✪ Healthcare Appointment No-Show Prediction

1. Introduction
Missed healthcare appointments are a common problem in hospitals and clinics. They waste valuable time, increase costs, and often delay treatment for other patients. To address this issue, I built a predictive system that uses patient data to forecast whether someone is likely to attend their appointment.

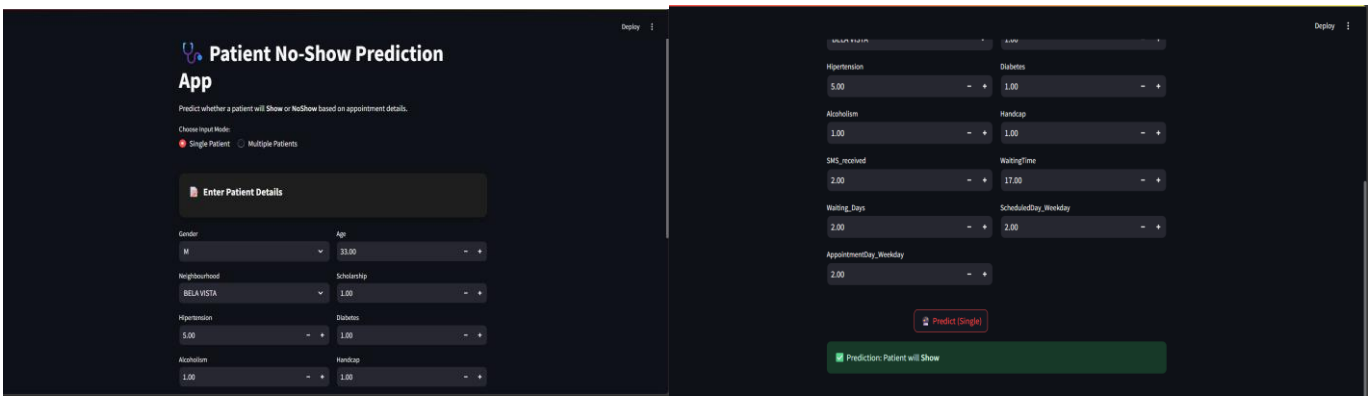
2. Abstract
The main goal of this project was to understand patterns behind patient no-shows and create a model that could predict them in advance. By looking at information such as appointment dates, patient demographics, and waiting time between scheduling and the actual appointment, I trained a machine learning model that classifies patients as “Show” or “No-Show.”
The project goes beyond just model building. I also developed a simple **Streamlit web app** to test predictions in real time and built an interactive **Power BI dashboard** to explore insights visually. Together, these tools make the solution more practical and useful for healthcare providers.

3. Tools Used

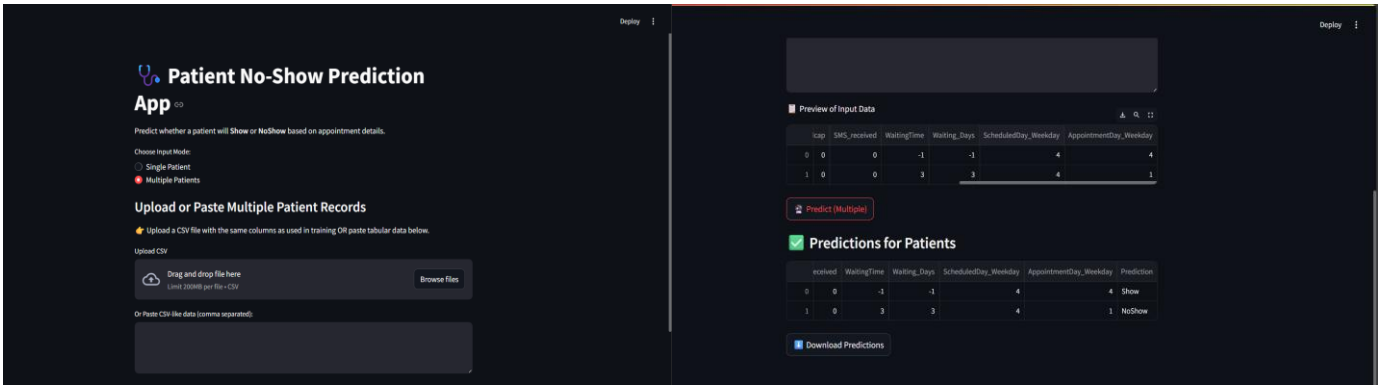
- **Python** (Pandas, Scikit-Learn, Streamlit, Matplotlib, Seaborn) – for cleaning data, building the model, and creating the prediction UI.
- **Power BI** – for designing dashboards to analyze patterns and visualize results.
- **Jupyter Notebook / VS Code** – for development and experiments.
- **Dataset (CSV)** – patient appointment records with show/no-show labels.

4. Steps Involved

1. **Data Preparation**
    - Cleaned invalid/missing entries.
    - Encoded categorical features (like gender, neighborhood).
    - Created new features such as **waiting days** and **appointment weekday**.
2. **Model Development**
    - Trained models like Logistic Regression and Random Forest.
    - Compared their performance using accuracy, precision, recall, and confusion matrix.
    - Selected the model that gave balanced and reliable results.
3. **Streamlit App**
    - Built a simple UI where users can enter patient details and instantly get predictions.
    - Supports both single patient input and multiple records.



