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1 from sklearn.tree import DecisionTreeClassifier, plot_tree, export_text
2 from sklearn.preprocessing import OneHotEncoder
3 import matplotlib.pyplot as plt
4 X = [
5     ['Sunny', 'Hot', 'High', 'Weak'],
6     ['Sunny', 'Hot', 'High', 'Strong'],
7     ['Overcast', 'Hot', 'High', 'Weak'],
8     ['Rain', 'Mild', 'High', 'Weak'],
9     ['Rain', 'Cool', 'Normal', 'Weak'],
10    ['Rain', 'Cool', 'Normal', 'Strong'],
11    ['Overcast', 'Cool', 'Normal', 'Strong'],
12    ['Sunny', 'Mild', 'High', 'Weak'],
13    ['Sunny', 'Cool', 'Normal', 'Weak'],
14    ['Rain', 'Mild', 'Normal', 'Weak'],
15    ['Sunny', 'Mild', 'Normal', 'Strong'],
16    ['Overcast', 'Mild', 'High', 'Strong'],
17    ['Overcast', 'Hot', 'Normal', 'Weak'],
18    ['Rain', 'Mild', 'High', 'Strong']
19 ]
20 y = ['No', 'No', 'Yes', 'Yes', 'Yes', 'No', 'Yes', 'No', 'Yes', 'Yes', 'Yes', 'Yes', 'Yes', 'No']
```

```
21 encoder = OneHotEncoder()
22 X_encoded = encoder.fit_transform(X).toarray()
23 clf = DecisionTreeClassifier(criterion='entropy', max_depth=3)
24 clf.fit(X_encoded, y)
25 tree_rules = export_text(clf, feature_names=encoder.get_feature_names_out())
26 print("Decision Tree Rules:\n")
27 print(tree_rules)
28 plt.figure(figsize=(12,8))
29 plot_tree(
30     clf,
31     feature_names=encoder.get_feature_names_out(),
32     class_names=clf.classes_,
33     filled=True,
34     rounded=True,
35     fontsize=10
36 )
37 plt.title("Decision Tree - Play Tennis")
38 plt.show()
39 example = [['Sunny', 'Cool', 'High', 'Strong']]
40 example_encoded = encoder.transform(example).toarray()
41 prediction = clf.predict(example_encoded)
42 print(f"\nPrediction for {example[0]}: {prediction[0]}")
```

Decision Tree Rules:

```
|--- x0_Overcast <= 0.50
|   |--- x2_High <= 0.50
|   |   |--- x3_Strong <= 0.50
|   |   |   |--- class: Yes
|   |   |--- x3_Strong > 0.50
|   |   |   |--- class: No
|   |--- x2_High > 0.50
|   |   |--- x0_Sunny <= 0.50
|   |   |   |--- class: No
|   |   |--- x0_Sunny > 0.50
|   |   |   |--- class: No
|--- x0_Overcast > 0.50
|   |--- class: Yes
```

Prediction for ['Sunny', 'Cool', 'High', 'Strong']: No

Decision Tree - Play Tennis

