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PK Senyo

University of Southampton, p.k.senyo@soton.ac.uk

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Towards an Artificial Intelligence-Driven Framework for Project Risk Management

TREO Talk Paper

PK Senyo

University of Southampton
p.k.senyo@soton.ac.uk

Abstract

Project risk management is a process of identifying, assessing, and responding to potential adverse events throughout the life cycle of a project to minimize their impacts and capitalize on opportunities (Association for Project Management, 2018). Traditional project risk management approaches often rely on subjective expert judgment, static risk models, siloed data, and reactive strategies.

However, with the increasing complexity and dynamism of projects, new sophisticated project risk management approaches are necessary to address the limitations of traditional methods. Artificial intelligence (AI), particularly through machine learning, can reimagine how risks are managed in projects (Niederman, 2021), offering enhanced predictive capabilities, real-time insights, and adaptive strategies.

While there is ongoing research, existing studies have only provided partial insights (Nenni et al., 2024), leading to several debates on the suitable model for project risk management. Moreover, existing research (e.g., Hu et al., 2013) has largely focused on generic risk prediction, while other important aspects of project risk management, such as risk prediction explainability, scoring, prioritization, and mitigation, remain largely unexplored.

To address these knowledge gaps, we develop an intelligent AI-driven project risk management framework that combines AI models, tools, and techniques with risk identification, evaluation, and mitigation capabilities. Specifically, we used a combination of the CatBoost algorithm, decision trees, natural language processing techniques, and large language models (LLMs) to develop an integrated framework. The CatBoost-supported prediction was complemented by natural language processing techniques that aided in the extraction of insights from unstructured data sources for sentiment analysis and identifying early warning signals. Relatedly, the LLMs supported developing risk mitigation strategies to overcome risks through an innovative deployment of RoBERTa— an advanced, optimized version of BERT (Bidirectional Encoder Representations from Transformers).

During the TREO, I will provide an overview of AI in project risk management and unpack how a combination of AI techniques, models, and tools was used to address the longstanding issue of intelligently identifying, evaluating, and mitigating project risks. I will discuss the proposed AI-driven framework for project risk management and the outcomes of its application in the real-world setting.

References

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