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# Step 1: Import libraries
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

# Step 2: Load dataset (replace path with your CSV file location)
df = pd.read_csv("diabetes.csv") # Make sure the file is in the same folder or give full path

# Step 3: Display first 10 rows
print("First 10 rows of the dataset:")
print(df.head(10))

# Step 4: Compute Mean, Median, Mode for selected columns
columns = ['Glucose', 'BloodPressure', 'BMI']
mean_vals = df[columns].mean()
median_vals = df[columns].median()
mode_vals = df[columns].mode().iloc[0]

print("\nMean Values:\n", mean_vals)
print("\nMedian Values:\n", median_vals)
print("\nMode Values:\n", mode_vals)

# Step 5: Compute Variance, Standard Deviation, and Interquartile Range
variance_vals = df[columns].var()
std_vals = df[columns].std()
iqr_vals = df[columns].quantile(0.75) - df[columns].quantile(0.25)

print("\nVariance:\n", variance_vals)
print("\nStandard Deviation:\n", std_vals)
print("\nInterquartile Range:\n", iqr_vals)

# Step 6: Plot Histograms for BMI and Age
plt.figure(figsize=(12,5))
plt.subplot(1,2,1)
plt.hist(df['BMI'], bins=20, color='skyblue', edgecolor='black')
plt.title("Histogram - BMI")
plt.xlabel("BMI")
plt.ylabel("Frequency")

plt.subplot(1,2,2)
plt.hist(df['Age'], bins=20, color='lightgreen', edgecolor='black')
plt.title("Histogram - Age")
plt.xlabel("Age")
plt.ylabel("Frequency")
plt.tight_layout()
plt.show()

# Step 7: Plot Boxplots for BMI and Age
plt.figure(figsize=(10,5))
plt.subplot(1,2,1)
sns.boxplot(y=df['BMI'], color='orange')
plt.title("Boxplot - BMI")

plt.subplot(1,2,2)
sns.boxplot(y=df['Age'], color='pink')
plt.title("Boxplot - Age")
plt.tight_layout()
plt.show()

# Step 8: Correlation matrix
corr_matrix = df.corr()

# Step 9: Heatmap
plt.figure(figsize=(10,6))
sns.heatmap(corr_matrix, annot=True, cmap='coolwarm', fmt=".2f")
plt.title("Correlation Matrix Heatmap")
plt.show()

# Step 10: Summary table with descriptive statistics
summary_table = df[columns].describe().T
summary_table['variance'] = variance_vals
summary_table['IQR'] = iqr_vals

print("\nSummary Table:\n")
print(summary_table)

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