Healthcare Appointment No-Show Prediction

By: Aishwarya Math

Objective

Predict whether patients will miss their appointments and optimize scheduling using machine learning and visual analytics.

Abstract

Missed medical appointments create inefficiencies and cost healthcare providers valuable time and resources. This project leverages a real-world dataset of patient appointments to develop a predictive model for no-shows. By analyzing factors such as age, gender, SMS reminders, and weekday patterns, actionable insights are derived to optimize scheduling and improve patient turnout.

Tools Used

- Python: Pandas, Scikit-learn
- Power BI: For interactive dashboards and data visualization

Steps Involved in Building the Project

1. Import and Clean Appointment Data
   - Loaded dataset using Pandas
   - Handled missing/inconsistent entries
   - Encoded categorical variables (e.g., Gender as binary)

2. Exploratory Data Analysis (EDA)
   - Used Power BI to visualize key trends:
     - No-show frequency by weekday
     - Impact of SMS reminders
     - Age distribution vs attendance

3. Train Decision Tree Model
   - Used Decision Tree Classifier from Scikit-learn

Healthcare Appointment No-Show Prediction

- Features: Age, Gender, Scheduled Date, Appointment Date, SMS Received
- Output: No-show (Yes/No)

4. Model Evaluation
   - Accuracy checked via confusion matrix and cross-validation
   - Identified top influencing factors for no-shows

5. Power BI Dashboard Development
   - Built dynamic dashboards to display:
     - Gender distribution
     - No-show trends by day and age
     - SMS impact analysis

Conclusion

This project proves that machine learning can be effectively applied to predict healthcare appointment no-shows. The insights gained can guide clinics to reduce missed appointments through strategic scheduling and patient engagement.

Key Recommendations:
- Ensure SMS reminders are consistently sent
- Avoid scheduling younger patients heavily on high no-show weekdays (e.g., Monday, Friday)
- Use model predictions to flag high-risk appointments for follow-up

Deliverables

- Prediction Model (Decision Tree Classifier)
- Power BI Insight Dashboard
- Optimization Recommendations (based on EDA and model results)