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import numpy as np
import joblib
from sklearn.model_selection import train_test_split, cross_val_score
from sklearn.naive_bayes import GaussianNB
from sklearn.metrics import accuracy score, classification report, confusion matrix
import matplotlib.pyplot as plt
# Load dataset from local file
data = joblib.load('olivetti_faces.pkl')
X = data.data
y = data.target
# Split into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=42)
# Train Naive Bayes classifier
gnb = GaussianNB()
gnb.fit(X_train, y_train)
# Predict and evaluate
y_pred = gnb.predict(X_test)
accuracy = accuracy_score(y_test, y_pred)
print(f'Accuracy: {accuracy * 100:.2f}%')
print("\nClassification Report:")
print(classification_report(y_test, y_pred, zero_division=1))
print("\nConfusion Matrix:")
print(confusion_matrix(y_test, y_pred))
# Cross-validation
cross_val_accuracy = cross_val_score(gnb, X, y, cv=5, scoring='accuracy')
print(f'\nCross-validation accuracy: {cross_val_accuracy.mean() * 100:.2f}%')
# Plot some predictions
fig, axes = plt.subplots(3, 5, figsize=(12, 8))
for ax, image, label, prediction in zip(axes.ravel(), X_test, y_test, y_pred):
    ax.imshow(image.reshape(64, 64), cmap=plt.cm.gray)
    ax.set_title(f"True: {label}, Pred: {prediction}")
    ax.axis('off')
plt.tight_layout()
plt.show()
```