Introduction to Machine Learning-1

Assignment Questions

Q1. Explain following with an example :

1. **Artificial Intelligence**
2. **Machine Learning**
3. **Deep Learning**

Ans:

Artificial intelligence is a smart application or system that performs simple to complex tasks without human interventions.

These applications or systems work with the same (or even improved) intelligence as humans have.

Machine Learning is the operating module of AI. ML provides a set of algorithms, programs, and tools for AI to process its tasks.
Machine learning uses algorithms to parse data, learn from that data, and make informed decisions based on what it has learned.

Deep Learning is a subset of machine learning.Deep learning structures algorithms in layers to create an “artificial neural network” that can learn and make intelligent decisions on its own.

Q2. What is supervised learning? List some examples of supervised learning.

In Supervised learning we feed an algorithm with some input features/data and the algorithm derives the output feature.

Eg. 1. Student Scorecards
We input the respective subjects marks and the algorithm will sum them up and provide the total.

2. Students grading system.
With referring to total marks, % will be calculated and students will be categorised as
More than 80%- Dist
60 - 79% First class
40-59% second class
Less than 40% - Fail

Supervised Learning breaks in two parts

A) **Classification** : depending on data, **categorical output features are** defined. In above example- Students grading systems.

Students are divided/ classified into diff categories.

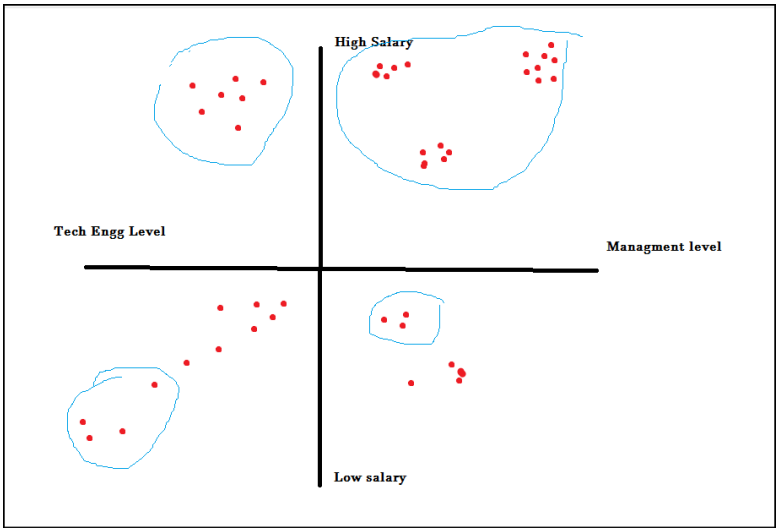
B) **Regression** : Using input data, output **features are derived/ calculated**.
In the above example , Student scorecard. Total score and % value is calculated using provided individual subject marks.

In both the above types, output features is dependant on input features

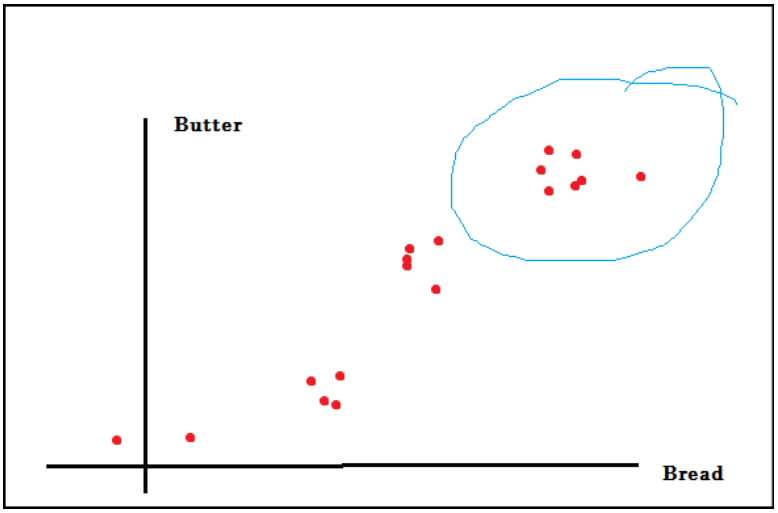
Q3. What is unsupervised learning? List some examples of it.

Unlike Supervised learning, here in unsupervised learning we don't calculate any output feature, rather group the input data with some logic applied to it.

