CBSE | DEPARTMENT OF SKILL EDUCATION

ARTIFICIAL INTELLIGENCE

QUESTION BANK – CLASS 10

CHAPTER 3: AI PROJECT CYCLE

One (01) Mark Questions

1. **Name all the stages of an AI Project cycle.**
   Problem Scoping, Data Acquisition, Data Exploration, Modeling, Evaluation

2. **What are sustainable development goals?**

   The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity.

   OR

   The Sustainable Development Goals (SDGs) or Global Goals are a collection of 17 interlinked goals designed to be a "blueprint to achieve a better and more sustainable future for all" so that the future generations may live in peace and prosperity.

3. **Name the 4Ws of problem canvases under the problem scoping stage of the AI Project Cycle.**
   a. Who,   b. what   c. where   d. why

4. **What is Testing Dataset?**
   The dataset provided to the model ML. algorithm after training the algorithm

5. **Mention the types of learning approaches for AI modeling.**
   Supervised, unsupervised and re-enforcement

6. **What is the objective of evaluation stage?**
   It is to evaluate whether the ML algorithm is able to predict with high accuracy or not before deployment.

7. **Fill in the blank:**
   The analogy of an Artificial Neural Network can be made with _____?
   (Parallel Processing)

8. **Which of the following is not an authentic source for data acquisition?**
   a. **Sensors**   b. **Surveys**   c. **Web Scraping**   d. **System Hacking**
   System Hacking

9. **Which type of graphical representation suits best for continuous type of data like monthly exam scores of a student?**
   Linear graph

10. **Fill in the blank: Neural Network is a mesh of multiple _____.**
    Hidden Layers / Layers

Two (02) Mark Questions

1. **What are the two different approaches for AI modelling? Define them.**
   There are two approaches for AI Modelling; Rule Based and Learning Based.
   The Rule based approach generates pre-defined outputs based on certain rules programmed by humans. Whereas, machine learning approach has its own rules based on the output and data used to train the models.

   OR

   Rule Based Approach Refers to the AI modelling where the relationship or patterns in data are defined by the developer. The machine follows the rules or instructions mentioned by the developer, and performs its task accordingly. Whereas in Learning based approach, the relationship or patterns in data are not defined by the developer. In this approach, random data is fed to the machine and it is left to the machine to figure out patterns and trends out of it

2. **What is a problem statement template and what is its significance?**
   The problem statement template gives a clear idea about the basic framework required to achieve the goal. It is the 4Ws canvas which segregates; what is the problem, where does it arise, who is affected, why is it a problem? It takes us straight to the goal.

3. **Explain any two SDGs in detail.**
   1. No Poverty: This is Goal 1 and strives to End poverty in all its forms everywhere globally by 2030. The goal has a total of seven targets to be achieved.
   2. Quality Education: This is Goal 4 which aspires to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. It has 10 targets to achieve.
   * (Any two goals can be defined)

4. **Mention the precautions to be taken while acquiring data for developing an AI Project.**
   It should be from an authentic source, and accurate. Look for redundant and irrelevant data parameters that does not take part in prediction.

5. **What do you mean by Data Features?**
   The type of data to collect,It should be relevant data.

6. **Write the names for missing stages in the given AI project cycle:**
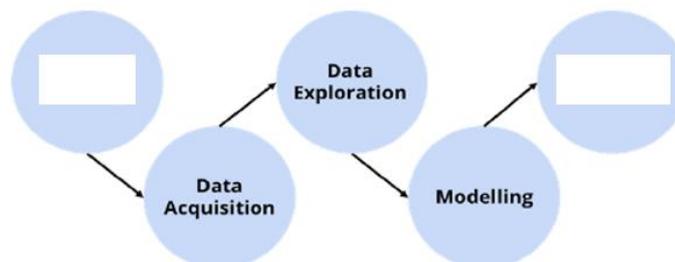
   Problem scoping, Evaluation

7. **Draw the icons of the following SDGs:**

Gender Equality	Clean Water and sanitation

8. **Draw the graphical representation of Classification AI model. Explain in brief.**

Classification: The classification Model works on the labelled data. For example, we have 3 coins of different denomination which are labelled according to their weight then the model would look for the labelled features for predicting the output. This model works on discrete dataset which means the data need not be continuous.

