International Journal of Innovative Research in Engineering and Management (IJIREM)
ISSN(Online): 2350-0557, Volume-11, Issue-6, December 2024
https://doi.org/10.55524/ijirem.2024.11.6.19
Article ID IJIRE-1370, Pages 175-179
www.ijirem.org

Implementing Gen AI for Increasing Robustness of US Financial and Regulatory System

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Received: 4 December 2024 Revised: 18 December 2024 Accepted: 31 December 2024

ABSTRACT- With Gen AI models becoming more evolved, their application in enhancing the robustness of the US Financial System is more viable. Financial risk modeling can take advantage of these development and aid regulatory framework by integrating these novel technologies to make their models more robust. In this work, we have used the latest Gen AI model by Open AI also known as Chat-GPT 4o and 40 mini and Google Gemini Version 2.0 and 1.5 to generate relevant questions from govt websites and measure the accuracy and relevance in checking the the pre trained logistic regression models. We have rated the accuracy of the questions by taking a survey of three Risk Analysts (volunteers) and found that Gen AI is 70-80% accurate in terms of the question for the models it generated. The new and the old model for open ai vs Gemini were compared. We have also documented how different models are sensitive to different prompts as they want to save computational cost and keep the output relevant. These questions generated can be used and integrated in the backend and auto curate the models under analyst supervision. We proposed a full stack framework as an end to end solution to address issues related to privacy and ethical considerations limiting exposure of property data and models. We have used all-MiniLM-L6-v2 as the bridging APIs for creating variants of the queries.

KEYWORDS- Gen AI, US Financial System, Risk and Regulatory Modeling, Robustness and Integrity

I. INTRODUCTION

Chat GPT and Google Gemini have been used as the two most common Gen AI publicly available tools. Although often the results are not repeatable or reliable we can still use them to generate the requisite results, We propose taking the inputs form these two independent models (and of different versions) on the front end side to generate questions to validate and check the robustness of our models. Big Banks like JP Morgan, Bank of America, Chase have already moved most of the modeling to python infrastructure. To run Gen AI for automated regulatory mock testing the whole stack from front end to backend has to be moved in a unified python framework. While in the literature review most models talk about adoption challenges and possible improvements, literature is lacking about the implementation of LLMs at large organizations. In the absence of Python, full stack infrastructure adoption has been slow. The other challenge comes to internally managing proprietary data and linking to APIs that come pre-trained with external data. has been a major challenge in the adoption of Gen AI.

Most of the research has been about sentimental analysis with a dearth of research on how to capture quantitative ideas from the regulatory portals and validate the models. Sentiment analysis only outputs the positive or negative sentiment regarding an event like interest rate hike and the confidence levels.

II. LITERATURE REVIEW

A. AI and Credit / Market Risk Management

Importance of Local Explanation and Local Interpretation for financial models in a regulatory environment which requires transparency has been Vital and a concern for regulators. Bello's [2] analysis of machine learning algorithms for credit risk assessment demonstrates that ML models, such as decision trees and neural networks, reduce default risk prediction errors by 25% compared to traditional credit scoring methods. The study shows that by integrating these models, financial institutions could improve the accuracy of credit decisions and reduce loan defaults by an estimated $3 billion annually across the industry. Bello further examines how machine learning algorithms can improve credit risk assessment models, comparing them with traditional financial models. The paper provides a comprehensive economic and financial analysis, emphasizing the impact of these algorithms on reducing default risks and enhancing predictive accuracy in credit scoring systems. It also addresses the challenges and benefits of integrating machine learning into financial institutions' risk management strategies. The paper shows that using ML algorithms can reduce default risks by 30% and enhance predictive accuracy in credit scoring systems.

In this regard we propose separating taking several models like open ai and Gemini on the front end to generate the regulatory questions and we propose clear separation of frond end, middle layers and back-end frameworks.

In [1], the authors have explored the role of Artificial Intelligence (AI) in enhancing regulatory compliance within the financial sector. Focusing on machine learning and natural language processing (NLP), it discusses AI's potential in improving anti-money laundering (AML) practices and predictive analytics, alongside its challenges related to data privacy and ethics. The paper highlights the proactive monitoring of compliance, thus suggesting AI as a