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Portfolio Analyser Integrated With Chatbot

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Abstract: *This project presents the development of an AI-powered Portfolio Analyzer integrated with a Chatbot to assist users in improving their resumes and provide job recommendations. The Portfolio Analyzer leverages machine learning and AI techniques to assess uploaded resumes, offering personalized feedback on key sections such as skills, education, and work experience. It evaluates the overall quality and relevance of the resume based on predefined scoring criteria, helping users optimize their profiles for better job prospects. The integrated Chatbot adds a conversational interface for users to interact with the system. The chatbot can answer queries related to resume optimization, track job application statuses, recommend jobs based on the resume content, and offer guidance for improvements. This system also highlights resume corrections using color-coded markers, with red indicating areas needing improvement and green signifying well-crafted sections.*

Keywords: Portfolio Analyser, Resume scoring, Resume optimization, Chatbot, Job recommendation solutions

I. INTRODUCTION

In today's competitive job market, having a well-crafted portfolio or resume is critical for securing employment opportunities. The Portfolio Analyzer with Chatbot aims to help individuals optimize their resumes by providing detailed feedback and offering job recommendations based on their qualifications. This system combines artificial intelligence and machine learning to evaluate resumes, ensuring that users can identify gaps and areas for improvement, thereby enhancing their chances of success. The Portfolio Analyzer assesses various aspects of a resume, such as education, skills, experience, and keywords, providing a comprehensive score. It not only highlights areas needing improvement but also recommends corrections, using color-coded feedback (e.g., red for errors and green for strengths) to make the evaluation process intuitive. Additionally, an integrated Chatbot enables users to interact with the system conversationally, facilitating easy access to resume insights, job tracking, and guidance on enhancing the portfolio. The chatbot further personalizes the user experience by answering questions about resume quality, suggesting improvements, and providing tailored job. The Portfolio Analyzer leverages machine learning models to predict and evaluate the quality of the user's resume based on factors such as industry standards, keyword relevance, and alignment with job descriptions. The system uses algorithms to predict job suitability and provide customized recommendations.

II. LITERATURE REVIEW

The integration of financial portfolio analysis tools with conversational agents (chatbots) represents a growing trend in fintech, driven by a need to make investment management more accessible, personalized, and user-friendly. While traditional portfolio analyzers have long helped investors track performance and rebalance assets, embedding these tools within a chatbot interface adds an entirely new layer of interaction—one that feels more human, intuitive, and real-time.

Financial Portfolio Analysis – The Backbone

At the core of any portfolio analyzer lies the foundation of **Modern Portfolio Theory (MPT)**, first introduced by Harry Markowitz in 1952. MPT emphasizes diversification and the trade-off between risk and return, concepts that remain

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fundamental in most digital portfolio tools today. These tools typically provide metrics such as asset allocation, Sharpe ratio, volatility, and drawdown—crucial for both novice and seasoned investors to understand their positions.

Modern tools have evolved significantly, leveraging **machine learning algorithms** for asset prediction and anomaly detection. For instance, studies have shown that incorporating historical trends with predictive analytics enhances accuracy in forecasting portfolio risk (Zhang & Zhou, 2018).

Rise of Chatbots in Fintech

The use of chatbots in finance isn't new, but their capabilities have expanded rapidly. Early bots focused on answering simple queries (like "What's my balance?"), but now, with advancements in **Natural Language Processing (NLP)** and AI, they can handle more complex interactions—like guiding a user through investment strategies or summarizing portfolio health.

Chatbots such as those built on platforms like **Google Dialogflow**, **Rasa**, or **OpenAI's GPT models** have demonstrated high potential in delivering near-human conversations. Recent research (e.g., Jain et al., 2020) highlights how conversational agents reduce friction in user engagement and boost financial literacy by offering personalized insights in digestible language.

Bridging the Gap: Integration of Analyzers with Chatbots

The integration of portfolio analytics with chatbots is relatively novel but promising. By combining real-time data processing with conversational interfaces, users can "talk" to their portfolios—asking, for example, *"How did my investments perform this week?"* or *"Should I consider rebalancing?"*

A few pioneering platforms, such as Cleo or Plum, offer conversational finance tools, but these often lack deep, real-time portfolio analysis features. Academic prototypes and startups are beginning to explore systems where chatbots act almost like personal financial advisors—context-aware, always available, and proactive in giving nudges based on live market data.

