

Ch 1) Machine Learning and Deep Learning Applications

Name: Ridam Srivastava

Course name and year: II-year, B.A.L.L.B(Hons.), Shambhunath Institute of Law affiliated to Prof. Rajendra Singh (Rajju Bhaiya) University, Mirzapur Road, Naini, Prayagraj-211010.

State: Uttar Pradesh.

Country: India

Abstract

This electronic document is a synopsis of the sub-theme “Machine Learning and Deep learning” provided to me and the information given to you below is according to the best of my knowledge and understanding in this topic. The document given below is divided into three main sub-parts which are Introduction, Main body and Conclusion. These sub-parts will provide you sufficient amount knowledge relating to this chapter and will help you to not only understand this topic but also develops your skills of observing machines more keenly and minutely which you use in your day-to-day life.

I) **Introduction:** a) **Machine Learning** is the process through which machine itself understands and learns the algorithms of the activities performed on it in past and then it applies them on its future actions using its own intelligence and capability. It is a sub class of AI and Self-Learning processes. In simple terms it can be understood as System has a fixed or statistical set of algorithms stored in it which can learn and understand different sets or different types of actions or activities performed on it in past and can apply it to its applications or wherever it is require to do so in a smarter or the smartest way it can do so. A Machine basically learns from its past experiences and applies it to its future applications in the best possible way it is capable of. The data given or acted as an input produces more desired output.

b) **Deep Learning**, on the other hand requires a large amount of data or vast database is being required by the machine to work in an effective or appropriate manner to create desired result or correct output. Actually, it basically requires such a large amount of data or vast database because its usages can be seen in the systems where AI has found its applications as wherever AI has been used there you can observe that it stores the data or activities as input and then provide the user or another intermediary machine which directly or indirectly uses the given output to perform the desired task or any other activity for which that machine is being made for. It uses or study the human activities or that of the machines, in either or both of the cases where it can find it to be most suitable and then produces and gives it output either to another machine or to the user as the final output. It can be found its applications in various devices like which uses AI like face recognition, retailers, travelers, etc.

II) **Body:** a) **ML** algorithms can be classified in three types which are supervised, unsupervised and reinforcement learning.

They can be defined as i) **Supervised Learning (Data driven)** which uses algorithm provided to it from an external help. It is divided into training and testing datasets. The output variables are derived from the training datasets. Its algorithm is being made in such a way that different types of applications or for the particular type of task because of which it is being made for process in such a way that during which training datasets are being under processed they take input and process the particular task and gives its output for estimation or for further processes to the testing datasets.

ii) **Unsupervised Learning (Task driven)**, in this type of ML algorithm, the source code is being made or designed in such a way that class which does the original work or task for which it has been made for takes the functions or help to complete it from another class called super class. The super class in simple terms does the work or reduces the task of the sub class or the main class. It does the work of background complicated functions which is being required for the completion of the particular task or main objective of making that required source code. It basically clusters the required functions for the result.

iii) **Reinforced Learning (Learn from mistakes)**, in this type of ML algorithm, the source code or algorithm is being made focussed on the final decision or output of the whole task. It is decision oriented or output oriented type of ML. In this type of learning the decision becomes more valuable or desirable at the option of the user. This type of learning is made to be in such a way that the learner is not been made aware of the information used in the source code. After the machine is being given the task or told what action to be done then later on machine learns what algorithm it should use or provides further information to the user. The actions to the performed by the machine at the time of writing the source code and after the code is been executed. The program is being to take action in such a way as required by the learner or the command given by the learner. It works on two principles that are delayed outcome and trial and error method.

Applications of ML: -

i) Computer Vision is a versatile area of interest which detects all sorts of different types of data which can or cannot be of human interaction. It can be data such as visual processing, visual analysis and its detection. It includes all sorts of different features by which computers or any other sort of commands of machines which detect human behavior or actions performed by their respective sense organs or any other body parts. The example of the above-mentioned statements is the use of AI in different smartphone's camera, other sensors as used in washing machines, refrigerators, air conditioners etc and so on. The sub-domain of this field is object detection, object processing and recognition.

ii) Due to Covid-19, many technological advancements can be seen in various fields such as if we talk in area of transportation, we can observe that iris scanner, fingerprint scanner, facial expression recognition, QR code scanner, etc, are been used in the airways, waterways and roadways.

iii) Increase in use of products which are battery-driven, different types of machines are coming into use which are battery driven such as a small scale we can see battery rickshaw, on coming to a little higher scale it can see its applications in electric scooters, electric bikes, electric cars, etc.

iv) Auto-Driven or Self-Driven, we can see a very rapid growth in this industry where number of vehicles from small range to premium range are using this technology for their progress and this is evolving with time in India but in foreign countries, we can see that many vehicles which does not any driver to control itself and to drive it. People in these countries use different means of cars, buses, trucks and other means of transportation which are self-driven and so in this way the usage of this type of vehicles becomes easier to use and are autonomous in nature. Ex: - Advance Driver Assistance System, etc.

v) Handwriting Recognition, this application can be seen in various organization where documents are been used in hardcopy. It is done by various machines which are been used in that respective office.

b) DL, it is done in way called as Deep Neural Networks (a sub-category of ML) in which the task to be done is divided in number of different small set of codes or programs which makes the required thing to be completed in a more systematic and organised way which results in easier detection of bugs, alteration of the code and using it more effective way, not in a single application but also can act as a function for another source code which will be resulting in a more compact and easier way of formation of source which will be taking less run-time memory, its processing becomes fast and simple.