OR

In classification, data is categorized under different labels according to some parameters given in input and then the labels are predicted for the data.


Classification
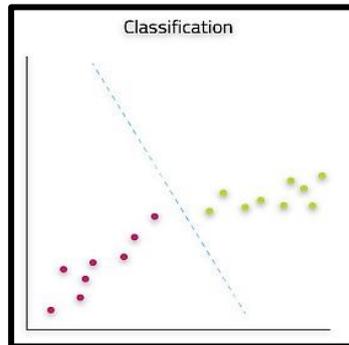
9. **Draw the graphical representation of Regression AI model. Explain in brief.**

Regression: These models work on continuous data to predict the output based on patterns. For example, if you wish to predict your next salary, then you would put in the data of your previous salary, any increments, etc., and would train the model. Here, the data which has been fed to the machine is continuous.

OR

Regression is the process of finding a model for distinguishing the data into continuous real values instead of using discrete values. It can also identify the distribution movement depending on the historical data.


Regression
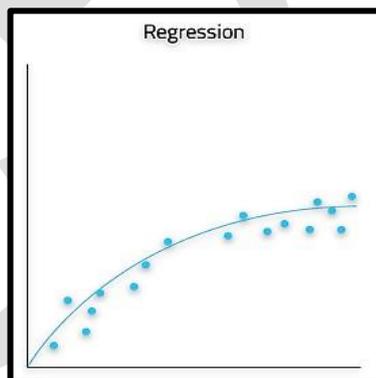
10. **Draw the graphical representation of Clustering AI model. Explain in brief.**

Clustering: It refers to the unsupervised learning algorithm which can cluster the unknown data according to the patterns or trends identified out of it. The patterns observed might be the ones which are known to the developer or it might even come up with some unique patterns out of it.

OR

Clustering is the task of dividing the data points into a number of groups such that data points in the same groups are more similar to other data points in the same

group and dissimilar to the data points in other groups. It is basically a collection of objects on the basis of similarity and dissimilarity between them.
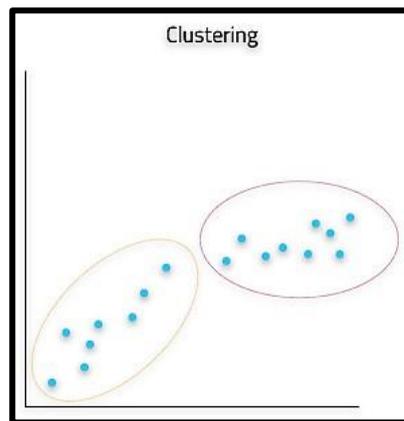
11. Explain Data Exploration stage.

In this stage of project cycle, we try to interpret some useful information out of the data we have acquired. For this purpose, we need to explore the data and try to put it uniformly for a better understanding. This stage deals with validating or verification of the collected data and to analyze that:

- The data is according to the specifications decided.
- The data is free from errors.
- The data is meeting our needs.

12. What are the features of an Artificial Neural Network?

Any Artificial Neural Network, irrespective of the style and logic of implementation, has a few basic features as given below.

- The Artificial Neural Network systems are modelled on the human brain and nervous system.
- They are able to automatically extract features without feeding the input by programmer.
- Every node of layer in a Neural Network is compulsorily a machine learning algorithm.
- It is very useful to implement when solving problems for very huge datasets.

OR

- It can work with incomplete knowledge and may produce output even with incomplete information.
- It has fault tolerance which means that corruption of one or more cells of ANN does not prevent it from generating output.
- It has the ability to learn events and make decisions by commenting on similar events.
- It has Parallel processing capability i.e. ANN have numerical strength that can perform more than one job at the same time.

OR

- Neural Networks have the ability to learn by themselves and produce the output that is not limited to the input provided to them.
- The input is stored in its own networks instead of a database; hence the loss of data does not affect its working.

- These networks can learn from examples and apply them when a similar event arises, making them able to work through real-time events.
- Even if a neuron is not responding or a piece of information is missing, the network can detect the fault and still produce the output.
- They can perform multiple tasks in parallel without affecting the system performance

13. **What is the purpose of getting AI Ready?**

The world is changing with each day and we have huge data coming our way. The purpose of getting AI ready means taking steps to collect data around relevant systems, equipment, and procedures; and storing and curating that data in a way that makes it easily accessible to others for use in future AI applications.

