Exercise: Decision Tree Optimization for Moons Dataset

In this exercise, you will train and optimize a decision tree classifier for the moons dataset. Follow the steps below:

1. **Generate Dataset:**
   - Use the `make_moons(n_samples=10000, noise=0.4)` function to create a moons dataset.
2. **Split Dataset:**
   - Divide the dataset into a training set and a test set using the `train_test_split()` function.
3. **Hyperparameter Tuning:**
   - Utilize grid search with cross-validation (GridSearchCV) to explore optimal hyperparameter values for a DecisionTreeClassifier. Experiment with different values for `max_leaf_nodes`.
4. **Model Training:**
   - Train the decision tree model on the entire training set using the best hyperparameters obtained from the grid search.
5. **Performance Evaluation:**
   - Evaluate the trained model's performance on the test set. Aim for an accuracy between 85% to 87%.

Complete the exercise by following these steps. Feel free to adjust the parameters and explore different strategies for optimizing the decision tree classifier.