The need use DL to is that where use of Human Intelligence is least and machines are capable of doing or controlling themselves without the human interference. The following are different methods by which DL is being exercised: -

i) Universal Learning Method: Another name given to DL is Universal Learning Method as it provides with all the techniques useful for every application field.

ii) Robust deep learning Method: This method doesn't need any designing feature instead, its process of automatically learning and representing the best features makes it robust.

iii)Transfer Learning Method: This method provides with different types of datasets or in different applications. Moreover, this method will act as a supportive where the problem has insufficient data.

iv)Data and Computation Method: This method is extremely scalable in terms of Data and Computation. Microsoft created a deep network called ResNet and was implemented at a supercomputing scale.

Along, with that DL helps us to face plenty of challenges such as Big Data analytics, it provides us with different features of Big Data such as its volume, truthfulness and its management.

Applications of DL: -

i)MAVIS (Microsoft speech recognition)- In this application it recognises human voices and speeches are being used to help and search video and audio files.

ii)Google Maps- It uses Deep Mind artificial intelligence to predict arrival time and it is also being used by different Public Sector Undertakings for cybersecurity. Its usage has been increased mostly after COVID-19.

iii)To cure Speech Disorders and Autism- This application uses to treat speech disorders and developmental disorders in children before the age of kindergarten.

iv)To Zoom in cameras- This application which we use in today's camera by which we can zoom in and out is known as Pixel-Restoration or Pixel Recursive Super-Restoration has been made possible with the feature of DL.

III) Conclusion: Machine Learning (ML) is the analysing and interpretation of sets of data used by different machines of that respective application for which they are being made or designed. Deep Learning (DL) is the sub-part of ML. It consists of Artificial Neural Networks which in terms combines to form ML. Each and every individual in today's world is using Machine Learning in one way or another from sorting or filtering any article on any of the online shopping websites, searching words in a mobile dictionary, using smart televisions, using Virtual Reality (VR) headsets, using smartwatches, using smart washing machines or refrigerators or anything which we use for our convenience in one way or another uses Machine Learning (ML) and so indirectly it uses Deep Learning(DL) because it comes under ML.

Abbreviations: -**AI** stands for Artificial Intelligence, **ML** stands for Machine Learning, **DL** stands for Deep Learning.

List of References: -

i)M. Arun, E. Baraneetharn, A. Kanchana, S. Prabhu.

Detection and monitoring of asymptomatic COVID-19 patients using IoT devices and Sensors.

ii)B. Velan, F.V. Jayasudha, P. Visu, K. Janarthanan

Mobile Technologies for contact tracing and prevention of COVID-19 positive cases: a cross-sectional study.

iii)M. Visweswaraiah, K. Somashekhar, N.V. Babu

Test mode power computation and IR drop analysis of application specific integrated circuits implementing face detection algorithms.

iv)S.B. Kotsiantis

Supervised machine learning: a review of classification techniques.

v)R.S. Sutton

Introduction: the challenge of reinforcement learning.

vi)F. Pardo

Tonic: A Deep Reinforcement Learning Library for Fast Prototyping and Benchmarking.

vii)Wibowo H., Prawiro T.A., Ihsan M., Aji A.F., Prasojo R.E., Mahendra R.

Semi-supervised Low resource Style Transfer of Indonesian Informal to Formal language with Iterative Forward Translation.

viii)M. Li, Z. Zhang, S. Jiang, Q. Liu, C. Chen, Y. Zhang

Predicting pandemic trend of COVID-19 in China and across the world using the machine learning approach.

ix)P. Kumar, H. Kalita, S. Patairiya, Y.D. Sharma, C. Nanda, M. Rani

Forecasting the dynamics of COVID-19 pandemic in top 15 countries in April 2020 through ARIMA model with Machine Learning approach.

x)C.-J. Huang, Y.-H. Chen, Y. Ma, P.-H. Kuo

Multiple deep convolutional neural network model for COVID-19 forecasting in China.

xi)G. Pandey, P. Chaudhary, R. Gupta, S. Pal

SEIR and Regression Model Based COVID-19 outbreak predictions in India.

xii)Zhang Lei, Wang Shuai, Liu Bing

Deep Learning for Sentiment Analysis: A Survey.