Leveraging on Predictive Analytics to Improve Accessibility of Care

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Introduction

How is Predictive Analytics being applied?

It is used to predict patients with high risk of not showing up for appointments. We call them no-shows or defaulters for short.

Operational Inefficiency

Clinic no-shows results in inefficient use of precious hospital resources and it denies other needy patients timely appointments.

Identifying Relevant Data Sources

Patient Data Source

Patient data such as
- age
- gender
- address
- medical history

Appointment Data Source

Appointment data such as
- time and date
- month of year
- appointment waiting days
- referral source

Nurse Manager’s Expertise

Nurse manager’s expertise such as
- clinic’s workflows
- operation concerns
- feasible points of intervention

Data Driven Methodology

1. Merged Data Sources
   Normalize all data into a flat file

2. Prediction Model
   Extreme Gradient Boosting Tree

3. Model Evaluation
   Test AUC averages at 0.81

4. Dashboard Development
   Build decision support tools from prediction scores

5. Deployment Evaluation
   Deployment AUC averages at 0.77

6. Success Measurement
   Estimates suggest 14% increase in clinic capacity

Disseminating Prediction Scores Through Dashboards

Resource Optimization

For whom:

Purpose: Gives an overview of the clinic’s utilization so as to plan resources better and reduce inefficiencies.

Scheduling

For whom:

Purpose: Allow schedulers to assign patients the earliest available appointment slot on days with lower clinic utilization.

Patient Risk

For whom:

Purpose: Allow nurse managers to contact high no-show risk patients to reconfirm attendance or reschedule slot.

Clinic Utilization

For whom:

Purpose: Allow nurse managers to distribute case files to doctors evenly based on the daily predicted risk.

Achieved Business Goals

1. Mitigate wasteful appointment no-shows
2. Improve clinic resource planning
3. Enhance accessibility of patient care