**MACHINE LEARNING**

**A SUMMER TRAINING REPORT**

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*in the partial fulfilment of Summer training for the award of the degree*

*of*

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**IN**

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**ABOUT THE COMPANY**

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We gave **trainings to more than twenty thousand students**. We successfully conducted **workshops and seminars in 300+** colleges all over India including the most prestigious institutes like IITs and NITs

**CERTIFICATE**

**ACKNOWLEDGEMENT**

I have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organizations. I would like to extend my sincere thanks to all of them.

I would like to thank Mr.Saurabh Bhardwaj, our supervisors for the training for their efforts and teaching us Machine Learning and giving us a new skill set. I would like to thank them for wonderfully taking us through the different concepts of the subject / domain and explaining its importance in the industry and its real – time uses. I would like to thank them for their continuous guidance and their support throughout the training.

I would also like to thank the TAs for the course who were always available to solve our doubts and help us with our projects if we got stuck anywhere and also helping us to clear our concepts on various aspects of the training, either in person after the class or through whatsApp groups at any time.

I would like to thank the entire support team of TechieNest for seamlessly organizing the training and also bringing different opportunities to our doors and also organizing webinars / sessions with the industry leaders in different fields to keep us motivated and realize the importance of the work.

**ABSRACT**

**Machine Learning** is the field of study that gives computers the capability to learn without being explicitly programmed. ML is one of the most exciting technologies that one would have ever come across. As it is evident from the name, it gives the computer that which makes it more similar to humans: The ability to learn. Machine learning is actively being used today, perhaps in many more places than one would expect.

Machine Learning can be broadly classified into 2 categories: Supervised and Unsupervised Learning.

Supervised learning is a learning in which we teach or train the machine using data which is well labelled that means some data is already tagged with the correct answer. After that, the machine is provided with a new set of examples(data) so that supervised learning algorithm analyses the training data(set of training examples) and produces a correct outcome from labelled data. It can be broadly classified into 2 categories: Classification and Regression.

Unsupervised learning is the training of an artificial intelligence (AI) algorithm using information that is neither classified nor labelled and allowing the algorithm to act on that information without guidance. It can be broadly classified into 2 types: Clustering and Association.

The training started with learning the syntax of Python and problem solving using Python. After that, the next part consisted of learning the python libraries necessary for Machine Learning which act as important tools while using Machine learning algorithms. The different modules covered were: Pandas, Numpy, Matplotlib. Pandas and numpy help in fetching nad manipulating the data whereas Matplotlib helps in visualising the data through bar graphs, histograms, plots, pie charts, etc.

After that, I was introduced to basics of Machine Learning and its benefits, use cases, and the library having inbuilt ML models – Sklearn. Then I was introduced to different regression and classification algorithms like Linear Regression, Gradient Descent and Logistic Regression, Decision Trees, Random Forests, KNN, Naïve Bayes, Support Vector Machines (SVMs) and Principle Component Analysis (PCA).

The next part consisted of working on Natural Language Processing (NLP), a basic introduction to Neural Networks and deep learning. After that, there was a basic introduction to Tensor Flow and Git (Version Control System) and GitHub and Unsupervised learning algorithms like k-Means Clustering.

During the training, I did several projects also like implementing Linear Regression on my own, applying Logistic Regression on titanic dataset and predicting who survived and who did not survive by applying different aspects of Machine learning on the dataset like data cleaning, feature extraction, etc. Another project I worked upon during the training was image classification on Cifar10 dataset which consists of around 60000 images of different categories.

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**CHAPTER – 1: INTRODUCTION**

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves.

The process of learning begins with observations or data, such as examples, direct experience, or instruction, in order to look for patterns in data and make better decisions in the future based on the examples that we provide. The primary aim is to allow thecomputerslearn automatically without human intervention or assistance and adjust actions accordingly.

**1.1. Some machine learning methods**

Machine learning algorithms are often categorized as supervised or unsupervised.

Supervised machine learning algorithmscan apply what has been learned in the past to new data using labelled examples to predict future events. Starting from the analysis of a known training dataset, the learning algorithm produces an inferred function to make predictions about the output values. The system is able to provide targets for any new input after sufficient training. The learning algorithm can also compare its output with the correct, intended output and find errors in order to modify the model accordingly.

In contrast, unsupervised machine learning algorithmsare used when the information used to train is neither classified nor labelled. Unsupervised learning studies how systems can infer a function to describe a hidden structure from unlabelled data. The system doesn’t figure out the right output, but it explores the data and can draw inferences from datasets to describe hidden structures from unlabelled data.

Semi-supervised machine learning algorithms fall somewhere in between supervised and unsupervised learning, since they use both labelled and unlabelled data for training – typically a small amount of labelled data and a large amount of unlabelled data. The systems that use this method are able to considerably improve learning accuracy. Usually, semi-supervised learning is chosen when the acquired labelled data requires skilled and relevant resources in order to train it / learn from it. Otherwise, acquiringunlabelled data generally doesn’t require additional resources.

Reinforcement machine learning algorithmsis a learning method that interacts with its environment by producing actions and discovers errors or rewards. Trial and error search and delayed reward are the most relevant characteristics of reinforcement learning. This method allows machines and software agents to automatically determine the ideal behavior within a specific context in order to maximize its performance. Simple reward feedback is required for the agent to learn which action is best; this is known as the reinforcement signal.

Machine learning enables analysis of massive quantities of data. While it generally delivers faster, more accurate results in order to identify profitable opportunities or dangerous risks, it may also require additional time and resources to train it properly. Combining machine

learning with AI and cognitive technologies can make it even more effective in processing large volumes of information.

