Healthcare Appointment No-Show Prediction Report

Project Objective

The objective of this project is to predict whether patients will miss their appointments and provide recommendations to optimize scheduling. The project uses Python (Pandas, Sklearn) for data cleaning and model building, and Power BI for visualization.

Data Cleaning & Preparation

The dataset was cleaned to handle missing values, format date fields, and encode categorical variables. Important features such as SMS_received, age, and day of the week were derived for analysis.

Model Building

A Decision Tree Classifier was used to train the model on the cleaned dataset. The model was able to classify 'No-Show' and 'Show' based on various features. Accuracy and performance metrics were evaluated using a confusion matrix and classification report.

Trend Analysis

Key trends observed:

- Patients who received SMS reminders had higher attendance.
- Younger patients (under 25) had more no-shows.
- Appointments on certain weekdays like Friday had higher no-show rates.
- Patients with conditions like diabetes and hypertension showed up more reliably.

Power BI Dashboard Summary

A Power BI dashboard was created to visualize no-show patterns by age, gender, weekdays, and medical conditions. The dashboard helps stakeholders to understand key trends and identify target groups for interventions.

Optimization Recommendations

Based on the analysis of patient appointment data and no-show patterns, the following recommendations are

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suggested to reduce missed appointments and improve scheduling efficiency:

- 1. Send SMS Reminders Strategically: Patients who received SMS reminders showed higher attendance. Make SMS mandatory 24 hours before appointments, especially for senior citizens and those with a history of no-shows.
- 2. Avoid Overbooking on High No-Show Days: No-show rates are higher on certain weekdays (e.g., Fridays). Avoid scheduling too many appointments on these days or prioritize reliable patients.
- 3. Target Younger Age Groups With Follow-Ups: Patients under the age of 25 had higher no-show rates. Implement follow-up calls or app-based reminders for this age group.
- 4. Consider Health Conditions in Scheduling: Patients with chronic conditions like Diabetes or Hypertension tend to show up more regularly. Schedule these patients at peak times.
- 5. Create a Penalty or Reward System: Introduce a soft penalty for frequent no-shows (e.g., delayed re-booking) or rewards (discounts or priority booking) for consistent attendance.
- 6. Analyze No-Show History for Personalized Scheduling: Use patient history to predict future behavior and adjust scheduling.

Conclusion

By using predictive analytics and data visualization, this project identifies patterns in patient attendance and suggests actionable steps to reduce no-shows. Implementing these strategies can improve operational efficiency and patient care outcomes.