🏥 Capstone Project Title:
"Hospital Patient Care & Performance Analysis"

Project Overview

Hospitals collect massive amounts of data — patient demographics, treatment history, admission records, and hospital operations data. This project aims to **analyze hospital data to improve patient care, optimize resources, and identify patterns** that can help in decision-making.

Problem Statement

Hospital management wants to:

- Understand patient admission trends.
- Identify the most common diseases and treatment types.
- Track doctor and department performance.
- Optimize bed and resource allocation.
- Improve patient experience and reduce waiting times.

Objectives

1. Perform **Exploratory Data Analysis (EDA)** on hospital records.
2. Identify **trends** in admissions, discharges, and treatments.
3. Analyze **disease occurrence** patterns by age, gender, and season.
4. Evaluate **department and doctor performance**.
5. Create **interactive dashboards** for decision-makers.

Sample Dataset Ideas

(You can use synthetic or public datasets)

- Hospital Admission Dataset (Kaggle)
- MIMIC-III Clinical Database (PhysioNet)
- Hospital data with:
    - **Patient_ID, Age, Gender, Admission_Date, Discharge_Date**
    - **Disease/Diagnosis, Treatment Given**
    - **Doctor_Name, Department**
    - **Bed_Occupancy, Hospital_Costs**

Tools & Technologies

- **Python**: pandas, numpy, matplotlib, seaborn, plotly
- **SQL**: For querying large hospital datasets
- **Power BI** : For interactive dashboards
- **Excel**: For quick pivot table analysis

Key Analysis Areas

1. Patient Demographics

- Age and gender distribution of patients
- Admission trends over time (daily/weekly/monthly)

2. Disease & Treatment Patterns

- Most common diseases treated
- Seasonal trends in diseases (e.g., flu in winter)
- Average treatment duration by disease

3. Resource Utilization

- Bed occupancy rate over time
- Emergency vs. scheduled admissions
- Average waiting time for patients

4. Doctor & Department Performance

- Number of patients handled per doctor/department
- Average recovery time per department
- Treatment success rate

5. Financial Analysis

- Revenue from different departments
- Average treatment cost per disease
- Cost efficiency analysis

Power BI / Tableau Dashboard Suggestions

- **Filters**: Date range, department, disease, doctor name
- **Charts**:
    - Admissions trend (line chart)
    - Top 10 diseases (bar chart)
    - Bed occupancy (gauge)
    - Age distribution (histogram)
    - Cost vs. treatment duration (scatter plot)

Folder Structure

hospital_data_analysis/

```
├── data/
│   ├── hospital_raw.csv
│   ├── hospital_clean.csv
├── notebooks/
│   ├── eda.ipynb
│   ├── sql_analysis_queries.sql
├── dashboard/
│   ├── Hospital_Analysis.pbix
├── reports/
│   ├── hospital_analysis_report.pdf
├── README.md
```

Final Deliverables

- Cleaned hospital dataset
- Jupyter Notebook with EDA & insights
- SQL scripts for hospital queries
- Power BI/Tableau dashboard
- PDF report summarizing key findings and recommendations