**1.2 Advantages Of Machine Learning**

#### 1.Easily identifies trends and patterns

Machine Learning can review large volumes of data and discover specific trends and patterns that would not be apparent to humans. For instance, for an e-commerce website like Amazon, it serves to understand the browsing behaviours and purchase histories of its users to help cater to the right products, deals, and reminders relevant to them. It uses the results to reveal relevant advertisements to them.

#### 2. No human intervention needed (automation)

With ML, you don’t need to babysit your project every step of the way. Since it means giving machines the ability to learn, it lets them make predictions and also improve the algorithms on their own. A common example of this is anti-virus soft wares; they learn to filter new threats as they are recognized. ML is also good at recognizing spam.

#### 3. Continuous Improvement

As ML Algorithms gain experience, they keep improving in accuracy and efficiency. This lets them make better decisions. Say you need to make a weather forecast model. As the amount of data you have keeps growing, your algorithms learn to make more accurate predictions faster.

#### 4. Handling multi-dimensional and multi-variety data

Machine Learning algorithms are good at handling data that are multi-dimensional and multi-variety, and they can do this in dynamic or uncertain environments.

#### 5. Wide Applications

You could be an e-tailer or a healthcare provider and make ML work for you. Where it does apply, it holds the capability to help deliver a much more personal experience to customers while also targeting the right customers.

**1.3 Applications Of Machine Learning**

1. **Web Search Engine:** One of the reasons why search engines like google, bing etc work so well is because the system has learnt how to rank pages through a complex learning algorithm.

2. **Photo tagging Applications:** Be it facebook or any other photo tagging application, the ability to tag friends makes it even more happening. It is all possible because of a face recognition algorithm that runs behind the application.

**CHAPTER – 2: THEORY**

**2.1 General Theory**

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves.

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**CHAPTER–3: Project Work / Problem Solving and Methodology**

**3.1 Introduction**

* We have developed an automatic Attendance Checking System that can be used in classes by teachers to check attendances of their students.
* Face is used as clue for identifying who a person is.
* Automatic Attendance System is designed to collect and manage student’s attendance records from video camera devices installed in a class rooms. Based on the verification of student identification in the video cameras, attendance will be updated in data base. Attendance will be taken in every class at particular interval of time.
* OTP is sent on mail id of student if he enter a wrong OTP after three try he will mark absent

## 3.2 Face Extraction & Face Detection:

The face detection and extraction part has been executed by the OpenCv(cv2) module of Python. Haar Casscade Classifiers have been used for frontal face detection.

## 3.3 Datbase Handling:

The database handling i.e. storing student's information and attendance has been done in this project using sqlite3 module in Python.

## 3.4 Working:

The program can be executed by running the Biometric\_Project2.py after you have installed libraries like cv2, numpy and Face Recognition.One time password is sent to your mail After three trial session will out

**CHAPTER-4: Result and Discussion**

As a result of the different Machine Learning concepts learnt during the training and the projects undertaken, I have learnt the following things –

1.How to work on live images .

2.How to save data on excel sheet through python.

3.Sending one time password on student mail if He/She enter write password in three trial He/She will be mark present otherwise absent.

4.face Recognition is done using saving face encoding (128) in dataset

5.Use date time library to mark attendance within 5 min of class.

6.Use openCV to read image of student

7.Using xlrd library to add details in excel sheet

8.This project is highly secure and there is no possibility of proxy

**CHAPTER-5: Conclusion and Future Scope**

A subset of artificial intelligence (AI), machine learning (ML) is the area of computational science that focuses on analysing and interpreting patterns and structures in data to enable learning, reasoning, and decision making outside of human interaction. Simply put, machine learning allows the user to feed a computer algorithm an immense amount of data and have the computer analyse and make data-driven recommendations and decisions based on only the input data. If any corrections are identified, the algorithm can incorporate that information to improve its future decision making.

In today’s world, Machine Learning finds uses in every field we can think of, either it be predicting the outcomes, smartphones, virtual personal assistants like Alexa and Siri. Every smart system in today’s world is trained using Machine Learning Algorithms and it is one of the most promising sub-fields in the field of computer science. Machine Learning has immensely helped in creating enhanced user experience like customized ads for every user through Google Adwords. Google Adwords uses Machine Learning to look into what kind of websites/services, a particular user uses and based on that, it recommends similar ads to the person. Similarly, the people you may know feature of Facebook also using Machine Learning to suggest us the people we should add.

Machine Learning is currently one of the most developing and opportunistic field. In terms of jobs, Machine learning promises to bring a lot of new jobs in the future.The global machine learning as a service (MLaaS) market is rising expeditiously mainly due to the Internet revolution. The process of connecting the world virtually has generated vast amount of data which is boosting the adoption of machine learning solutions. This is because deployment of machine learning improves the speed and accuracy of functions performed by the system.

Apart from this, adoption of advanced analytics technologies from several industry verticals such as healthcare and life sciences, BFSI, retail, telecom, and manufacturing is contributing towards the growth of machine learning as a service market. Machine learning as a service solutions are also adopted acrossindustry verticals to enhance the decision making capability of machines.

Different job opportunities based websites like Indeed have termed Machine Learning as the biggest job producing field in the near future and currently, the average salary of a Machine Learning engineer lies at around 10-12 lakhs in India and the highest salary lies around 18-20 lakhs and the no of job opportunities in this field is growing at a very fast pace which establishes the fact that Machine Learning is the next big thing of the IT Industry

In terms of higher education also, Machine Learning is growing. In the premier institutes of India, Machine Learning is now offered as a specialization in the Masters courses which leads to the development of better Machine Learning engineers and better IT industry.

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