OR

The purpose of getting AI ready specifies the responsible and optimum use of huge amount of data around us to create and implement into such systems and applications which should make life of future generations more organized and sustainable. This process may lead to better lives for mankind.

14. **What are the different types of sources of data from where we can collect reliable and authentic datasets? Explain in brief.**

Data can be a piece of information or facts and statistics collected together for reference or analysis. Whenever we want an AI project to be able to predict an output, we need to train it first using data There could be many ways and sources from where we can collect reliable and authentic datasets namely Surveys, Web scrapping, Sensors, Cameras, Observations, Research, Investigation, API etc.

Sometimes Internet is also used to acquire data but the most important point to keep in mind is that the data should be taken from reliable and authentic websites only. Some reliable data sources are UN, Google scholar, Finance, CIA, Data.gov etc.

Four (04) Mark Questions

1. **Explain the AI Project Cycle in detail.**

The steps involved in AI project cycle are as given:
- The first step is Scope the Problem by which, you set the goal for your AI project by stating the problem which you wish to solve with it. Under problem scoping, we look at various parameters which affect the problem we wish to solve so that the picture becomes clearer
- Next step is to acquire data which will become the base of your project as it will help you in understanding what the parameters that are related to problem scoping.
- Next, you go for data acquisition by collecting data from various reliable and authentic sources. Since the data you collect would be in large quantities, you can try to give it a visual image of different types of representations like graphs, databases, flow charts, maps, etc. This makes it easier for you to interpret the patterns in which your acquired data follows.
- After exploring the patterns, you can decide upon the type of model you would build to achieve the goal. For this, you can research online and select various models which give a suitable output.
- You can test the selected models and figure out which is the most efficient one.
- The most efficient model is now the base of your AI project and you can develop your algorithm around it.
- Once the modelling is complete, you now need to test your model on some newly

fetched data. The results will help you in evaluating your model and hence improving it.

Finally, after evaluation, the project cycle is now complete and what you get is your AI project.

2. **Explain the relation between data size and model performance of an Artificial Neural Network.**

The basis for any kind of AI development is BIG DATASET. The performance of any AI based application depends on the data supplied

ANN models are also known as Learning models and are used for prediction purposes. These are mostly developed without paying much cognizance to the size of datasets that can produce models of high accuracy and better generalization. Although, the general belief is that, large dataset is needed to construct a predictive learning model. To describe a data set as large in size, perhaps, is circumstance dependent, thus, what constitutes a dataset to be considered as being big or small is somehow vague.

In fact, the quantity of data partitioned for the purpose of training must be of good representation of the entire sets and sufficient enough to span through the input space. It must be authentic and relevant to give better model performance.

3. **Draw the 4Ws problem canvas and explain each one of them briefly.**

The 4Ws problem canvas is the basic template while scoping a problem and using this canvas, the picture becomes clearer while we are working to solve it.

a) **Who:** The "Who" block helps you in analyzing the people getting affected directly or indirectly due to it? Under this, you find out who the 'stakeholders' to this problem are and what you know about them. Stakeholders are the people who face this problem and would be benefitted with the solution.

b) **What:** Under the "What" block, you need to look into what you have on hand. At this stage, you need to determine the nature of the problem. What is the problem and how do you know that it is a problem?

c) **Where:** In this block, you need to focus on the context/situation/location of the problem. It will help you look into the situation in which the problem arises, the context of it, and the locations where it is prominent.

d) **Why:** in the "Why" canvas, think about the benefits which the stakeholders would get from the solution and how would it benefit them as well as the society.

4. **Differentiate between rule-based and learning-based AI modelling approaches.**

Rule Based Approach: It refers to the AI modelling where the relationship or patterns in data are defined by the developer. The machine follows the rules or instructions mentioned by the developer, and performs its task accordingly.

For example, suppose you have a dataset comprising of 100 images of apples and 100 images of bananas. To train your machine, you feed this data into the machine and label each image as either apple or banana. Now if you test the machine with the image of an apple, it will compare the image with the trained data and according to the labels of trained images, it will identify the test image as an apple. This is known as Rule based approach. The rules given to the machine in this example are the labels given to the machine for each image in the training dataset.

