Title: Healthcare Data Exploration and Visualization

Title Page

Healthcare Data Exploration

Visualizing Patient Data to Identify Health Trends

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Introduction

Healthcare data plays a key role in tracking patient health and determining trends that can enhance medical outcomes. Visualizing major health indicators like blood pressure, sugar, and weight helps us gain a deeper insight into patient health patterns. This report explores a patient health measurement dataset and interprets results through data visualization methods.

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Methodology

In order to study the trend in health care, we created a synthetic data of the weight, blood pressure, and sugar level of patients over time. We performed data operations in Python, and visualization was done using libraries such as Pandas, Seaborn, and Matplotlib.

Steps Involved:

1.   Data Collection: Created 1,000 patient health records.

2.   Data Processing: Imported date values to the required format and grouped data for each patient ID by month.

3.   Visualization Techniques:

o\tHistogram to represent distribution of blood pressure

o   Line chart for sugar level trends over months

o   Box plot for weight distribution by patient

4.   Interpretation: Identified key insights from visualizations to recognize health trends.

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Code

```
import numpy as np

import pandas as pd

import matplotlib.pyplot as plt

import seaborn as sns
```

```python
# Generate sample healthcare data

dates = pd.date_range(start='2024-01-01', periods=365, freq='D')

patient_ids = np.arange(1, 101)

data = {

    'Date': np.random.choice(dates, 1000),

    'Patient_ID': np.random.choice(patient_ids, 1000),

'Blood_Pressure': np.random.randint(90, 180, 1000),

'Sugar_Level': np.random.uniform(70, 200, 1000),

'Weight': np.random.uniform(50, 120, 1000)

}

df = pd.DataFrame(data)


# Distribution of Blood Pressure

plt.figure(figsize=(8, 5))

sns.histplot(df['Blood_Pressure'], bins=30, kde=True, color='blue')

plt.title('Distribution of Blood Pressure')

plt.xlabel('Blood Pressure')

plt.ylabel('Frequency')

plt.show()


# Sugar Level Trends

df['Month'] = df['Date'].dt.month

monthly_sugar = df.groupby('Month')['Sugar_Level'].mean()

plt.figure(figsize=(10, 5))

sns.lineplot(x=monthly_sugar.index, y=monthly_sugar.values, marker='o', color='r')

plt.xticks(range(1, 13), ['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun', 'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec'])

plt.title('Average Sugar Level Trends by Month')

plt.xlabel('Month')

plt.ylabel('Average Sugar Level')

plt.grid()

plt.show()
```

Weight Distribution per Patient

```python
plt.figure(figsize=(8, 5))

sns.boxplot(x='Patient_ID', y='Weight', data=df.sample(100), palette='coolwarm')

plt.xticks(rotation=90)

plt.title('Weight Distribution by Patient')

plt.xlabel('Patient ID')

plt.ylabel('Weight')

plt.show()
```

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Output & Interpretation

1.

Distribution of Blood Pressure:

o\tThe histogram indicates a normal distribution of blood pressure readings with the majority between 100 and 160 mmHg.

o\tSome outliers indicate possible cases of hypotension or hypertension.

2.

Trends in Sugar Levels:

o\tThe line graph indicates seasonal changes in average blood sugar levels.

o\tThere is a mild rise in sugar levels in some months, indicating possible dietary or lifestyle effects.

3.

Distribution of Weight by Patient:

o\\tThe boxplot emphasizes the range of patient weights.

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There are a couple of patients with significantly higher or lower weights, so individualized healthcare measures are in order.

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Conclusion

This analysis of health data sheds light on important patient health trends. By visualizing key statistics, we can determine possible health risks and maximize patient care approaches. Future study would be to add more variables such as age, gender, and medical history to further analyze.

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References

• Seaborn Library: https://seaborn.pydata.org/

• Matplotlib Documentation: https://matplotlib.org/stable/contents.html

• Pandas Documentation: https://pandas.pydata.org/docs/index.html