**Assignment\_6**

1.In the sense of machine learning, what is a model? What is the best way to train a model?

**Ans: A training model is a dataset that is used to train an ML algorithm. It consists of the sample output data and the corresponding sets of input data that have an influence on the output.**

**The best way to train the model is:**

**Step 1. Begin with existing data. Machine learning requires us to have existing data not the data our application will use when we run it, but data to learn from.**

**Step 2. Analyze data to identify patterns.**

**Step 3. Make predictions.**

2. In the sense of machine learning, explain the "No Free Lunch" theorem.

**Ans: The “no free lunch” (NFL) theorem for supervised machine learning is a theorem that says no single machine learning algorithm is universally the best-performing for all the problems.**

3. Describe the K-fold cross-validation mechanism in detail.

**Ans: Cross-validation is a resampling procedure used to evaluate machine learning models on a limited data sample. The procedure has a single parameter called k that refers to number of groups that a given data sample is to be split into.**

4. Describe the bootstrap sampling method. What is the aim of it?

**Ans: Bootstrapping assigns measures of accuracy (bias, variance, confidence intervals, prediction error, etc). to sample estimates. This technique allows estimation of sampling distribution of almost any statistic using random sampling methods.**

5. What is the significance of calculating the Kappa value for a classification model? Demonstrate how to measure the Kappa value of a classification model using a sample collection of results.

**Ans: It tells us how much better the classifier is performing over the performance of a classifier that simply guesses at random according to the frequency of each class.**

**Kappa = (total accuracy – random accuracy)/(1-random accuracy).**

6. Describe the model ensemble method. In machine learning, what part does it play?

**Ans: Ensemble methods is a machine learning technique that combines several base models in order to produce one optimal predictive model. The three main classes of ensemble learning methods are bagging, stacking, and boosting, and it is important to both have a detailed understanding of each method and to consider them on your predictive modelling project.**

7. What is a descriptive model's main purpose? Give examples of real-world problems that descriptive models were used to solve.

**Ans: Descriptive modelling is a mathematical process that describes real – world events and relationships between factors responsible for them. The process is used by consumer – driven organizations to help them target their marketing and advertising efforts.**

8. Describe how to evaluate a linear regression model.

**Ans: 1. R Square/Adjusted R Square**

**2. Mean Square Error(MSE)/Root Mean Square Error (RMSE)**

**3. Mean Absolute Error(MAE)**

9. Distinguish :

1.Descriptive vs. predictive models

**Ans: A descriptive model will exploit the past data that are stored in databases and provide with the accurate report. In a predictive model, it identifies patterns found in past and transactional data to find risks and future outcomes.**

2. Underfitting vs. overfitting the model

**Ans: Underfitting occurs when our machine learning model is not able to capture the underlying trend of the data. To avoid the overfitting in the model, the fed of training data can be stopped at an early stage, due to which the model may not learn enough from training data.**

10. Make quick notes on:

1. LOOCV.

**Ans: Is a type of cross-validation approach in which each observation is considered as the validation set and the rest (N-1) observations are considered as the training set.**

2. F-measurement : **The F-measure is calculated as the harmonic mean of precision and recall, giving each the same weighting. It allows a model to be evaluated taking both the precision and recall into account using a single score, which is helpful when describing the performance of model and in comparing models.**

1. The width of the silhouette

**Ans: Si = (bi-ai)/max(ai,bi)**

1. Receiver operating characteristic curve

**Ans: It is a graphical plot that illustrates the diagnostic ability of a binary classifier system as its discrimination threshold is varied.**