

The Review on XAI-Driven Kidney Transplant Prediction

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Abstract: Kidney transplantation is the best treatment for end-stage renal disease patients, with better survival rates and quality of life compared to dialysis. Yet, predicting the success of a transplant is still difficult due to the presence of various factors like donor-recipient matching, immunological reactions, patient health status, and post-operative management. Statistical and machine learning models have been employed for outcome prediction, but their "black-box" nature restricts clinical trust since they do not provide explanations for predictions. In healthcare, where transparency and accountability are paramount, this lack of interpretability is a hindrance to adoption.

Explainable Artificial Intelligence (XAI) has been proposed as a solution to overcome this limitation. XAI not only enhances predictive performance but also offers insights into the most impactful features influencing outcomes. For example, in kidney transplant prediction, XAI can identify important variables like donor age, HLA matching, comorbidities, and blood type compatibility, making predictions easier to validate and interpret. This interpretability enables clinicians to develop confidence in AI-supported decisions, facilitates patient counseling, and improves post-transplant care planning.

This review paper discusses the applications of XAI in kidney transplant prediction, reviews recent trends in research, and discusses advantages like enhanced trust and transparency. It also points out challenges like data quality, generalization across populations, and integration into clinical practice. The paper concludes by outlining future directions for XAI in promoting personalized and reliable transplant care..

Keywords: Kidney Transplant, Explainable Artificial Intelligence (XAI), Machine Learning in Healthcare

