**BCM SCHOOL, BASANT AVENUE, DUGRI ROAD, LUDHIANA**

**ARTIFICIAL INTELLIGENCE**

**ASSIGNMENT 2**

**Q1:- What is the difference between Supervised and Unsupervised Learning? (3 marks)**

Ans 1:-

| Supervised Learning | Unsupervised Learning |
|---|---|
| Supervised learning algorithms are trained using labeled data. | Unsupervised learning algorithms are trained using unlabeled data. |
| Supervised learning model takes direct feedback to check if it is predicting correct output or not. | Unsupervised learning model does not take any feedback. |
| Supervised learning model predicts the output. | Unsupervised learning model finds the hidden patterns in data. |
| In supervised learning, input data is provided to the model along with the output. | In unsupervised learning, only input data is provided to the model. |
| The goal of supervised learning is to train the model so that it can predict the output when it is given new data. | The goal of unsupervised learning is to find the hidden patterns and useful insights from the unknown dataset. |
| Supervised learning needs supervision to train the model. | Unsupervised learning does not need any supervision to train the model. |

**Q2:- What is the difference between Artificial Intelligence, Machine Learning and Deep Learning? (5 marks)**

Ans 2:-

| Artificial Intelligence | Machine Learning | Deep Learning |
|---|---|---|
| AI stands for Artificial Intelligence, and is basically the study/process which enables machines to mimic human behaviour through particular algorithm. | ML stands for Machine Learning, and is the study that uses statistical methods enabling machines to improve with experience. | DL stands for Deep Learning, and is the study that makes use of Neural Networks(similar to neurons present in human brain) to imitate functionality just like a human brain. |
| AI is the broader family consisting of ML and DL as it's components. | ML is the subset of AI. | DL is the subset of ML. |
| AI is a computer algorithm which exhibits intelligence through decision making. | ML is an AI algorithm which allows system to learn from data. | DL is a ML algorithm that uses deep(more than one layer) neural networks to analyze data and provide output accordingly. |
| Search Trees and much complex math is involved in AI. | If you have a clear idea about the logic(math) involved in behind and you | If you are clear about the math involved in it but don't have idea |

| Artificial Intelligence | Machine Learning | Deep Learning |
|---|---|---|
| | can visualize the complex functionalities like K-Mean, Support Vector Machines, etc., then it defines the ML aspect. | about the features, so you break the complex functionalities into linear/lower dimension features by adding more layers, then it defines the DL aspect. |
| The aim is to basically increase chances of success and not accuracy. | The aim is to increase accuracy not caring much about the success ratio. | It attains the highest rank in terms of accuracy when it is trained with large amount of data. |
| Three broad categories/types Of AI are: Artificial Narrow Intelligence (ANI), Artificial General Intelligence (AGI) and Artificial Super Intelligence (ASI) | Three broad categories/types Of ML are: Supervised Learning, Unsupervised Learning and Reinforcement Learning | DL can be considered as neural networks with a large number of parameters layers lying in one of the four fundamental network architectures: Unsupervised Pre-trained Networks, Convolutional Neural Networks, Recurrent Neural Networks and Recursive Neural Networks |
| The efficiency Of AI is basically the efficiency provided by ML and DL respectively. | Less efficient than DL as it can't work for longer dimensions or higher amount of data. | More powerful than ML as it can easily work for larger sets of data. |
| Examples of AI applications include: Google's AI-Powered Predictions, Ridesharing Apps Like Uber and Lyft, Commercial Flights Use an AI Autopilot, etc. | Examples of ML applications include: Virtual Personal Assistants: Siri, Alexa, Google, etc., Email Spam and Malware Filtering. | Examples of DL applications include: Sentiment based news aggregation, Image analysis and caption generation, etc. |
| AI refers to the broad field of computer science that focuses on creating intelligent machines that can perform tasks that would normally require human intelligence, such as reasoning, perception, and decision-making. | ML is a subset of AI that focuses on developing algorithms that can learn from data and improve their performance over time without being explicitly programmed. | DL is a subset of ML that focuses on developing deep neural networks that can automatically learn and extract features from data. |
| AI can be further broken down into various subfields such as robotics, natural language processing, computer vision, expert systems, and more. | ML algorithms can be categorized as supervised, unsupervised, or reinforcement learning. In supervised learning, the algorithm is trained on labeled data, where the desired output is known. In unsupervised learning, the algorithm is trained on unlabeled data, where the desired output is unknown. | DL algorithms are inspired by the structure and function of the human brain, and they are particularly well-suited to tasks such as image and speech recognition. |

| Artificial Intelligence | Machine Learning | Deep Learning |
|---|---|---|
| AI systems can be rule-based, knowledge-based, or data-driven. | In reinforcement learning, the algorithm learns by trial and error, receiving feedback in the form of rewards or punishments. | DL networks consist of multiple layers of interconnected neurons that process data in a hierarchical manner, allowing them to learn increasingly complex representations of the data. |

**Q3:- Define Data and two types of Data? (3 marks)**

Ans 3:- Data is a representation of facts or instructions about an entity that can be processed or conveyed by a human or a machine, such as numbers, text, pictures, audio clips, videos, and so on.

**There is two type of data –**

1. Structured Data
2. Unstructured Data

**a. Structured Data**

When data is in a standardized format, has a well-defined structure, follows a consistent order, and is easily accessible by humans and program. This data is in the form of numbers, characters, special characters etc.

**b. Unstructured Data**

Unstructured data is information that doesn't follow traditional data models and is therefore difficult to store and manage. Video, audio, and image files, as well as log files, are all examples of unstructured data.

**Q4:- What are the sources from where you can gather data? (3 marks)**

Ans 4:- **a. Surveys**

A research method for gathering data from a predetermined sample of respondents in order to get knowledge and insights into a variety of issues.

**b. Cameras**

We can collect visual data with the help of cameras, this data is unstructured data that can be analyzed via Machine learning.

**c. Web Scripting**

Web scribing is a technique for collecting structured data from the internet, such as news monitoring, market research, and price tracking.

**d. Observation**

Some of the information we can gather through attentive observation and monitoring.

**e. Sensors**

With the help of sensors also we can collect the data. A device that detects or measures a physical property are called sensors, such as biomatrix.

**f. Application program interface**

An API is a software interface that enables two apps to communicate with one another.

**Q5:- What is the purpose of Data Exploration? ( 2 marks)**

Ans 5:- Exploration helps you gain a better understanding of a dataset, making it easier to explore and use it later. It also helps to quickly understand the data's trends, and patterns.