

# Hypoglycemia Risk Prediction in Inpatient Settings

Presenter: Lee Jia Yun Amanda

Company Supervisor: Dr. Srinath Sridharan | Academic Supervisor: Prof. Andrew Lim

## Project Background

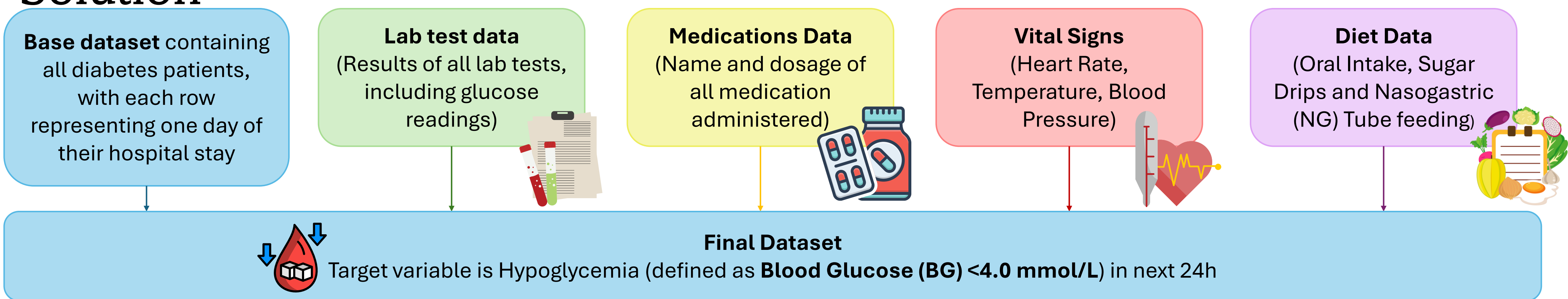
**Clinical Problem:** Hypoglycemia (low blood sugar) is a common complication of diabetes, associated with higher mortality and longer hospital stays.

**Challenge:** The large volume and complexity of healthcare data make accurate prediction of hypoglycemia difficult.

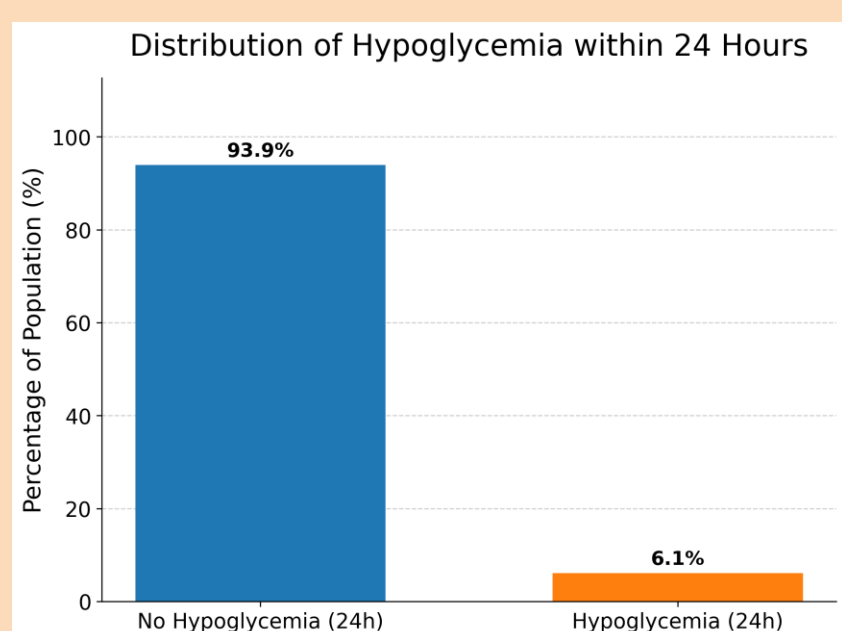
**Project Aim:** Develop a model to predict whether a patient will experience a hypoglycemic event within the next 24 hours.

**Intended Use:** Run the model daily on current patients and deliver predictions to ward nurses at the start of each day. Early identification of high-risk patients enables proactive monitoring and intervention by the care team.