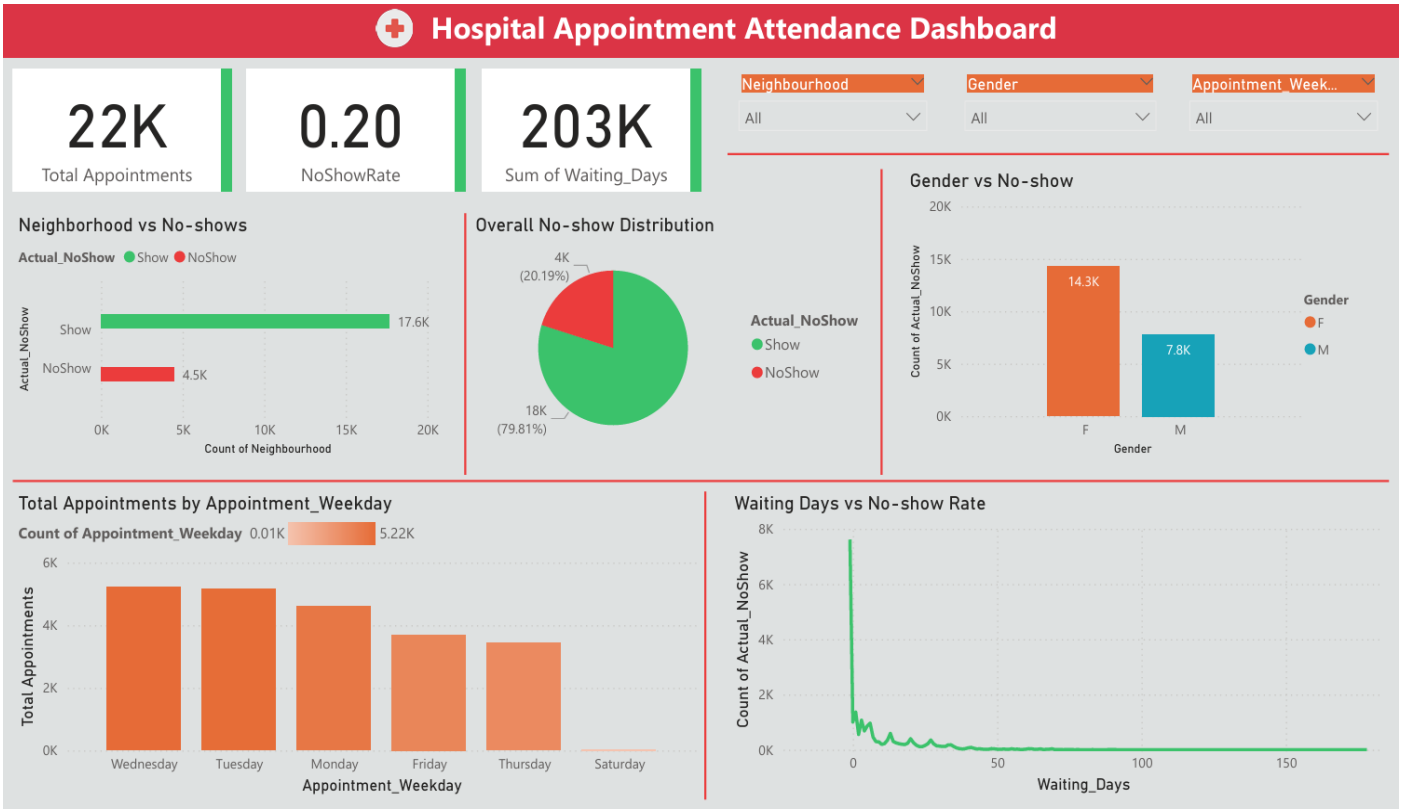
Single Patient Input Mode □$
I entered all patient details manually into the form (Gender, Age, Neighbourhood, Hypertension, etc.).
After clicking 🔘 **Predict (Single)**, the model analyzed the data and predicted:
✅ **The patient will Show up for the appointment.**



Multiple Patients Input Mode 🗃

I uploaded/pasted a sample dataset in **CSV format** containing multiple patient records.
The app processed each record, applied the trained encoders, and predicted:
📋 Predictions were generated for **each patient** in the dataset, with the output table showing whether the patient is likely to **Show** or **NoShow**.
A **Download CSV button** was also available to save the predictions.

4. **Power BI Dashboard**
    - Imported predictions into Power BI for interactive visual analysis.
    - Created charts for:
        - Actual vs Predicted No-Shows
        - Gender and neighborhood breakdown
        - Waiting days vs no-show probability
        - Overall model accuracy



5. Conclusion

This project showed how machine learning can be applied to a real-world healthcare challenge. By combining predictive models with an easy-to-use Streamlit app and a Power BI dashboard, the solution can help hospitals identify patients at risk of missing appointments and take preventive measures.
Looking ahead, the system could be improved by training on larger datasets, testing advanced models like XGBoost or Neural Networks, and eventually integrating it directly into hospital scheduling systems.