

# **An Explainable Artificial Intelligence Model for Project Risk Assessment**

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## **Abstract**

Project management is essential for achieving objectives within specified timeframes, but real-world projects are prone to various risks that can impede progress. Developing robust risk management systems can reduce associated costs and enable proactive risk mitigation. Yet, current risk analysis methods struggle with modern project complexities, leading to the exploration of artificial intelligence (AI) techniques. AI, particularly machine learning, crafts predictive models from past data for precise risk assessment. But AI's opacity sparks transparency and fairness concerns. To address these, eXplainable AI (XAI) enhances model interpretability. In project risk management, the incorporation of explainable AI (XAI) techniques is crucial due to the socio-economic impact and ethical perspectives associated with each project, and stakeholders are responsible for ensuring that decision-making processes align with logical reasoning and conform to ethical perspectives. However, the popular XAI technique, Local Interpretable Model-agnostic Explanations (LIME), has limitations in capturing complex interactions and class imbalances. To address this, a novel approach integrates the Variational Autoencoder (VAE) to generate meaningful samples and a rule-based decision tree model for complex interactions and nonlinearity. The expected contributions of the proposed study include improved interpretability and accuracy, handling complex models, and advancing XAI techniques in project risk management. To accomplish these goals, the study begins by selecting instances for the explanation, generating synthetic neighbourhoods using VAE, and fitting a rule-based decision tree model to capture complex interactions. This integrated approach strives to enhance interpretability, generate meaningful samples, and provide transparent explanations for informed risk strategies in project risk management.

## **Keywords**

Explainable Artificial Intelligence, Interpretability, Machine Learning and Risk Management.

## **Biographies**

**Bodrunnessa Badhon** is currently pursuing her PhD in Computer Science at the University of New South Wales, Australia. She received her M.Sc. and B.Sc. degrees in Computer Science and Engineering from Rajshahi University of Engineering and Technology (RUET), Bangladesh, in 2021 and 2016, respectively. Her research interests

encompass Explainable Artificial Intelligence, Machine Learning, Project Risk Management, Optimization, and Data mining.

**Dr Ripon K. Chakraborty** (Senior Member, IEEE) is a Lecturer (Assistant Professor Eqvnt.) in Systems Engineering & Decision Analytics at the School of Systems & Computing (SysCom), UNW Canberra, Australia. He is experienced in “Artificial Intelligence in Decision-Making for Complex Systems”. His research interest covers a wide range of topics in decision analytics, applied artificial intelligence, evolutionary computation, operations research, and applied optimisation in the "Project Scheduling and Supply Chain Management" domains. He is the team leader and founder of ‘The Decision Support & Analytics Research Group’ at the School of Systems & Computing, UNW Canberra, Australia. Many organisations, such as the Department of Defence and the Commonwealth Government of Australia, have funded his research programs

**Dr Sreenatha Anavatti** is a Senior Lecturer with the School of Engineering and Technology at the University of New South Wales, Canberra, Australia. He has been working on Intelligent Systems and has more than 300 refereed publications in international journals and conferences. His research interests include Artificial Intelligent systems, their interpretations and their control.