

NAME:- KRUNAL RANK

Adm. No:- U18C00081

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AI/ML  
Tutorial 1

Ans 1: Machine Learning is a branch of algorithms that have the ability to improve upon themselves using repetitive training upon input data, which is also known as training.

There are three types of machine learning algorithms:-

- Unsupervised learning:- The input data is not assigned any labels (correct expected output) and the algorithm needs to group together the input data into self-made classifications. Some of these algorithms are K-Means Clustering, K Nearest Neighbours, etc..
- Supervised learning:- In this type, the algorithm is trained on ~~label~~ labelled data. Even though the data needs to be labelled accurately for this method to work, supervised learning is extremely powerful when used in right circumstances.
- Reinforcement learning:- In this type, the algorithm learns based on trial and error method. Favourable outcomes are rewarded and unfavourable outcomes are punished. Q learning is one of the ways for Reinforcement Learning.

Ans 2:

a) Regression vs Classification.

Regression is a machine learning paradigm wherein the labels are continuous and can lie in any range of data with infinite ~~data~~ output possibilities.

Classification is a machine learning paradigm wherein the labels are discrete and accounts to strictly finite set of outcomes.



b) Bias is the simplifying assumptions made by the model to make the target function easier to approximate.

Variance is the amount that the estimate of the target function will change given different training data.

c) Instance space is the set of all the possible examples or given input data.

Hypothesis space however is the set of boolean functions on the input features.

d) Categorical features are those features that assume values from a finite set of data.

Continuous features are those features that assume values from an infinite set of continuous data.

For example, in any employee dataset, the gender of employee is categorical, however, his salary is continuous.

Ans 3: Generalization error also known as the out of the sample error; is a measure of how accurate an algorithm is able to predict outcome for values of previously unseen data.

- Some of the standard metrics used as the recall, true, F1 score, the

Remember using expected

AI is similar like the

Machinability upon



Ans 3: Some of the errors in supervised learning are:-

- **Standard RMS error:-** This error is used in regression techniques where the error is the square root of the means of the squares of the difference of expected value and output value.
- **Precision and Recall:-** These two errors are the errors used in classification techniques where precision is defined as the ratio of true positives and total positives and recall is defined as the ratio of true positives and total (true positives + false negatives).
- **F1 Score:-** This is a reliable method to calculate the correctness of classification.

$$F1 \text{ Score} = \frac{\text{Precision} \times \text{Recall}}{\text{Precision} + \text{Recall}}$$

Remember that precision and recall can be calculated using a confusion matrix which includes the data of expected and actual output.

Ans 4: AI is defined as a program that exhibits cognitive ability similar to that of a human being. Making computers think like humans and solve problems the way we do is one of the main tenets of artificial intelligence.

Machine learning is a branch of algorithms that have the ability to improve upon themselves using repetitive training upon training data.



Ans 5: Rationality is defined as the quality of being based on or in accordance with reason or logic.

Logical reasoning is one of the fundamental skills that involve analysis of hypothesis and validating it based on previous assumptions and knowledge.

Agents :- An agent is defined by the mapping from percept sequences to actions that the agent instantiates.

Intelligence :- Intelligence is the way in which a machine can easily mimic and execute actions similar to how a human does.

Ans 6: The different types of AI are as follows:-

- Based on Capabilities:-

- i) Weak AI (Narrow AI)

- ii) General AI

- iii) Super AI

- Based on Functionality

- i) Reactive Machines

- ii) Limited Memory

- iii) Theory of Mind

- iv) Self-Awareness



Ans 7. Some of the different approaches to AI are as follows:-

- Statistical methods
- Computational Intelligence
- Traditional Symbolic AI
- Bayesian Inference
- Evolutionary algorithms that test variation.

Ans 8. Some of the applications of AI are as follows:-

- Healthcare :- laboratory simulations
- Financial technology :- Automation of stock handling jobs
- Education :- Automated grading.
- Autonomous vehicles
- Robotics
- Cyborg technology