A. EXISTING SYSTEM

First Generation Hiring Systems In this System the Hiring team would publish their vacancies and invite applicants. Methods of publishing were newspaper, television and mouth-talk. The interested candidates would then apply by sending their resumes. These resumes were then received and sorted by the hiring team and shortlisted candidates were called for further rounds of interviews. The whole process would take lot of time and human efforts to find right candidate suitable for their job roles. As the industries have grown, there hiring needs have also rapidly grown. To serve these needs of hiring process, certain consultancy units have come into existence. They offered solution in which the candidate has to upload their information in a particular format and submit it to the agency. Then these agencies would search the candidates based on certain keywords. These agencies were middle level organizations between the candidate and company. These systems were not flexible as the candidate has to upload there resume in a particular formats, and these formats changed from system to system.

Plum

- **What it is**: An AI-powered finance assistant based in the UK.
- **Chatbot Features**: Operates mainly through messaging interfaces (Facebook Messenger, iOS/Android), allowing users to interact with their finances conversationally.
- **Portfolio Analysis**: While Plum started as a savings tool, it now offers investment portfolios and insights. Users can ask about performance, fees, and projections.
- **Integration**: Not deeply analytical (e.g., no Sharpe ratio or volatility calculations), but provides simple, digestible updates and visual summaries.

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2. Cleo

- **What it is**: A popular AI chatbot for personal finance, aimed at younger users.
- **Chatbot Features**: Friendly, humorous conversational style. Users chat with Cleo to ask about budgets, savings, and spending habits.
- **Portfolio Angle**: Investment features are minimal. Cleo's strength is in financial literacy and saving nudges, not full portfolio analysis.
- **Takeaway**: While not a portfolio analyzer per se, Cleo shows the potential of an engaging chatbot interface that could be extended to investment data.

3.Kasisto (KAI Platform)

- **What it is**: Enterprise-level AI platform powering chatbots for banks like DBS, Standard Chartered.
- **Chatbot Features**: Robust NLP engine designed for banking and finance; supports investment-related queries.
- **Portfolio Integration**: Some implementations allow users to ask about their portfolio performance, holdings, and rebalancing options.
- **Enterprise Use**: This is more B2B—banks integrate Kasisto into their apps to offer chatbot-assisted portfolio tracking.

III. PROPOSED METHODOLOGY

To design and develop a user-friendly system that allows users to monitor, analyze, and receive insights about their investment portfolio through a conversational chatbot interface. The goal is to make portfolio management more accessible, intuitive, and personalized.

1. System Architecture Overview

The system will have two major components:

Backend Portfolio Analyzer: Handles data processing, analytics, and financial modeling.

Frontend Chatbot Interface: Interacts with users, translates queries into actionable backend requests, and presents responses in natural language.

These two layers communicate through APIs to ensure real-time interaction and flexibility in deployment.

2. Modules & Workflow

A. Data Ingestion & Portfolio Management

User Portfolio Input**:**

Manual input of assets (stocks, crypto, mutual funds, etc.)

Integration with third-party APIs (e.g., Plaid, Yahoo Finance, Alpha Vantage)

Stored in: Secure database (e.g., PostgreSQL or MongoDB)

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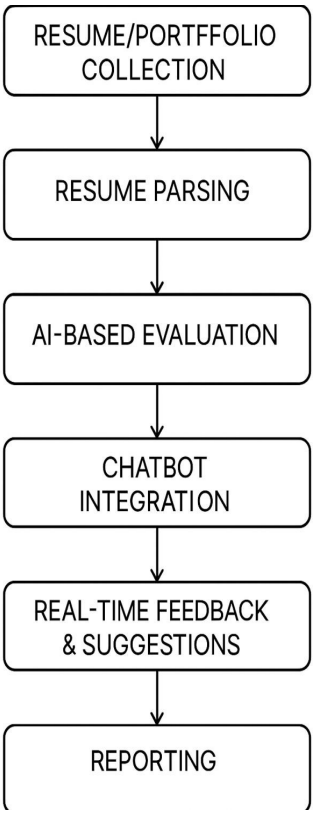

Figure 1: Proposed System Flowchart

IV. IMPLEMENTATION

Software Architectural Designs:

Our system follows the three tier architecture. First tier consist of GUI, followed by Processing block and the Database. GUI (Graphical User Interface) In our project GUI deals with the interface for the user where the user will have to register and then login give the skill test and submit his resume in any format (Pdf, doc, docs, etc.) Processing block: This is the block where the actual processing of our project is done. This block will connect the database and the GUI .i.e. it acts as a connector as well as communicator which connects the database and helps in transfer of data between the GUI and the database. Its main function will be to take input from the uploaded CV of the candidate.

Database: Database tier is used for the data storage. This contains all the data that is need for the processing and string data of the project. The data in this tier is related to the student information gathered from his/her CV.

