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COURSE NAME: Machine Learning
Algorithm

COURSE CODE: MIE 465

SECTION: A

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Answer To The Question NO.1Machine learning algorithm:

Machine learning algorithm is an approach where machine learns from given data and build a appropriate logic to solve a problem.

Classical algorithm:

classical algorithms are step-by-step instructions such that given specific input one can trace and determine exactly the output. Classical algorithm is a rule based algorithm.

There are some key differences between them. They are given below.

Machine learning Algorithm	Classical Algorithm
1. Machine learning algorithm can learn from data	1. Classical algorithms specify the exact rules to find the overall answer
2. Field of study that gives computers the ability to learn without being explicitly programmed. It is not rule based algorithm.	2. It is a rule based algorithm where every instruction coded by human
3. The inner feature of the data extracted by machine itself.	3. The inner feature should be analysed by human.

Machine Learning Algorithm	Classical Algorithm
4. Machine learning is used where problem is bit more complex and where traditional algorithms do not work well.	4. Classical algorithms are used in simpler problems.
5. In machine learning algorithms 100% accuracy can not be achieved.	5. In classical algorithm 100% accuracy can be achieved.

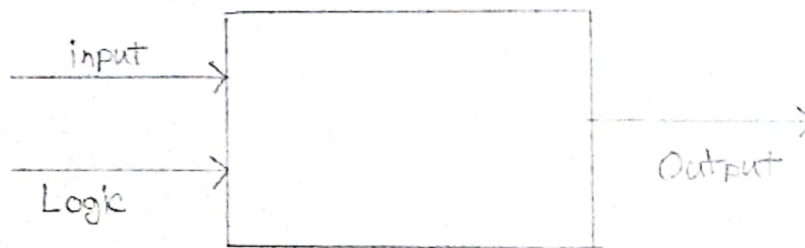


Figure 1: classical Algorithm

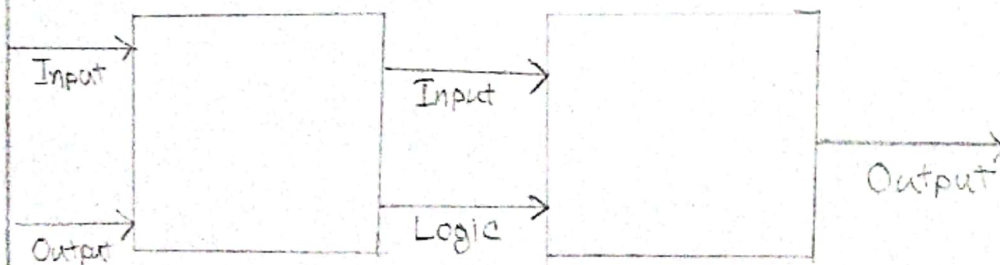


Figure 2: Machine Learning Algorithm

Answer To The Question No. 2Scenario A:

In this scenario, Abid and Akit like different types of news. They use a single device to read the news, though they use different profiles. If I want to create a ML-based application to show news based on their choices on their machine, it will be a unsupervised clustering problem. Clustering algorithm groups data points into a set amount of clusters based on point location relative to the centroids. It will make group of different types of news. The clusters are what helps the algorithm to determine which news is from sports and which is political news. When the algorithm see a high percentage of specific term in news, it gives a higher probability of the material being that sports news or political news.