Learning Based Approach: In this approach, the machine learns by itself. It refers to the AI modelling where the relationship or patterns in data are not defined by the developer. In this approach, random data is fed to the machine and it is left on the

machine to figure out patterns and trends out of it. Generally, this approach is followed when the data is un labelled and too random for a human to make sense out of it.

For example, suppose you have a dataset of 1000 images of random stray dogs of your area. You would put this into a learning approach-based AI machine and the machine would come up with various patterns it has observed in the features of these 1000 images which you might not have even thought of!

5. **What is an Artificial Neural Network? Explain the layers in an artificial neural network.**

Artificial Neural Network: Modeled in accordance with the human brain, a Neural Network was built to mimic the functionality of a human brain. The human brain is a neural network made up of multiple neurons, similarly, an Artificial Neural Network (ANN) is made up of multiple perceptrons.

A neural network consists of three important layers:

Input Layer: As the name suggests, this layer accepts all the inputs provided by the programmer.

Hidden Layer: Between the input and the output layer is a set of layers known as Hidden layers. In this layer, computations are performed which result in the output. There can be any number of hidden layers

Output Layer: The inputs go through a series of transformations via the hidden layer which finally results in the output that is delivered via this layer.

6. **What is the need of an AI Project Cycle? Explain.**

Project cycle is the process of planning, organizing, coordinating, and finally developing a project effectively throughout its phases, from planning through execution then completion and review to achieve pre-defined objectives.

Our mind makes up plans for every task which we have to accomplish which is why things become clearer in our mind. Similarly, if we have to develop an AI project, the AI Project Cycle provides us with an appropriate framework which can lead us towards the goal.

The major role of AI Project Cycle is to distribute the development of AI project in various stages so that the development becomes easier, clearly understandable and the steps / stages should become more specific to efficiently get the best possible output. It mainly has 5 ordered stages which distribute the entire development in specific and clear steps: These are Problem Scoping, Data Acquisition, Data Exploration, Modelling and Evaluation.

7. **Explain the following:**
   a. **Supervised Learning**   b. **Unsupervised Learning**

   • **Supervised learning** is an approach to creating artificial intelligence (AI), where the program is given labelled input data and the expected output results.

   OR

   • **Supervised learning** is a learning in which we teach or train the machine using data which is well labelled that means some data is already tagged with the correct answer. After that, the machine is provided with a new set of examples (data) so that supervised learning algorithm analyses the training data (set of training examples) and produces a correct outcome from labelled data.

OR

- In a supervised learning model, the dataset which is fed to the machine is labelled. It means some data is already tagged with the correct answer. In other words, we can say that the dataset is known to the person who is training the machine only then he/she is able to label the data.

- **Unsupervised Learning**: An unsupervised learning model works on unlabeled dataset. This means that the data which is fed to the machine is random and there is a possibility that the person who is training the model does not have any information regarding it. The unsupervised learning models are used to identify relationships, patterns and trends out of the data which is fed into it. It helps the user in understanding what the data is about and what are the major features identified by the machine in it.

OR

- **Unsupervised learning** is the training of a machine using information that is neither classified nor labelled and allowing the algorithm to act on that information without guidance. Here the task of the machine is to group unsorted information according to similarities, patterns and differences without any prior training of data.

8. **Differentiate between classification and clustering algorithms with the help of suitable examples.**

   Classification is a process of finding a function which helps in dividing the dataset into classes based on different parameters. In Classification, a computer program is trained on the training dataset and based on that training; it categorizes the data into different classes. The task of the classification algorithm is to find the mapping function to map the input(x) to the discrete output(y).

   Example: The best example to understand the Classification problem is Email Spam Detection. The model is trained on the basis of millions of emails on different parameters, and whenever it receives a new email, it identifies whether the email is spam or not. If the email is spam, then it is moved to the Spam folder.

   Regression is a process of finding the correlations between dependent and independent variables. It helps in predicting the continuous variables such as prediction of Market Trends, prediction of House prices, etc. The task of the Regression algorithm is to find the mapping function to map the input variable(x) to the continuous output variable(y).

   Example: Suppose we want to do weather forecasting, so for this, we will use the Regression algorithm. In weather prediction, the model is trained on the past data, and once the training is completed, it can easily predict the weather for future days.

