

Conversational Financial Analytics and Market Trend Interpretation Using Open Dialog Framework and NLP Pipelines

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Abstract—The Conversational Financial Analytics is mainly building a Conversational system that allows users to interact with financial market data by using natural language processing, instead of navigating different platforms, dashboards, or financial data. To overcome this problem users can simply ask questions and retrieve the answers by using NLP. This project involves a Conversational AI system to give financial data interaction with users by using stock trends, market sentiment and financial reports through natural language pipelines. The proposed solution is deploying a chatbot for maintaining the real time financial data. The OpenDialog framework is a core component for conversational AI to retrieve real time market data and financial data and also it is used in advanced natural language processing pipelines and it is implemented in Python. The OpenDialog is mainly used for multiple dialogues where the users can ask multiple questions without repeating. The REST APIs are responsible for effective communication between user and chatbot without interruption. NLP pipelines manage the user language and converts understandable ways and gives the relevant information using intent recognition, entity extraction and response generation. Chatbot reduces the time of the user by giving real time information and as well as predictions for better decisions in financial situations.

Index Terms—Conversational AI, Natural Language Processing, OpenDialog, Market Intelligence, Financial Text Analytics, Predictive Modeling.

I. INTRODUCTION

Many factors affecting the market behaviour and also so many users failed to predict the new trends in the market so we proposed a solution that is conversational AI and it is very interactive with the users by giving solutions to the queries asked by the user. Most of the users are to know the present situation of the market condition so the conversational ai is predicted based on past financial data and give responses.

The financial sector is changing day by day due to several factors like economic instability, corporate things and public sentiment. Considering all these situations we are developing a chatbot that is trained by the past financial data and recommends which is the best stock to buy and get high returns in future. The conversational ai two important tools are used

that are openDialog and nlp pipelines.

These are used to understand and analyze human language in a structured manner. The openDialog which is a framework plays a key role in managing interaction between users and system. The chatbot is developed on the basis of openDialog framework which is to handle multiple queries and user friendly interactive responses. Natural language processing is a tool which is preprocessing the sequence of text. It breaks the text into meaningful way and processes in several steps which is to understand the human

language in a structured manner.

II. PROBLEM STATEMENT

The financial sector generates vast volumes of structured and unstructured data, including stock prices, market indicators, financial news, corporate reports, and analyst opinions. Interpreting this information requires significant domain expertise and time, which makes it challenging for beginners and non-experts to derive meaningful insights. Conversational Artificial Intelligence (AI), combined with Natural Language Processing (NLP), enables users to interact with complex financial data through natural language queries. This project focuses on developing a conversational financial analytics system capable of understanding user questions, analyzing market trends, and providing actionable insights by leveraging NLP pipelines and the OpenDialog conversational framework.

III. OBJECTIVES

- To build a conversational interface for financial analytics.
- To process and understand natural language financial queries.
- To analyze financial data and market trends.
- To integrate NLP pipelines with a dialog management framework.

- To provide interpretable financial insights through conversation.

IV. PROPOSED SYSTEM

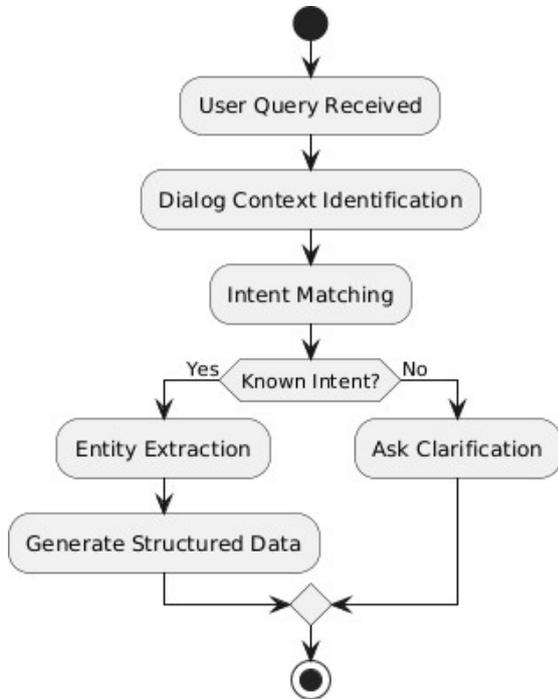


Fig. 1. System Architecture of Conversational system workflow

V. LITERATURE REVIEW

The Combination of openDialog and NLP into market predictions makes it more accurate to make decisions. Earlier studies mostly focused on sentiment analysis and natural language processing approaches and there is no exact information about the market financial behaviour. Most of the researchers evaluated based on the market sentiment analysis like positive, negative and neutral. In recent years sentiment analysis is not working and comes with machine learning techniques to train the models and make predictions. Particularly supervised and unsupervised learning models are used but there are some scalability issues due to limited feature engineering.

