

Postoperative Acute Kidney Injury (AKI) Prediction

Acute Kidney Injury (AKI) is a serious postoperative complication associated with increased morbidity, prolonged hospital stays, and higher mortality rates. Traditional risk assessment methods rely on static clinical scores and limited preoperative indicators, which may not fully capture the complex interplay of perioperative factors. This project aims to leverage **machine learning (ML)** techniques to develop a predictive model for **postoperative AKI** in patients undergoing thoracic surgery.

Objectives

1. **Develop predictive models** for identification of patients at risk of AKI after thoracic surgery.
2. **Integrate multi-dimensional data** (demographics, comorbidities, laboratory results, intraoperative variables, and postoperative monitoring data) to improve accuracy.
3. **Compare ML algorithms** (e.g., Logistic Regression, Random Forest, XGBoost, Support Vector Machine, and Deep Learning models) for predictive performance.
4. **Create a risk stratification tool** that clinicians can use for decision support and personalized postoperative care.

Expected Outcomes

- A validated machine learning model that outperforms traditional risk scores in predicting postoperative AKI (i.e., 0 = non AKI, 1 = mild stage, 2 = moderate stage, and 3 = severe stage).
- Identification of key perioperative risk factors contributing to AKI.
- A Web-based prototype for upload patient cases and predict AKI stages

Evaluation Criteria

- **Precision (Positive Predictive Value):** Proportion of predicted AKI cases that are true positives.

- **F1-score:** Balance between precision and recall.
- **ROC Curve** To assess the model's ability to distinguish between AKI stages and non-AKI patients.