Testing and Deployment:

To ensure the Portfolio Analyzer integrated with a chatbot operates reliably, a comprehensive **testing phase** is essential before deployment. First, **unit testing** is conducted to verify the functionality of individual components, such as the chatbot's intent recognition, the portfolio API endpoints, the analysis engine calculations, visualization generation, and the recommendation logic. Tools like Pytest, Postman, and built-in chatbot testing frameworks are used extensively. Afterward, **integration testing** ensures that these modules work together smoothly; for instance, verifying that user-uploaded portfolios are correctly processed and analyzed, and the results are appropriately returned to the chatbot interface. **UI/UX testing** is also critical, particularly for the chat interface, ensuring that users can seamlessly upload portfolios, interact naturally with the bot, and view visualized reports correctly on both web and mobile devices. To guarantee system resilience under heavy load, **performance testing** is performed using tools like Locust and JMeter,

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simulating hundreds of users simultaneously. Additionally, **security testing** focuses on protecting user data by validating input, securing file uploads, and enforcing strict authentication protocols, using tools like OWASP ZAP.

Once testing is completed, the **deployment phase** begins by setting up a production environment on cloud platforms such as AWS, GCP, or Azure. All services — including the backend, chatbot server, analysis engine, and frontend — are **Dockerized** for portability and scalability, and managed using docker-compose. A **CI/CD pipeline** is established, typically via GitHub Actions, automating the process of building Docker images, running tests, and deploying to the cloud whenever code changes are pushed to the main branch. During deployment, care is taken to configure database backups, file storage (such as AWS S3 for portfolio uploads), SSL/TLS encryption, and server monitoring systems. Post-deployment, **monitoring tools** like AWS CloudWatch, Grafana, and Sentry are set up to track API response times, system errors, chatbot success rates, and overall uptime, ensuring that any issue can be detected and resolved swiftly.

V. RESULTS & DISCUSSION

Figure 2: Introduction page

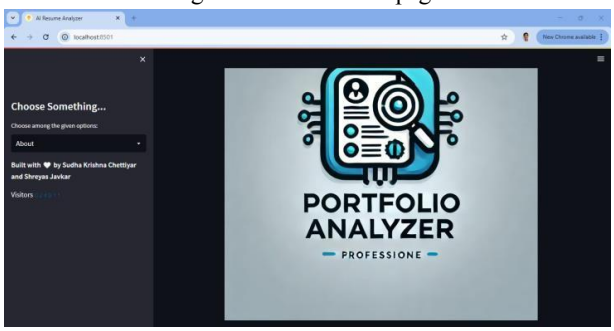

Figure 3:About the tool

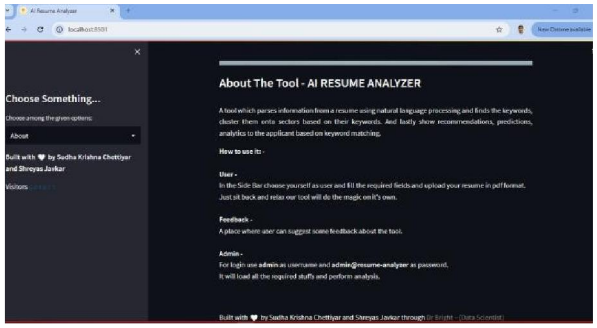

Figure 4:Details

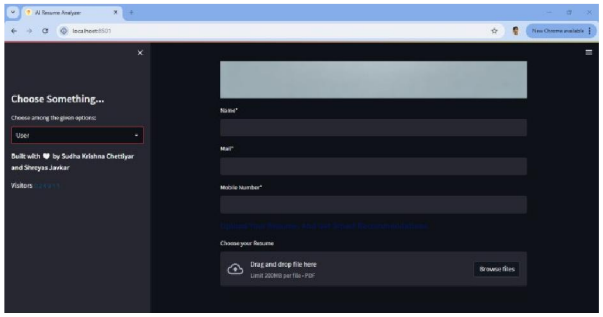

Figure 5:Collecting user Data

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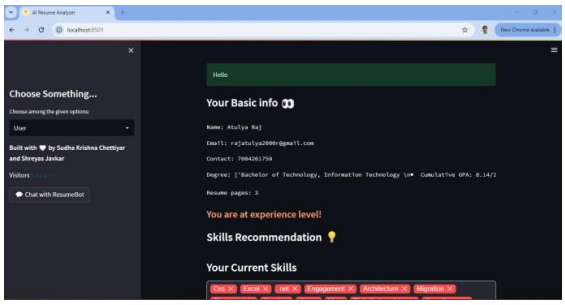

