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| **Assignment 1**  **Due Date 30 Jan 2023 Max. Marks 10** | |
| Course: B. Tech(Hons) | Machine Learning Using Python |

Q1. How machine learning is different from traditional programming approach? Name some applications of machine learning. Define the machine learning with respect to following terms: Task, Experience, and Performance.

Q2. Illustrate the machine learning process step by step with suitable diagram.

Q3. What are the different types of machine learning approaches also differentiate between each of them? What are the types of supervised machine learning approach?

Q4. What is the Train, test and validation data and their uses?

Q5. Explain the various evaluation metrics for Classification and Regression model?

Q6. What is the significance of k-fold cross validation?

Q7. What is the confusion matrix? Suppose that a machine learning algorithm (**A\_mail**) identifies whether a mail is spam or not spam. To test the performance of the A\_mail total 40 mails are given to the machine out of which 30 mails are spam (The algorithms A\_mail identifies 25 mails as spam and 5 mail as not spam) and remaining mails are not spam (The algorithms A\_mail identifies 6 mails as spam and 4 mail as not spam).

1. Identify the type of the machine learning algorithm.
2. Draw the confusion matrix for the above problem statement
3. Find the accuracy, precision, recall and F1 Score of the A\_mail algorithm.
4. Why we should not always rely on the accuracy as a performance metric, give an example.

Q8. What is over-fitting and under-fitting. Explain the bias and variance tradeoff.