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Rizwana Naz Asif

Ulster University London
UK

NeuralXAI: Unravel the Code of Brain's Trust in AI – Neural Interface for Real-Time Explanation Tuning

Abstract:

With the rise of Artificial Intelligence (AI) systems to play an advancing role in creating high-stakes decisions, human and reliable explanations of the action have become critical. Although Explainable AI (XAI) provides an interpretable result, the majority of the existing approaches produce a static and one-size-fits-all outcome that does not take into consideration the emotional and cognitive condition of a user. The study proposes NeuroXAI a new framework that connects online neural feedback with the explanation generation, producing dynamic, personalized and emotionally sensitive AI explanation. NeuroXAI is a non-invasive system of continuously inferring user trust, confusion or anxiety during AI interaction by combining non-invasive EEG-based brain-computer interfaces and a multimodal affect recognition system (facial expressions, speech tone, eye tracking). Through a neuro-symbolic reasoning engine, an explanation is then altered in an adaptive fashion using visual, analogical, and counterfactual strategies. There is also a trust calibration component in the system to avoid the effects of over- or under-confidence especially critical in an area like mental health diagnostics. Rudimentary prototypes indicate higher levels of user trust, lowered cognitive load, and better correspondence with the judgment of experts. NeuroXAI alters the definition of explainability toward being co-evolutionary by creating a double loop of feedback between human affect and the AI introspection into an explanation process in which the current state of explaining what is being done and why is regarding a state of not justification but understanding and empathetic communication. This piece of work postulates a new domain of human-AI interactions that have to be not only transparent but also cognitively and emotionally aware.

Biography

Rizwana Naz Asif, is an outstanding educator and researcher who has a Ph.D. in Computer Science, focusing on utilizing AI in healthcare applications. Having completed 2 MSc degrees in Robotics at Middlesex University and Management at BPP University she is a technically innovative leader. She has an MSCS Bioinformatics degree and an MCS in Hajvery University, with a sound base in life sciences. She has written extensively in leading journals and has more than 20 years of teaching experience in Pakistan and the UK and is a devoted advocate of education, health, and AI in the future, through the use of technology.