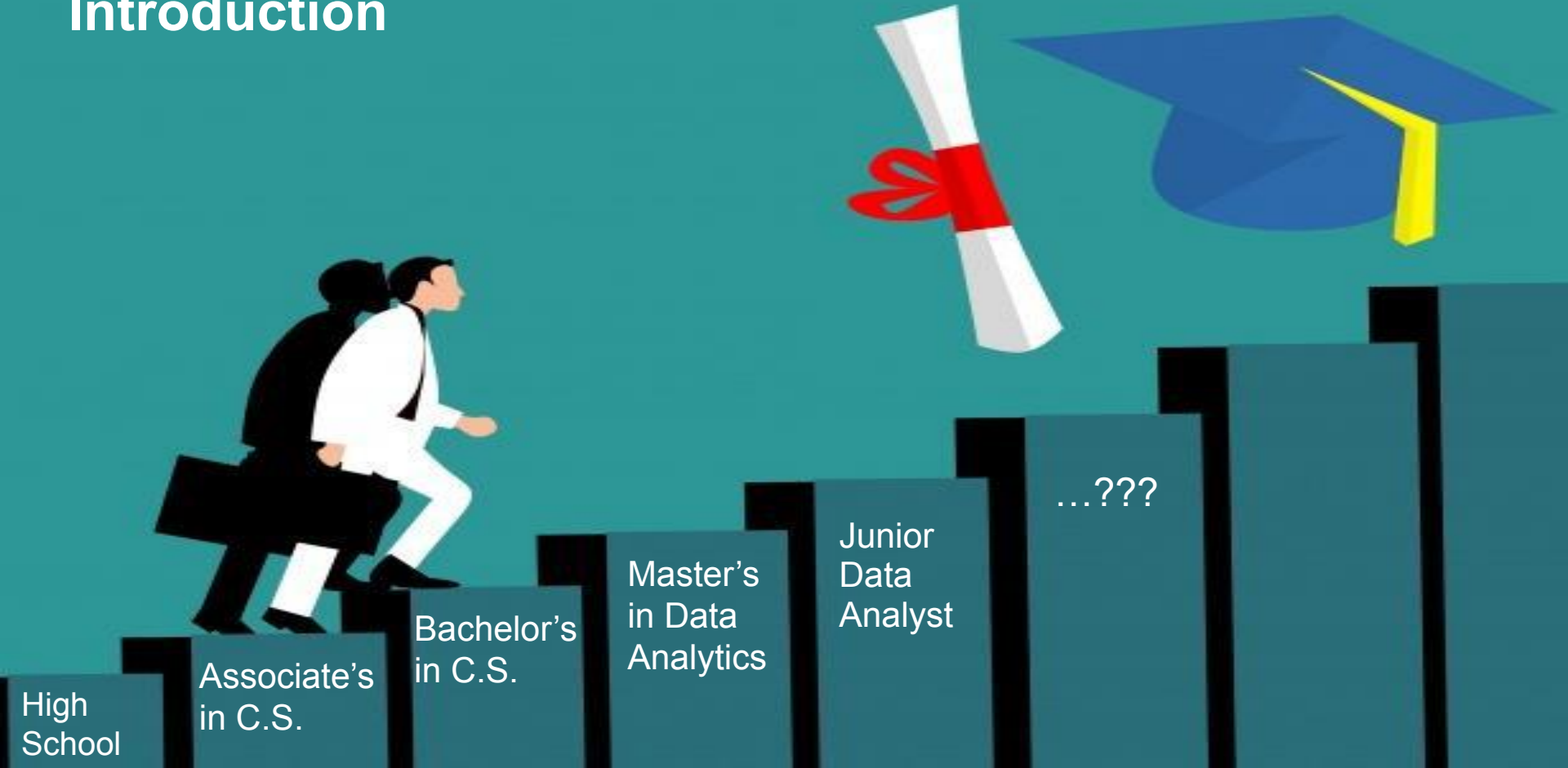


Predicting Hospital Stays

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EMERGENCY

Introduction



Objectives

- Problem
- Research Question
- Approach
- Data
- Results
- Key Factors
- Limitations
- Recommendations
- Benefits

Problem

- Hospitals face major challenges predicting patient length of stay.
- Even with the same diagnosis, stays can range from 2 to 50+ days due to individual and treatment factors.
- This unpredictability affects resource planning, care quality, and cost control.
- Congestion during peak periods also raises staff stress and workload.
- Incorrect estimates can lead to overcrowding in the emergency department.