## Solution



### Severe Class Imbalance

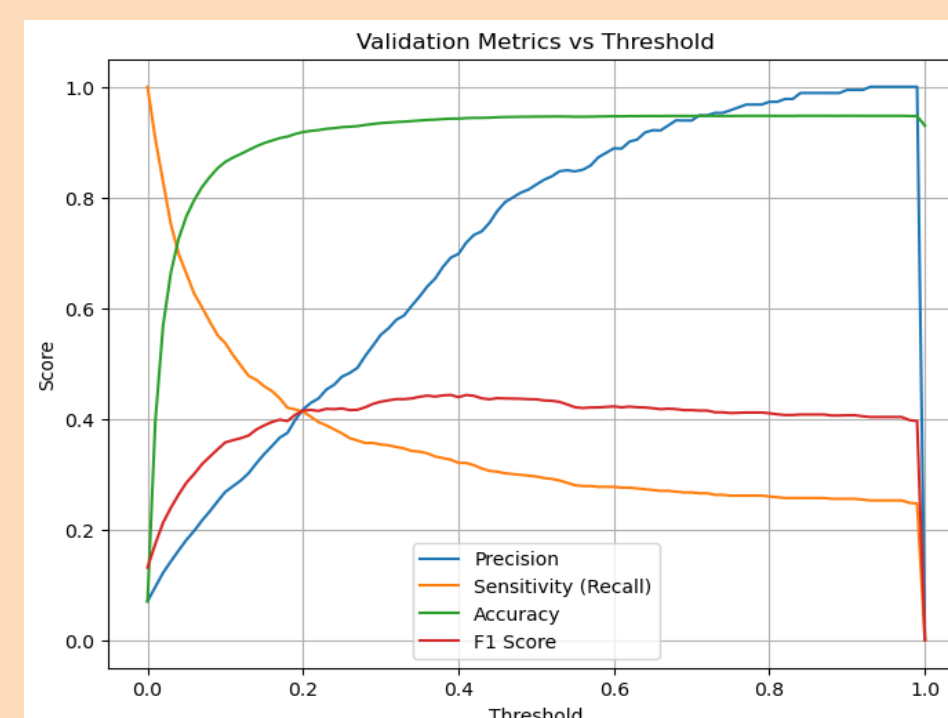


- Minority class making up 6% of population
- **Undersampled population** (on a patient level to maintain continuity throughout admission)
- **Added weights** to Minority class

Training (60%), Validation (20%) and Testing (20%) split done on **Patient-Day Level**

