Healthcare Appointment No-Show Prediction - Project Report

Objective

Predict whether patients will miss their medical appointments to optimize scheduling and reduce operational inefficiencies.

Tools & Technologies

Python (Pandas, Scikit-Learn), Power BI for interactive dashboards and insights visualization.

Dataset Description

Includes patient demographics, appointment details, wait duration, and communication interactions (like SMS reminders).

Methodology

- Data Cleaning & Preprocessing
- Feature Engineering (age groups, waiting days)
- Decision Tree Classification Model to predict no-shows
- Model Evaluation using accuracy metrics
- Dashboard creation in Power BI for actionable insights

Dashboard Visuals & Insights

Visualizations used:
- Donut Chart: Show vs No-Show ratio
- Bar Chart: Age group vs No-Show rate
- Bar Chart: Day of week vs No-Show rate
- Column Chart: SMS reminders impact
- Line Chart: Waiting time vs No-Show rate
- Heatmap: Age vs Waiting duration

Insights:
- Longer wait time increases no-show chances
- Younger and elderly groups show higher no-show rates
- SMS reminders reduce missed appointments

Model Results

Decision Tree Model provided clear rule-based prediction outputs. Accuracy score depended on feature quality and data completeness.

Optimization Recommendations

- Automate SMS and follow-up communication
- Reduce long appointment waiting times
- Identify high-risk patient groups for proactive outreach
- Schedule high no-show days more effectively
- Use machine learning predictions in hospital scheduling systems

Conclusion

Implementing predictive analytics in healthcare improves patient outcomes, resource allocation, and operational performance by reducing appointment no-shows.