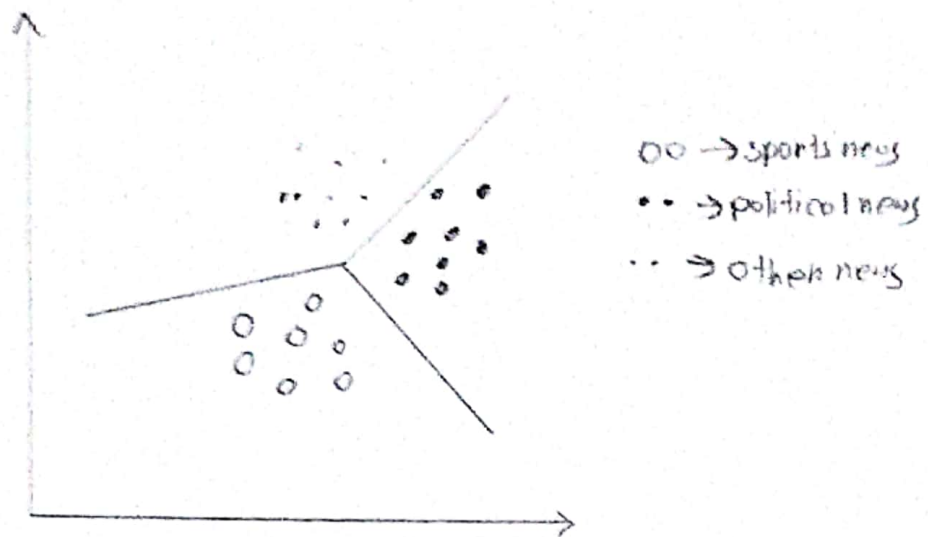


Figure 3: K means clustering

Scenario B

In this scenario, Robin is developing a robot. Accuracy of his robot is not so good. Task is to increase the accuracy of his robot. In this case we can use reinforcement learning to increase the accuracy of the robot. In reinforcement learning we take suitable action to maximize award in a particular situation. We have an agent, which is robot and a reward which is accuracy. The goal of the robot is to get the reward. In reinforcement learning the robot will learn by all the possible

paths and then will choose the path which which will give him the reward with least handles. Each right step will give the robot a reward and each wrong step will subtract the reward. The total reward will be calculated when it reaches the final reward. Then the robot will be more accurate and will be able to kick a football at the target.

Answer To The Question No. 3Learning Rate:

In machine learning, the learning rate is a tuning parameter in an optimization algorithm such as gradient descent. It is mainly a step size that how fast a machine will learn. Normally, it is denoted as α (alpha).

Selecting the right value for learning rate is very much important. Learning rate should not be too big or too small. If the learning rate is too big then machine tries to learn fast and put a greater step in every epoch. In that case machine may miss the convergence and fail to reach at global minimum. In figure 4 the problem is depicted.

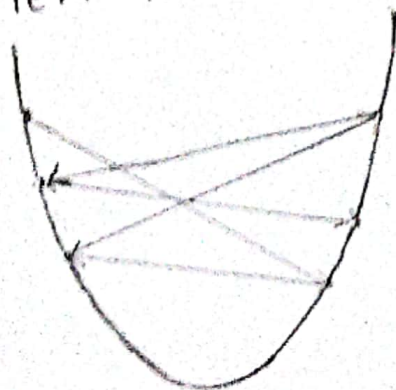


Figure 4: The problem of too big learning rate.

On the otherhand, if the learning rate is too small then a new problem arises. In this case the machine will learn very slowly and the decrease of cost will be very small. The optimizer will take a very long time to reach at the minimum. In Figure # the problem is depicted.

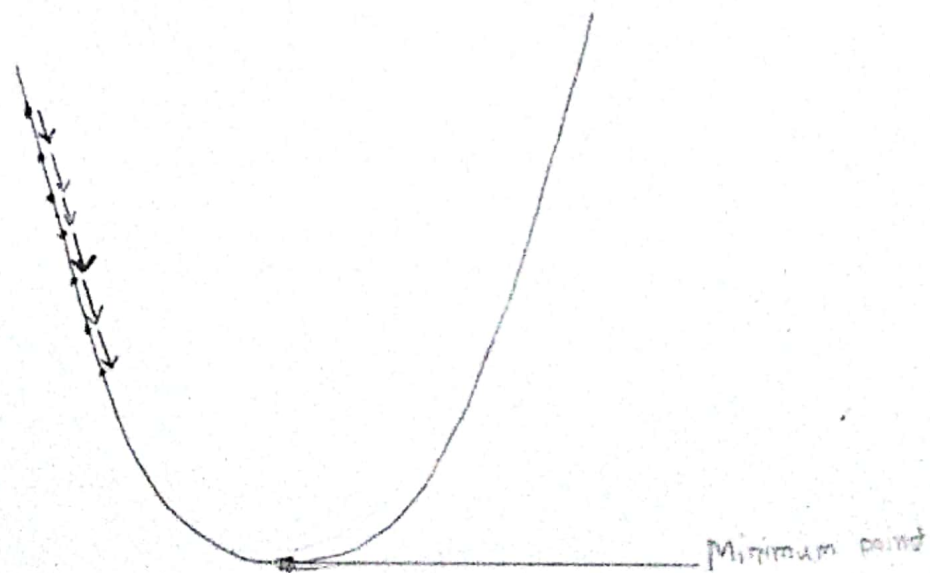


Figure #: The problem of too small learning rate