Research Question

Can we build a model that accurately predicts how long patients will stay in the hospital by using their personal information, medical measurements, and admission details?

Goal: Predict admission duration within 5 hours of actual stay.

Approach



```
graph TD; A[Data Collection] --> B[Data Cleaning]; B --> C[Building Prediction Models]; C --> D[Testing the Models];
```

Data Collection

Data Cleaning

Building Prediction
Models

Testing the Models

Data



Patient information (age, gender, race)



Medical measurements (blood pressure, height, weight)



Admission details (emergency vs. planned)



Medications and procedures

Base dataset: Over 500,000 records

Specialized datasets: 50,000-160,000 records with additional clinical details

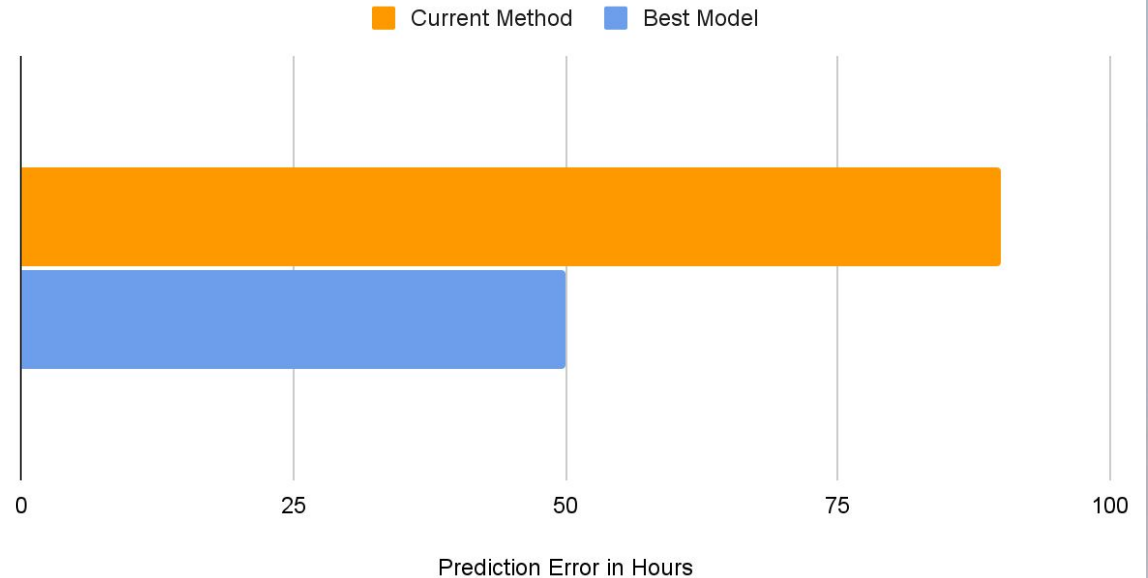
Data source: De-identified patient records from a hospital in Boston, Massachusetts