Eg. based on position in company and salary drawn, expenditure of those people seen and cluster the set of people



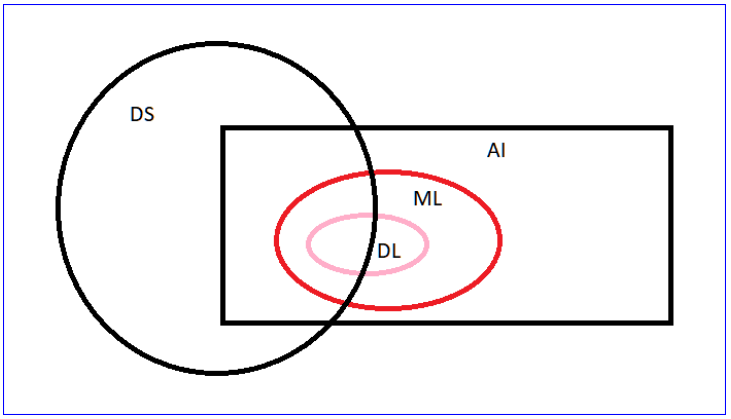
Eg 2. From the set of people , it is seen that those who buy bred, tend to buy butter as well.



More often inferences are drawn in unsupervised learning.

Q4. What is the difference between AI, ML, DL, and DS?

Always remember to follow the venn Diagram.



AI - is the smart app or system that performs its task without human intervention.

ML - is a subset of AI. ML is operating module of AI, it provides statistical tools, set of algorithms ,analytics, visualisation etc

DL - Deep learning is the subset of ML. Deep learning further re-structures algorithms in layers to create an “artificial neural network” that can learn and make intelligent decisions on its own.

DS- Data science is pretty vast and not limited to AI. Artificial Intelligence is only limited to the implementation of ML algorithms, whereas Data Science involves various underlying operations of data.

Q5. What are the main differences between supervised, unsupervised, and semi-supervised learning?

Supervised - Using an independent input variable, a dependent output variable is determined.

Eg. Input data - the duration that car was running, speed at each interval
Output data - distance covered by car at each interval and in total

Unsupervised - Using input features, clusters or groups are formed to draw inferences.
Eg. Group the cars who were running at longer intervals without halt

Semi-Supervised -Combination of supervised + Unsupervised.

- Take input data and derive the output feature .--Supervised
- Using that output feature , form a group. –Unsupervised

Eg - Group cars which has travelled more distance

1. Calculate distance- supervised
2. Group based on total distance - unsupervised.

Q6. What is train, test and validation split? Explain the importance of each term.

–While considering creating an ML model , we first require feeding some data to it,that will act as a training dataset.
–Then we would need to validate whether or not the ML model is working as expected.
–Further we need to test ML model by feeding unknown dataset

Training Dataset
Create Training dataset, which will have input data and derive the output data.
This data set will be used further to train our model.

Eg. In our schooling , we refer to books, guides, notes and train ourselves before appearing for the exam.

Validation DataSet
Hyper Tuning
Slightly update the training module and see if we get more accurate output.

Eg. a day before the exam we try to memorise the topics we learnt, by heart the qsnt answer etc.

Test Dataset
Model will be tested using a Test dataset. This dataset should always be unknown to test if the model is really accurate or not.

Eg. Exam paper

Another example: In Car manufacturing industry

Training : Cars are built up using predefined spare parts, engine, wheels, interior etc.
Validate : Engg then inspects the builded car, for all norms, its engine functionality etc. some simulations are run.
Test : Cars then tested on actual road surface and all observations ,parameters are noted down.

Q7. How can unsupervised learning be used in anomaly detection?

Let's first understand what is an anomaly? Anything unusual in the pattern which is getting followed is an anomaly.

Unsupervised learning does not derive any output, rather it clusters the data.
Based on the dataset , un-usual events can be grouped and highlighted further.

Eg. Using a Credit card after a very long time.
When a credit card is not used for so long then there is a pattern of non utilisation and suddenly there is an event of utilisation.
That's an anomaly.

Eg. One fine day you draw 1 lac rupees from the ATM which is the highest transaction you have ever drawn from an ATM.
So you had pattern of withdrawing amount 5000-15000 and one fine day you withdraw 1lac.

Eg. Number of tourists to hill stations increased during the long weekend.

Q8. List down some commonly used supervised learning algorithms and unsupervised learning algorithms.

Supervised Learning

1. Stock market price predictions
2. Text to speech conversion

Unsupervised Learning

1. Anomaly detection is credit card usage
2. Understand sales pattern of specific products