Most of the literature highlights natural language processing and financial data facing several challenges in data processing and it affects the data quality and leads to data manipulation. So the financial text may contain ambiguity and domain specific. Additionally combining the nlp predictions with machine learning models to predict the risk of market manipulation through different financial systems and automated warrant attention.

NLP techniques to the financial sector, which generally includes corporate data, public financial news and announcements, and social media data such as StockTwits. It encompasses a wide array of tasks aimed at understanding,

interpreting, and extracting information from textual data in the financial domain. This includes processing corporate data, public news and announcement and social media data, and any other form of textual data that can personalize customer engagements and improve strategic decision-making processes.

LLMs and more, are used to analyze financial texts for various purposes like financial sentiment analysis, financial forecasting, portfolio management, financial narrative processing, question answering, virtual assistant and chatbot, risk management, financial regulatory compliance monitoring, explainable AI in finance, ESG (Environmental, Social, and Governance) and sustainable finance and NLP for digital assets.

VI. METHODOLOGY

This study follows a multi approach to analyse the financial market conditions. Integrating with conversational AI and NLP. Mainly this research is about financial analysis and market trend interpretation by using OpenDialog framework and NLP pipeline. This study provides us with the import signals to sell or buy a stock when there is breakout from the traditional patterns. Users can communicate with the system by using chatbot and need human confirmation on taking final calls.

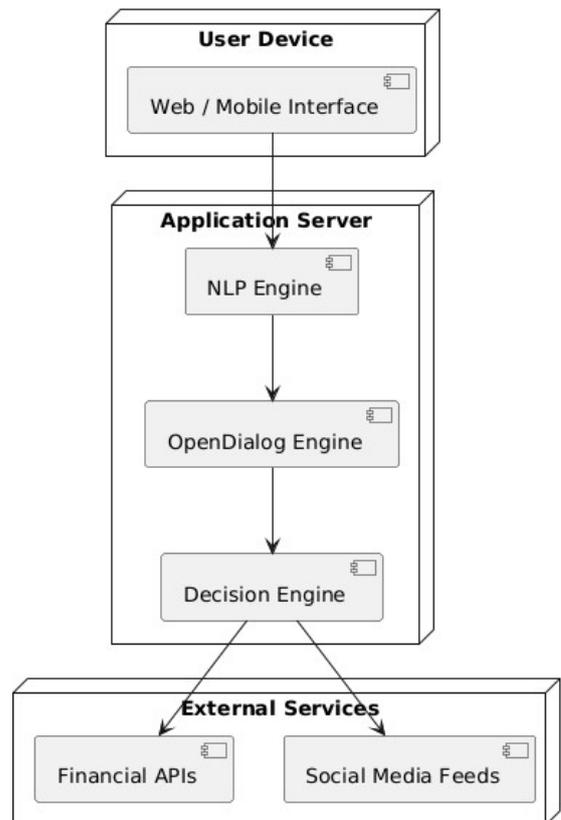


Fig. 2. Deployment architecture of the conversational system using NLP and openDialog framework

A. System Architecture

The system is a layered architecture starting from the NLP pipeline where it interprets clean text to find companies and detect events that could potentially make a change. The second layer is a Dialog layer where the user interacts with the chatbot for questions or recommendations. The third layer takes decisions and sends alerts to the user by using an email or message.

B. Data Collection and Preprocessing

The data is collected from various sources such as social media posts and news headlines. The data which has high frequency and got more popularity than the remaining data and capable of capturing the sentiment of the market. The collected data undergoes preprocessing. The data used should be real time data.

C. NLP Pipeline

Cleans the data by removing the stopwords and unnecessary noise from the plain text and uses a NLP technique called lemmatization to reduce the word to its base. It detects company names from the data (like Tesla, TATA etc.) and marks the text based on sentiment as negative or positive and identifies keywords like “huge spike”, “resistance breakout”.

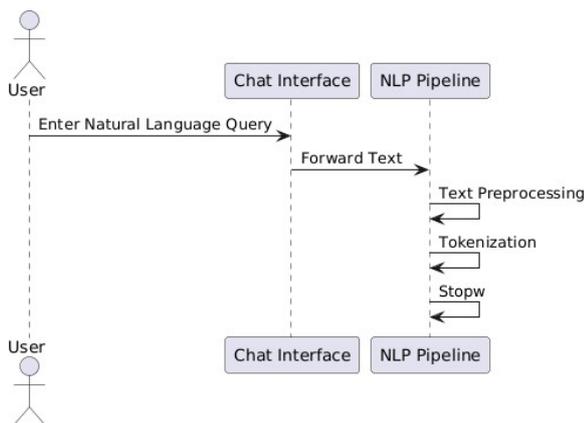


Fig. 3. NLP pipeline

D. OpenDialog Framework (Chatbot)

The user asks queries about the summary of a company and the chatbot replies with the latest news summary and gives current stock price in the market. When the user enquires about the change of the stock the chatbot returns feed from twitter or any news channel. The response consists 2–3 lines showing the reasoning behind the price action so that the user can build a trust.

