Assignment 3 Question: Ensemble Techniques

In this assignment, you will explore ensemble learning techniques for classification tasks using the wine dataset. You will implement and compare the performance of two ensemble methods: Voting Classifier and Stacking Classifier, using classes in scikit-learn.

Tasks:

1. **Data Preparation:**
    - Load the wine dataset from scikit-learn's built-in datasets.
    - Perform necessary data preprocessing, such as scaling or encoding categorical variables.
    - Split the dataset into training and testing sets.
2. **Implementation of Ensemble Techniques:**
    - **Task 1: Voting Classifier**
        - Implement a Voting Classifier using a combination of at least three different base classifiers available in scikit-learn.
        - Train the Voting Classifier on the training set and evaluate its performance on the testing set.
    - **Task 2: Stacking Classifier**
        - Implement a Stacking Classifier using base classifiers available in scikit-learn.
        - Train the Stacking Classifier on the training set and evaluate its performance on the testing set.
3. **Performance Comparison:**
    - Compare the classification performance (accuracy, precision, recall, F1-score) of the Voting Classifier and Stacking Classifier.
    - Analyze and discuss the results, highlighting the strengths and weaknesses of each approach.

Submission Instructions:

- Submit your Python code along with .pdf documenting your implementation approach, experimental results, and analysis.

Note: Utilize scikit-learn's ensemble module to implement the ensemble techniques mentioned above. Ensure to encapsulate each ensemble method implementation within a class for modularity and clarity in your code. For Task 1, choose at least three base classifiers of your choice to construct the Voting Classifier.