Support Vector machine

**Dataset Selection:**

For this assignment, we'll utilize the widely recognized Mushroom Dataset

**Task 1: Exploratory Data Analysis (EDA)**

1. Load the Mushroom dataset and perform fundamental data exploration.
2. Utilize histograms, box plots, or density plots to understand feature distributions.
3. Investigate feature correlations to discern relationships within the data.

**Task 2: Data Preprocessing**

1. Encode categorical variables if necessary.
2. Split the dataset into training and testing sets.

**Task 3: Data Visualization**

1. Employ scatter plots, pair plots, or relevant visualizations to comprehend feature distributions and relationships.
2. Visualize class distributions to gauge dataset balance or imbalance.

**Task 4: SVM Implementation**

1. Implement a basic SVM classifier using Python libraries like scikit-learn.
2. Train the SVM model on the training data.
3. Evaluate model performance on the testing data using appropriate metrics (e.g., accuracy, precision, recall, F1-score).

**Task 5: Visualization of SVM Results**

1. Visualize classification results on the testing data.

**Task 6: Parameter Tuning and Optimization**

1. Experiment with different SVM hyperparameters (e.g., kernel type, regularization parameter) to optimize performance.

**Task 7: Comparison and Analysis**

1. Compare SVM performance with various kernels (e.g., linear, polynomial, radial basis function).
2. Analyze SVM strengths and weaknesses for the Mushroom dataset based on EDA and visualization results.
3. Discuss practical implications of SVM in real-world classification tasks.