World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

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Leveraging prompt engineering to enhance financial market integrity and risk management

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World Journal of Advanced Research and Reviews, 2025, 25(01), 1775-1785

Publication history: Received on 16 December 2024; revised on 22 January 2025; accepted on 25 January 2025

Article DOI: https://doi.org/10.30574/wjarr.2025.25.1.0279

Abstract

This paper presents a comprehensive investigation into the role of prompt engineering in optimizing the effectiveness of large language models (LLMs) like ChatGPT-4 and Google Gemini for financial market integrity and risk management. As AI tools are increasingly integrated into financial services, including credit risk analysis, market risk evaluation, and financial modeling, prompt engineering has become crucial for improving the relevance, accuracy, and contextual alignment of AI-generated outputs. This study evaluates the impact of various prompt configurations in enhancing financial decision-making. Through a series of experiments, the paper compares the performance of ChatGPT-4 and Google Gemini (versions 1.5 and 2.0) in generating actionable insights for credit and market risk analysis. The results reveal that ChatGPT-4 outperforms Google Gemini by over 30% in generating accurate financial insights. Additionally, ChatGPT-4 Version 4 is found to be 20% more effective than Version 3 in risk analysis tasks, particularly in aligning with regulatory frameworks and financial data. These improvements highlight the significant role of prompt engineering in enhancing the precision of financial models. Furthermore, the study explores the reduction of error rates through optimized prompt strategies. In particular, prompt engineering reduces error rates by approximately 20% when assessing complex financial queries.

Keywords: Prompt Engineering; Gen AI; Financial Risk Management; GPT; BERT

1. Introduction

In recent years, the financial sector has witnessed a transformative shift with the adoption of artificial intelligence (AI) technologies, particularly in enhancing decision-making processes and improving risk management strategies. A key component in maximizing the effectiveness of AI tools, especially large language models (LLMs) like ChatGPT, is prompt engineering. This technique plays an essential role in refining AI-generated outputs to make them more accurate, relevant, and contextually aware, ultimately empowering financial institutions to optimize their operations. As financial institutions continue to integrate AI and machine learning into their systems, prompt engineering has emerged as a pivotal method for automating complex financial tasks, from risk assessment to compliance strategies. This paper provides a comprehensive literature review on the growing application of prompt engineering within the financial industry. It explores the ways in which prompt engineering is being utilized to enhance the accuracy of financial modeling, improve predictive analytics, and streamline decision-making processes across a range of financial services. Furthermore, it highlights both the potential and the challenges associated with the integration of AI tools, focusing on ethical considerations such as data privacy, model biases, and governance issues that arise from their use. The paper discusses various perspectives from recent research and presents an evolving landscape for how finance professionals can leverage prompt engineering to drive better outcomes and maintain market integrity in an increasingly AI-driven world.

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