Healthcare Appointment No-Show Analysis & Prediction

1. Introduction

Patient no-shows are a common challenge in healthcare systems, leading to wasted time, reduced efficiency, and financial losses. To predict whether a patient will miss a scheduled appointment using machine learning, and to improve hospital scheduling efficiency with the help of Power BI data visualization.

2.Abstract

This project aims to predict healthcare appointment no-shows using machine learning. The dataset includes factors such as patient age, gender, appointment date, and SMS reminders. A Decision Tree model is trained to classify whether a patient will attend. Power BI is used to visualize patterns and insights, supporting data-driven scheduling improvements.

3.Technologies Used

- Python: Data cleaning, preprocessing, and model training.
- Pandas: Data manipulation and analysis.
- Scikit-learn: Building and evaluating the Decision Tree classifier.
- Matplotlib & Seaborn: Data visualization.
- Power BI: Dashboard creation for insights and trends.

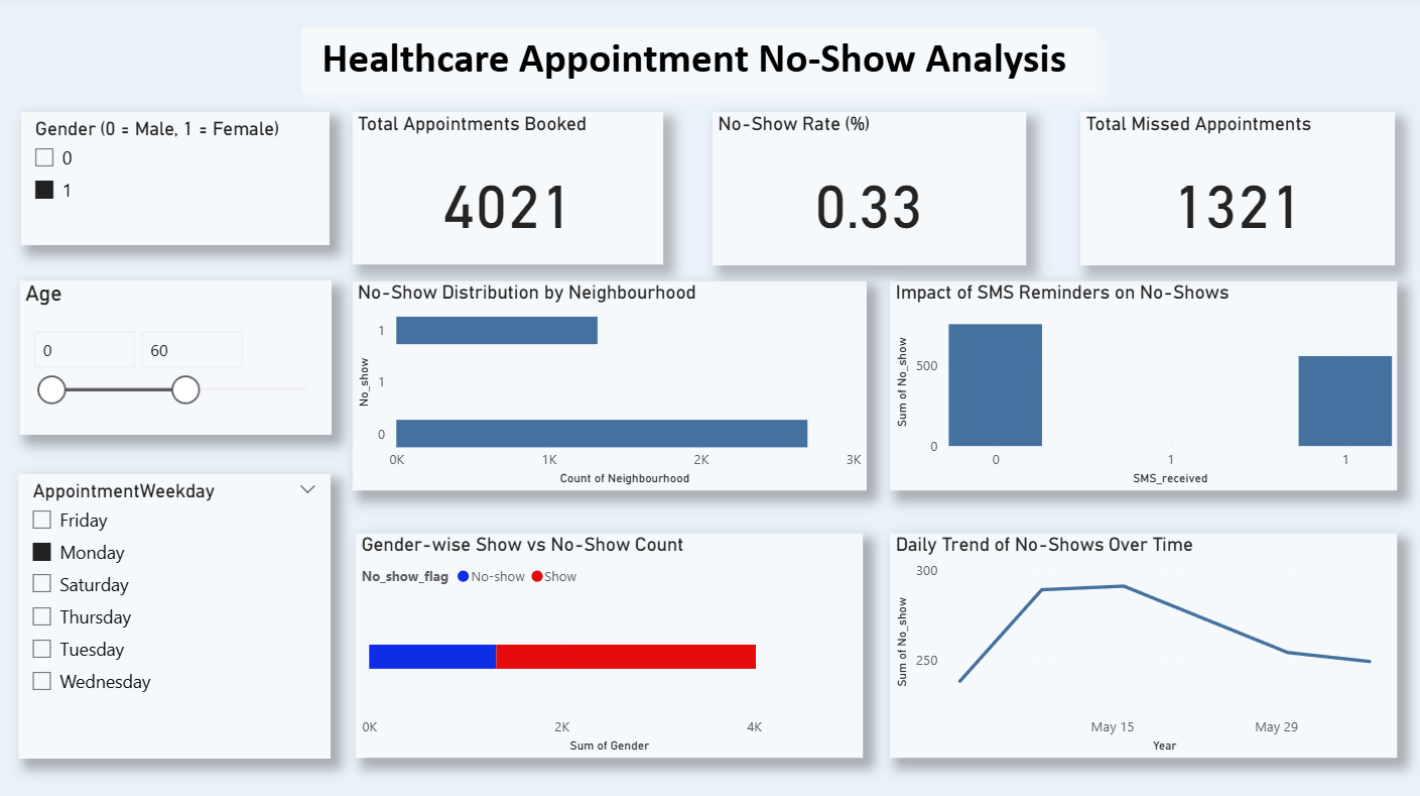
4.Dataset Overview

- Total Records: 1113 appointments.
- Target Variable: No-show status (Yes/No).
- Key Features: Age, Gender, SMS_received, WaitingDays, Scholarship, etc.

5.Steps Involved in Building the Project

- Import and clean dataset : handle missing values and inconsistent data.
- Explore and visualize data : analyze correlations between variables and no-shows.
- Model training : use Decision Tree algorithm to predict no-shows.
- Model evaluation : measure accuracy, precision, and recall.
- Dashboard creation in Power BI : visualize patterns like age, weekday, and SMS reminder impact.

Power BI Dashboard



6.Key Insights

- SMS reminders are effective in reducing no-shows.
- Higher no-show rates seen in specific neighborhoods.
- No-shows fluctuate across days of the week.
- Age and gender have a minor influence.

7.Recommendations

- Send SMS reminders to all patients.
- Reduce waiting time between booking and appointment.
- Schedule more on days with lower no-show rates.
- Identify and focus on high-risk groups, such as the elderly or patients with chronic conditions.

8.Conclusion

The model effectively predicts appointment no-shows, helping healthcare providers improve scheduling and reduce patient absenteeism. Integrating predictive insights with Power BI dashboards enables smarter, data-driven decisions in healthcare management.