VI. CODE

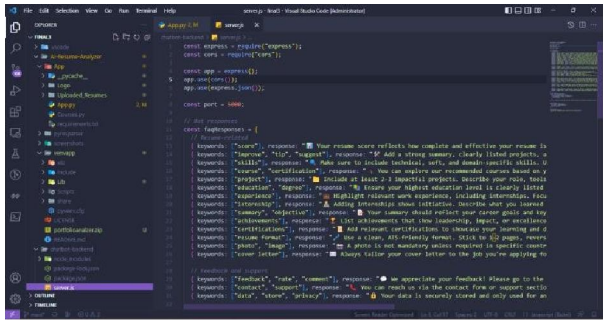

Figure 7:Resume score details

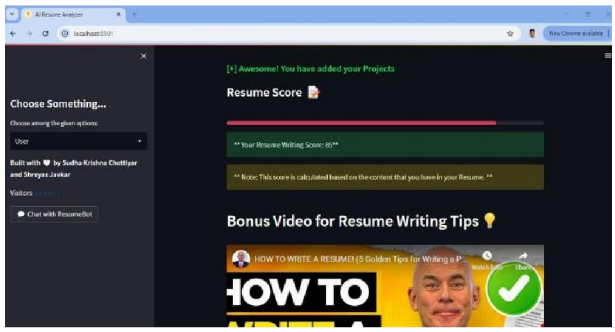

Figure 8:Recommendation of skills

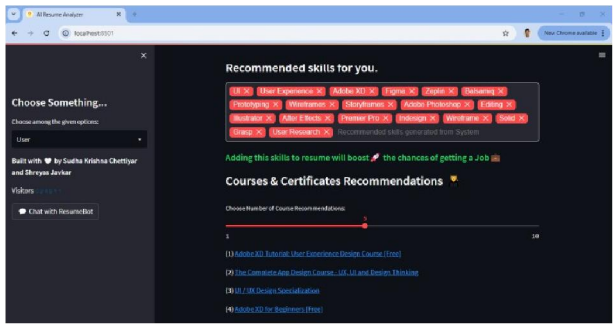

Figure 9:Chatbot Integration

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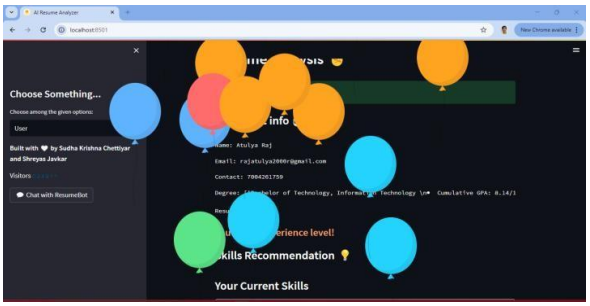

VII. CONCLUSION & FUTURE WORK

The Portfolio Analyzer integrated with a Chatbot represents a major step forward in making financial management more intuitive, accessible, and personalized. Traditionally, portfolio analysis required specialized tools, financial knowledge, and often manual effort. By embedding this functionality within a conversational chatbot, we bridge the gap between complex financial analytics and everyday users who simply want quick, understandable insights into their investments.

Through natural dialogue, users can now upload their portfolios, ask questions about asset performance, understand their risk exposure, and even receive tailored recommendations

— all without needing to navigate complicated dashboards or consult a financial advisor immediately. The chatbot serves as a friendly, always-available guide, making the interaction feel effortless while the heavy lifting — data validation, analysis, visualization, and reporting — happens seamlessly in the background.

From a system perspective, strong emphasis was placed on thorough testing to ensure that every interaction feels smooth, every analysis is accurate, and every error is handled gracefully. Security and performance were prioritized at every step, ensuring that users' sensitive financial data remains protected and that the system can scale comfortably as user demand grows.

Deploying the solution on a cloud-based, containerized infrastructure ensures reliability, flexibility, and room for future improvements — whether that's smarter investment suggestions using machine learning, or broader integration with real-time financial markets.

Expanding the system's reach through multi-language support and voice-enabled interactions (using platforms like Alexa or Google Assistant) would make financial services more inclusive, breaking down barriers for users around the world who may be less comfortable with text-based or English-only interactions.

There is also scope for integration with banking and brokerage APIs, allowing users to not only analyze but also directly execute trades, rebalance portfolios, or automate investment contributions — all through simple, conversational commands. Additionally, incorporating blockchain for secure, transparent, and immutable portfolio records could further enhance trust and security, especially in institutional settings.

From a business perspective, offering the solution as a white- label product to financial advisors, banks, and fintech startups could open up new revenue streams. These organizations could customize the chatbot to match their brand and offer it as part of their digital services.

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