programming language, structured data types, arrays, and packages like pandas in python programming language, introduction and road map for machine learning using python programming language, data exploration techniques, map function, apply function, lambda function in pandas.
- Data cleaning, Data visualisation and various data analysis. Feature engineering and methods to perform feature engineering, data processing with types of encoding, data processing, features and methods of scaling, standardization and normalization.
- Linear regression and a real time example project on experience based salary prediction using machine learning, linear regression, multi linear regression, project on insurance expense prediction using linear regression, and training the model using ML, classification models in machine learning.

CHAPTER 4

OUTCOMES OF INTERNSHIP

- After completing the internship, I was able to learn the process of development through various cycles and also with the latest technologies involved in the industry.
- I was able to understand the proper flow of code and professional code ethics to be followed bythe developer in order for the code to be globally accepted.
- I was able to understand the implementation procedures for the machine learning algorithms.
- I am capable of designing python programs for various Learning algorithms. Identify and applyMachine Learning algorithms to solve real world problems.
- Developed soft skills which include effectively communicate, leadership skills etc.
- Built network which can help in future.
- Gained hands on professional experience.
- Build a record of work experience.

CHAPTER 5

APPENDICES

Project:

Salary Expectation Based On Experiences

Steps of execution:

The steps for executing a prediction in AI/ML typically involve the following:

1. Collect and preprocess the data: The first step in executing a prediction is to collect relevant data from various sources and preprocess it to make it suitable for training your AI/ML model.
2. Select an appropriate AI/ML algorithm: Once you have preprocessed the data, the next step is to select an appropriate AI/ML algorithm that can analyze the data and make predictions. The choice of algorithm depends on the type of data and the problem you're trying to solve.
3. Train the model: After selecting the algorithm, the next step is to train the model using the preprocessed data. This involves using the algorithm to learn patterns and relationships in the data and to optimize the model's performance.
4. Test the model: Once the model is trained, you need to test its accuracy and performance using a separate set of data that was not used during the training process. This step is critical to ensure that the model can accurately predict outcomes on new data.
5. Deploy the model: After testing the model, the final step is to deploy it in a production environment where it can make predictions on new data. This step involves integrating the model into your existing software infrastructure and configuring it to receive new data and make predictions in real-time.
6. Monitor and update the model: Once the model is deployed, it's essential to monitor its performance and update it periodically to ensure that it continues to provide accurate predictions. This step involves collecting feedback on the model's performance and making adjustments as needed to improve its accuracy and reliability.

Code:

```
import pandas as pd
import numpy as np
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
from sklearn.metrics import mean_squared_error

# Load the dataset
data = pd.read_csv('salary_data.csv')
data.head()
print(data.columns)
data.describe()
data.isnull()
data.isnull().any()
data.isnull().sum()

import matplotlib.pyplot as plt
import seaborn as sns
sns.scatterplot(data = data, x = "YearsExperience",y = "Salary")

# Separate the independent variable (years of experience) from the dependent variable (salary)
X = data.drop("Salary",axis = 1)
Y = data["Salary"]

from sklearn.model_selection import train_test_split

# Split the data into training and testing sets
xtrain,xtest,ytrain,ytest=train_test_split(X,Y,test_size = 0.2,random_state = 40)

# Create a linear regression model and fit it to the training data
from sklearn.linear_model import LinearRegression
model = LinearRegression()
model.fit(xtrain,ytrain)

# Make predictions on the test data
y_pred=model.predict(xtest)
print(y_pred)
ytest

# Predict the salary for a new employee with years of experience
print(model.score(xtest, ytest))
model.predict(xtest[:1])
```

CONCLUSION

Today, different parsing data and different algorithms are used to model different problems. The amount of data generated by humans and machines is so great that the absorption, interpretation, and complex decisions based on that data go beyond human capabilities.

Artificial intelligence forms the basis of all computer learning and is the future of complex decision making. The use of computers in calculating these combinations and displacements is very useful for achieving the best decision. Artificial intelligence and deep learning is the key to making decisions about business and many other areas. Artificial intelligence can do many of the processes in a business on its own, dramatically reduce the workforce, and increase an organization's efficiency, save time and money, and many other resources. All of this is important to AI, especially All of this is important to AI, especially for businesses.