**Healthcare Appointment No-Shows Prediction**

# Introduction

The increasing rate of missed healthcare appointments poses a major challenge to hospital operations, patient care, and resource utilization. This project aims to develop a machine learning model that predicts whether a patient will show up for a scheduled medical appointment, based on historical and demographic data.

# Abstract

No-shows in healthcare lead to significant financial losses and reduced access to care. By analyzing factors such as patient age, appointment date, medical history, and SMS reminders, this project uses classification algorithms to predict patient attendance. This predictive capability can help optimize scheduling and improve healthcare service delivery.

# Tools Used

* Python - Core programming language
* Pandas & NumPy - Data manipulation and analysis
* Matplotlib & Seaborn - Data visualization
* Scikit-learn - Machine learning model development
* Google COLAB - Code development and experimentation environment
* Tableau – Visual analytics and Business Intelligence

# Steps Involved in Building the Project

1. Data Collection:

Dataset obtained from Kaggle, including patient appointment records.

1. Data Preprocessing:

* Handling missing values and inconsistent data
* Encoding categorical variables (e.g., Gender, SMS received)
* Feature engineering (e.g., days between scheduling and appointment) - Normalization and splitting of data into training and testing sets.

3. Model Building:

- Applied classification algorithm such as Decision Tree - Used accuracy, precision, recall, and F1-score as evaluation metrics

4. Model Evaluation and Comparison:

* Compared model performance
* Random Forest gave the highest accuracy (~80%)

# Conclusion

The model successfully predicts appointment no-shows with reasonable accuracy. The analysis shows that features like SMS reminders, days between scheduling and appointment, and patient's history play a significant role in attendance prediction. Such models can assist hospitals in managing resources more efficiently and improving patient outcomes.