Results

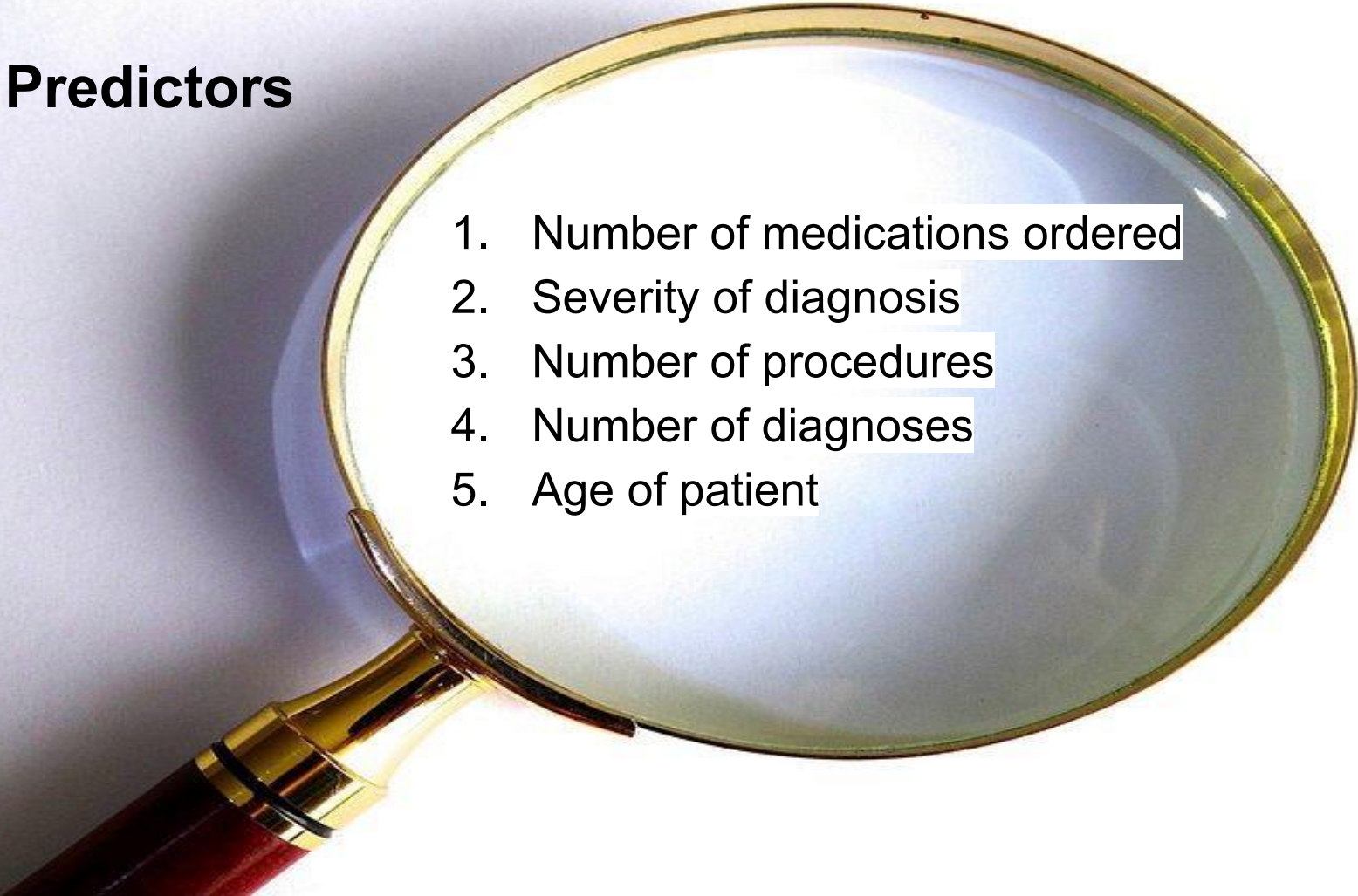
- 44% improvement

Our model reduced prediction error by nearly 2 days compared to simply using averages, cutting uncertainty by almost half.

Performance Comparison



Key Predictors

- 
1. Number of medications ordered
 2. Severity of diagnosis
 3. Number of procedures
 4. Number of diagnoses
 5. Age of patient

Limitations

- Data from only one hospital
- Some information not recorded consistently
- Models have improved prediction but still have room for improvement
- Still a moderate ~2 day margin of error
- The model doesn't include important real-world factors like staff availability, hospital crowding, or discharge planning, which all affect how long patients stay



Recommended Actions

- Improve how patient data is recorded and organized
- Look deeper into medication patterns and their effect on hospital stays
- Partner with other hospitals to share data and insights

Expected Benefits



More accurate discharge estimates for patients (~2 days more accurate)

Better staff scheduling during busy periods

Reduced overcrowding in emergency departments

Reduced cost and data preparation for future analysis that rely on clinical data

Potential identification of medication combinations that reduce hospital stays

Improved room preparation for incoming patients

A photograph of a stage with heavy red curtains. The curtains are closed and hang in vertical folds. The stage floor is visible at the bottom. The text 'The End' is centered in the upper half, and an email address is centered below it.

The End

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