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import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

# Sample data generation
np.random.seed(0)
data = pd.DataFrame({
    'Variable1': np.random.normal(loc=0, scale=1, size=1000),
    'Variable2': np.random.normal(loc=10, scale=2, size=1000),
    'Variable3': np.random.normal(loc=-5, scale=3, size=1000)
})

# Visualizations
plt.figure(figsize=(12, 4))

# Histograms
for i, col in enumerate(data.columns):
    plt.subplot(1, 3, i+1)
    sns.histplot(data[col], kde=True)
    plt.title(f'{col} Distribution')

plt.tight_layout()
plt.show()

# Box plots
plt.figure(figsize=(8, 6))
sns.boxplot(data=data)
plt.title('Box Plot of Variables')
plt.show()

# Scatter plot matrix
sns.pairplot(data)
plt.suptitle('Pair Plot of Variables')
plt.show()

# Correlation matrix heatmap
plt.figure(figsize=(8, 6))
sns.heatmap(data.corr(), annot=True, cmap='coolwarm', fmt=".2f")
plt.title('Correlation Matrix Heatmap')
plt.show()
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