📘 Theory (Short Definitions)

- **Naïve Bayes Classifier: A probabilistic machine learning algorithm based on Bayes' Theorem with an assumption of independence between features. It is best suited for classification tasks.**
- **GaussianNB: A variant of Naïve Bayes that assumes continuous features follow a normal distribution.**
- **Label Encoding: Converts categorical labels into numeric form for model compatibility.**
- **Confusion Matrix: A performance evaluation tool showing TP, FP, FN, and TN values to assess classifier accuracy.**
- **Precision, Recall, Accuracy: Metrics used to evaluate the model's performance on the test data.**

📋 Algorithm Steps

1. **Import Libraries: Load necessary libraries for data handling, model building, and evaluation.**
2. **Load Dataset: Read the `Iris.csv` file using `pandas` and check for null values and structure.**
3. **Preprocess Data: Separate features and target label. Apply `LabelEncoder` to convert species into numeric format.**
4. **Split Data: Use `train_test_split` to divide data into training and testing subsets.**
5. **Train Model: Initialize and train a `GaussianNB` model on the training data.**
6. **Predict Results: Predict species using the test data.**
7. **Evaluate Model: Use confusion matrix, classification report, and metrics like precision, recall, accuracy, etc., to analyze the performance.**

🧾 Conclusion

The Naïve Bayes classifier was successfully implemented on the Iris dataset. The model achieved high accuracy due to the simple structure and well-separated classes in the dataset. Key metrics such as accuracy, precision, and recall indicate that the classifier performs well for multi-class classification tasks. The confusion matrix and visualization further helped in understanding model errors class-wise.