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import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.datasets import load_iris
from sklearn.feature_selection import SelectKBest, chi2
from sklearn.model_selection import train_test_split
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import accuracy_score

# Load the Iris dataset
iris = load_iris()
X = iris.data
y = iris.target

# Create DataFrame from the Iris data
df = pd.DataFrame(data=X, columns=iris.feature_names)
df['Target'] = y

# Display the original dataset
print("Original Dataset:")
print(df.head())

# Feature Subset Selection using SelectKBest
selector = SelectKBest(score_func=chi2, k=2)
X_new = selector.fit_transform(X, y)

# Get the selected feature indices
selected_indices = selector.get_support(indices=True)

# Display the selected features
selected_features = df.columns[selected_indices]
print("\nSelected Features:")
print(selected_features)

# Split the dataset into train and test sets
X_train, X_test, y_train, y_test = train_test_split(X_new, y,
test_size=0.2, random_state=42)

# Train a classifier on the selected features
clf = RandomForestClassifier(random_state=42)
clf.fit(X_train, y_train)

# Make predictions on the test set
y_pred = clf.predict(X_test)

# Calculate accuracy
accuracy = accuracy_score(y_test, y_pred)
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print("\nAccuracy on test set:", accuracy)

# Visualize the selected features
plt.figure(figsize=(10, 6))

# Plot the selected features against the target variable
for i, feature in enumerate(selected_features):
    plt.subplot(1, 2, i+1)
    sns.scatterplot(x=feature, y='Target', data=df, hue='Target',
palette='Set1', legend=False)
    plt.title(f'{feature} vs Target')
    plt.xlabel(feature)
    plt.ylabel('Target')

plt.tight_layout()
plt.show()
```

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Original Dataset:
   sepal length (cm)  sepal width (cm)  petal length (cm)  petal width (cm)  \
0                5.1               3.5                1.4               0.2
1                4.9               3.0                1.4               0.2
2                4.7               3.2                1.3               0.2
3                4.6               3.1                1.5               0.2
4                5.0               3.6                1.4               0.2

   Target
0       0
1       0
2       0
3       0
4       0

Selected Features:
Index(['petal length (cm)', 'petal width (cm)'], dtype='object')

Accuracy on test set: 1.0
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```
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