OR

   Classification is the process of finding or discovering a model (function) which helps in separating the data into multiple categorical classes. In classification, the group membership of the problem is identified, which means the data is categorized under different labels according to some parameters and then the labels are predicted for the data.

   Regression is the process of finding a model or function for distinguishing the data into continuous real values instead of using classes. Mathematically, with a regression problem, one is trying to find the function approximation with the minimum error deviation. In regression, the data numeric dependency is predicted to distinguish it. The Regression analysis is the statistical model which is used to predict the numeric data instead of labels. It can also identify the distribution movement depending on the available data or historic data.

Key Differences between Classification and Regression

- The Classification process models a function through which the data is predicted in discrete class labels. On the other hand, regression is the process of creating a model which predicts continuous quantity.
- The classification algorithms involve decision tree, logistic regression, etc. In contrast, regression tree (e.g. Random forest) and linear regression are the examples of regression algorithms.
- Classification predicts unordered data while regression predicts ordered data.
- Regression can be evaluated using root mean square error. On the contrary, classification is evaluated by measuring accuracy.
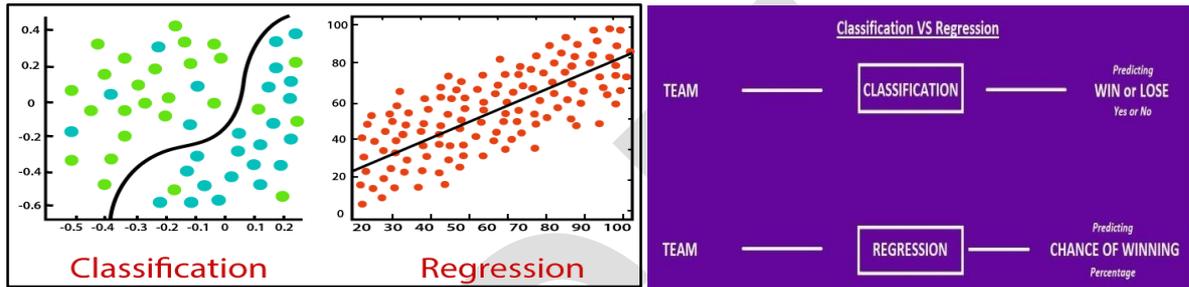
9. **Five sustainable Development Goals are mentioned below. Write 2 problems under each goal that you think should be addressed for achieving the goal.**
   a. **Quality Education**
   b. **Reduced Inequalities**
   c. **Life on Land**
   d. **No Poverty**
   e. **Clean Water and Sanitation**

   a. **Quality Education:**
   i. Providing education remotely, leveraging hi-tech, low-tech and no-tech approaches;
   ii. Ensure coordinated responses and avoid overlapping efforts;
   iii. Ensuring return of students to school when they reopen to avoid an upsurge in dropout rates.

   b. **Reduced inequalities:**
   i. Reduction of relative economic inequalities inequality in some countries having poorest and most vulnerable communities.
   ii. Improving the situations in countries with weaker health systems.

   c. **Life on Land:**
   i. Prevention of Deforestation caused by humans and restoration of land
   ii. Preventions and cure of diseases that are transmissible between animals and humans

   d. **No Poverty**
   i. Creation of Strong social protection systems to prevent people from falling into poverty
   ii. Reduction of social exclusion, and high vulnerability of certain populations to disasters and diseases.
   iii. Responsible distribution of resources.

e. Clean Water and Sanitation

i. To increase access to clean drinking water and sanitation mostly in rural areas
ii. Managing our water sustainably to manage our production of food and energy.

10. **Do ethics in AI hamper data acquisition stage? Justify your answer.**

Data acquisition is the most important factor or stage as the entire project development is based on the acquired data. There are several ethical issues which must always be considered when planning any type of data collection.

We need to understand that the data which is collected is ethical only if the provider agrees to provide. For example, in case of smartphone users, data is collected by clicking on allow when it asks for permission and by agreeing to all the terms and conditions. But at the same time if one does not want to share his/her data with anyone then this ethical issue hampers the acquisition process and lowers the accuracy or amount of data required for development.

Hence Regardless of the type of data collection, it is absolutely necessary to gain the approval of the community from which the data will collected otherwise.