# [[1]](#footnote-0) Explainable Artificial Intelligence: A Comprehensive Review Of Methods And Applications For Transparent Machine Learning With Heart Disease Prediction Case Study

*Abstract— Explainable Artificial Intelligence (XAI) is a critical research area that addresses the opacity of modern machine learning systems. As AI becomes more complex and is deployed in high-stakes fields like healthcare and finance, transparency and interpretability are paramount. This paper reviews XAI methodologies, categorizing them into local explanation methods (e.g., SHAP, LIME), global interpretation techniques (e.g., permutation importance), and inherently interpretable models. A practical case study on heart disease prediction demonstrates the value of using multiple XAI techniques to understand model behavior. This work contributes to the field by providing a structured taxonomy of explanation methods and highlighting future research directions for creating transparent and trustworthy AI systems.*

1. [↑](#footnote-ref-0)