 <b>Marwadi University</b>	<b>Marwadi University</b> <b>Faculty of Technology</b> <b>Department of Information and Communication Technology</b>	
<b>Subject: Machine Learning (01CT1519)</b>	<b>Aim: To obtain the appropriate class for the given features using Naïve Bayes algorithm</b>	
<b>Experiment No: 05</b>	<b>Date:</b>	<b>Enrollment No:</b>

**Aim:** To obtain the appropriate class for the given features using Naïve Bayes algorithm

**IDE:** Google Colab

### **Theory:**

Machine learning is a method of data analysis that automates analytical model building of data set. Using the implemented algorithms that iteratively learn from data, machine learning allows computers to find hidden insights without being explicitly programmed where to look. Naive bayes algorithm is one of the most popular machines learning technique.

Conditional Probability is just what is the probability that something will happen, given that something else has already happened. Let say we have a collection of people. Some of them are singers. They are either male or female. If we select a random sample, what is the probability that this person is a male? what is the probability that this person is a male and singer? Conditional Probability is the best option here.

We can calculate probability like,  
 $P(\text{Singer \& Male}) = P(\text{Male}) \times P(\text{Singer} / \text{Male})$

### **What is Bayes rule ?**


We can simply define Bayes rule like this. Let  $A_1, A_2, \dots, A_n$  be a set of mutually exclusive events that together form the sample space  $S$ . Let  $B$  be any event from the same sample space, such that  $P(B) > 0$ . Then,  $P(A_k | B) = P(A_k \cap B) / P(A_1 \cap B) + P(A_2 \cap B) + \dots + P(A_n \cap B)$

### **What is Bayes classifier?**

Naive Bayes classifiers are a family of simple probabilistic classifiers based on applying Bayes' theorem with strong (naive) independence assumptions between the features in machine learning. Basically, we can use above theories and equations for classification problem.

### **Methodology:**

1. Load the basic libraries and packages
2. Load the dataset
3. Analyse the dataset
4. Normalize the data
5. Pre-process the data
6. Visualize the Data
7. Separate the training and testing data
8. Apply the Bernoulli Naïve Bayes algorithm
9. Predict the testing dataset
10. Obtain the confusion matrix
11. Obtain the accuracy score

 <b>Marwadi</b> University	<b>Marwadi University</b> <b>Faculty of Technology</b> <b>Department of Information and Communication Technology</b>	
<b>Subject: Machine Learning (01CT1519)</b>	<b>Aim: To obtain the appropriate class for the given features using Naïve Bayes algorithm</b>	
<b>Experiment No: 05</b>	<b>Date:</b>	<b>Enrollment No:</b>

12. Visualize the classified dataset
13. Apply the Gaussian Naïve Bayes algorithm
14. Predict the testing dataset
15. Obtain the confusion matrix
16. Obtain the accuracy score
17. Visualize the classified dataset


### **Program (Code):**

To be attached with

### **Results:**

To be attached with

- a. Classified dataset using Bernoulli Naïve Bayes
- b. Classified dataset using Gaussian Naïve Bayes

 <b>Marwadi</b> University	<b>Marwadi University</b> <b>Faculty of Technology</b> <b>Department of Information and Communication Technology</b>	
<b>Subject: Machine Learning (01CT1519)</b>	<b>Aim: To obtain the appropriate class for the given features using Naïve Bayes algorithm</b>	
<b>Experiment No: 05</b>	<b>Date:</b>	<b>Enrollment No:</b>

### **Observation and Result Analysis:**

a. Nature of the dataset

---

---

---

---

b. During Training Process

---

---

---

---

c. After the training Process

---

---

---

---

d. Observation over the classification using both the approaches

---

---

---

### **Post Lab Exercise:**


a. Which are the types of Naïve Bayes algorithms?

---

---

---

b. Which are the limitations of the Naïve Bayes algorithm?

 <b>Marwadi</b> University	<b>Marwadi University</b> <b>Faculty of Technology</b> <b>Department of Information and Communication Technology</b>	
<b>Subject: Machine Learning (01CT1519)</b>	<b>Aim: To obtain the appropriate class for the given features using Naïve Bayes algorithm</b>	
<b>Experiment No: 05</b>	<b>Date:</b>	<b>Enrollment No:</b>

---

---

---

- c. Give three different applications of Naïve Bayes algorithm.

---

---

---

- d. Explain Bernoulli Naïve Bayes

---

---

---

- e. Explain Gaussian Naïve Bayes

---

---

---

- f. Explain Multinomial Naïve Bayes

---

---

---

### **Post Lab Activity:**

Consider any dataset from <https://archive.ics.uci.edu/ml/datasets.php> and perform the classification of various classes using Naïve Bayes algorithm. Make sure that the dataset is not matching with your classmates. You can also select the dataset from other ML repositories with prior permission from your concerned subject faculty.