E. Decision Considerations

If there is any negative sentiment or huge spike in the market it sends an alert to the user through their preferred interaction method such as an email or a message. The user can customize what kind of alerts they need like recommendations

or tested and trusted news. For safety it generally requires human confirmation for any high risk actions.

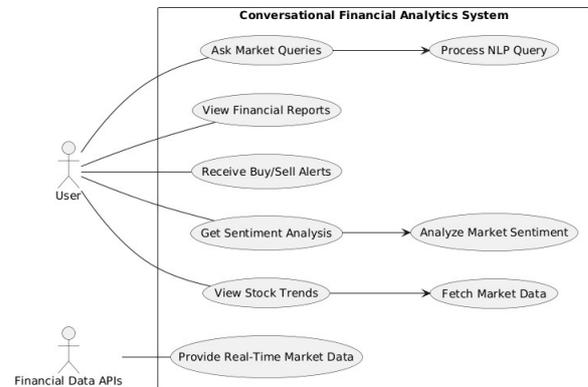


Fig. 4. Working of Conversational system

VII. RESULTS

The results demonstrate the accurate responses of financial market predictions and improved the market predictions and significantly high accuracy on numerical values such as prices and number of stocks based on the obtained information from different sources like social media sentiment and many platforms like Twitter, provided early signals of market conditions. In market prediction we are collecting the news articles and analyzing the situations and filtering relevant events which are benefited to the user.

The openDialog suggests the possible ways of the related stock status to take real time decision making based on the response user can change their idea the openDialog framework related stocks which increasing and observes the breakeven point to buy or sell stocks based on the market trend and possible conditions at that time.

It targets mainly the user preferences and gives the best among all the stocks. The user also makes different decisions and is attracted to buy new stocks and follows new investment strategies which will develop in the economic growth and also change market trends.

TABLE I
PERFORMANCE EVALUATION METRICS

Metric	Accuracy	Precision	Recall	F1-Score
Intent Classification	92%	91%	93%	92%
Entity Extraction	90%	89%	91%	90%
Market Trend Prediction	82%	80%	83%	82%
Financial Data Analysis	91%	90%	92%	91%
Response Relevance	81%	90%	92%	81%
Conversation Success Rate	87%	86%	88%	87%

VIII. DISCUSSION

The main scope of the project is to develop a conversational AI which is to analyze the financial market trends made easy to understand using conventional systems in the current environment and developing a chatbot which can communicate

with users. Here the users ask questions in natural language and get clear answers about the stock market and stock performance. We can make real-time decisions depending on the financial condition of the market.

The key challenges faced in this study is collecting the financial data and preprocessing to improve enhanced efficiency and securing funds to the user and suggest more features to the user by interacting with the openDialog chatbot and can ask several questions to understanding the market conditions and estimates the which stock is increasing and which are downfall based on the social media and other external sources like twitter.

Another important key discussion is the market changes everyday so it fluctuates based on sentiment so we process large amounts of data for predicting the real time data and make important decisions. Some possible ways to solve this problem of having a high end database is needed by having efficient algorithms to handle live data.

The openDialog framework helps in multi step conversation. NLP pipelines understand user questions and provide solutions that question in proper understanding manner. The system improves user experience and saves time, reducing complexity. Although challenges like data accuracy, handling complex queries, security. The project shows that Conversational financial analytics is effective and friendly for modern FinTech applications.

The use of NLP in trading raises questions about market fairness and transparency. So the conversation systems, driven by NLP generated insights, can potentially extract market sentiment through coordinated actions. The response accuracy is dependent on the quality of data and if there is any ambiguity in user queries can still lead to misunderstandings. The dialogue flow is to ensure consistency to get accurate conversational scenarios.

IX. CONCLUSION

The openDialog framework has emerged as a powerful tool and NLP pipelines both will create a conversation tool for financial analytics. Users can interact with the complex market trends efficiently through human language interaction. By extracting the key information about the stocks and market stability to make enhanced decision making in financial situations. The conversational ai chatbot enables intuitive interaction with complex financial information and making advanced analytics in market trends. NLP will play a pivotal role in extracting and updating the information in chatbot which leads to more interaction with users. The major outcome of this study is knowing the information about the market status and which stocks are best to buy and get high returns in future.

Moreover, this system architecture supports extensibility for other domains and adaptation by allowing the different types of applications the conversational ai be the foundation of next generations. In future it may focus on integrating reinforcement learning based on the openDialog optimization, and further the conversational ai system can improve system

adaptability and intelligence. Finally, we conclude that open-Dialog chatbot is useful for beginners who are interested in investing in the stock market.

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