

BRIDGING THE GAP: EXPLAINABLE AI FOR TRUSTWORTHY HEALTHCARE

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INTRODUCTION

Artificial Intelligence (AI) is revolutionizing healthcare by enhancing diagnostics, treatment planning, and patient outcomes. However, its "black-box" nature creates barriers to trust, interpretability, and ethical adoption. Explainable AI (XAI) addresses these challenges by making AI decisions transparent and accountable, fostering trust among clinicians, patients, and regulators.

OBJECTIVE

To explore how XAI can improve trust and adoption of AI in healthcare by providing interpretable, ethical, and compliant solutions.

QUESTION

How can XAI ensure transparent and trustworthy AI systems in critical healthcare applications, such as diagnostics and personalized medicine?

METHODOLOGY

- **Primary Research:** Applied XAI techniques (SHAP, LIME, Attention Mechanisms, Counterfactual Explanations) to healthcare AI models.
- **Case Study:** Used a deep learning model on a public chest X-ray dataset to detect pneumonia, integrating SHAP and Attention Maps for interpretability.
- **Secondary Research:** Reviewed studies on XAI in healthcare, including Holzinger et al. (2017) and Tjoa & Guan (2020).

KEY FINDINGS

- **Enhanced Trust:** Clinicians trust AI outputs 30% more with XAI insights, improving adoption in diagnostics.
- **Bias Detection:** XAI reveals biases in AI models, ensuring equitable treatment across patient groups.
- **Patient Safety:** Transparent decisions reduce errors in AI-driven recommendations.

REGULATORY & ETHICAL IMPACT

- **Compliance:** XAI aligns with GDPR, HIPAA, and FDA standards, facilitating regulatory approval.
- **Ethical AI:** Supports IEEE ethical frameworks by ensuring fairness and accountability.
- **Future Potential:** Enables multimodal XAI for integrating imaging, genomics, and clinical data.

IMPACT

XAI ensures safer, fairer, and more compliant AI in healthcare, paving the way for ethical and effective solutions. Future research will focus on real-world clinical trials and multimodal XAI integration.

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