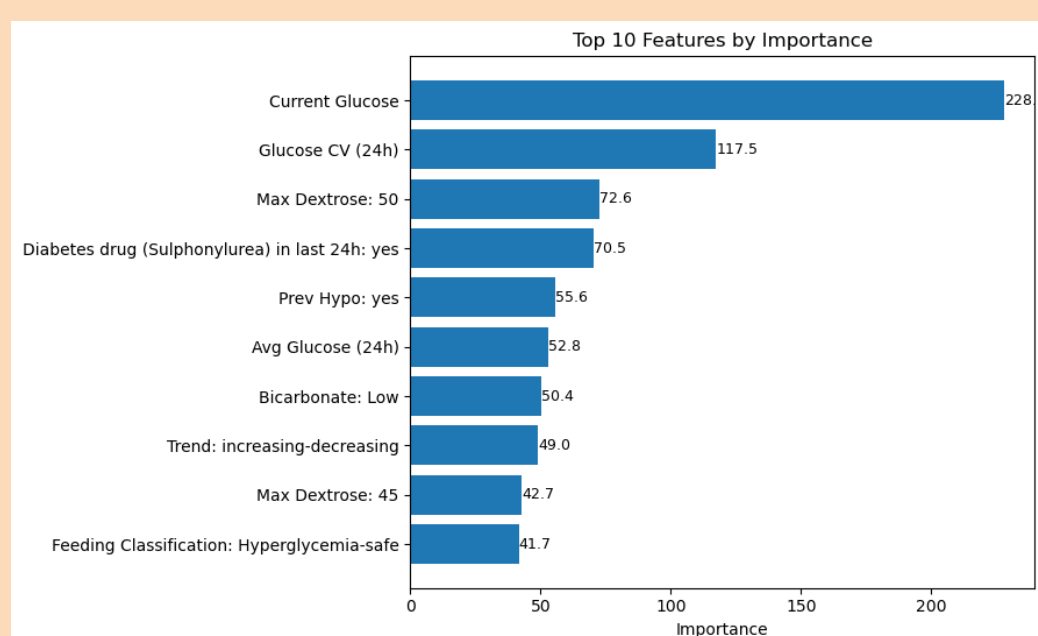


### Precision vs Recall



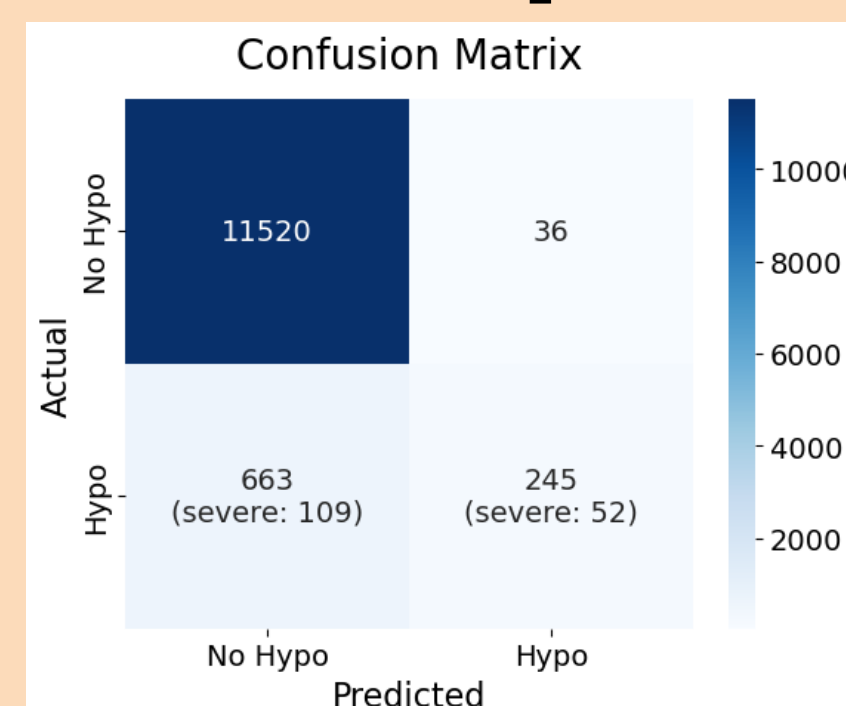
- Model **performs well on accuracy and AUC** metrics
- Trade-off between precision and recall is tricky
- Practically, a trade-off between **false positives and false negatives**
- **Threshold for prediction** can be adjusted to fit needs

### Feature Selection



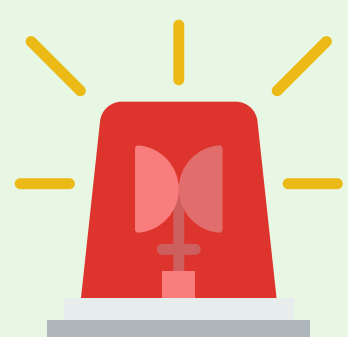
- Original base model with **110 features**
- Reduced to **26 features** by 2 methods:
  - **Domain Knowledge** (based on clinicians' advice)
  - **Feature Importance** (based on XGBoost feature importance on 110 features)

### Operational Considerations



- Reduce false positives to **prevent false-alarm fatigue** (Precision >0.8)
- Model must be **quick and simple enough** for deployment (Reduce features)
- Want to catch **patients with severe hypoglycemia** (where BG <math><3.0</math>)

## Business Impact



- Early daily warning system
- **Less than 13% false positive rate**, ensuring trust in model predictions



- Provides **insights to clinicians** on factors that are associated with hypoglycemic events, including both global and local understanding



- Helps ward nurses and less experienced doctors identify and focus on at-risk patients, for **better patient care and early intervention**