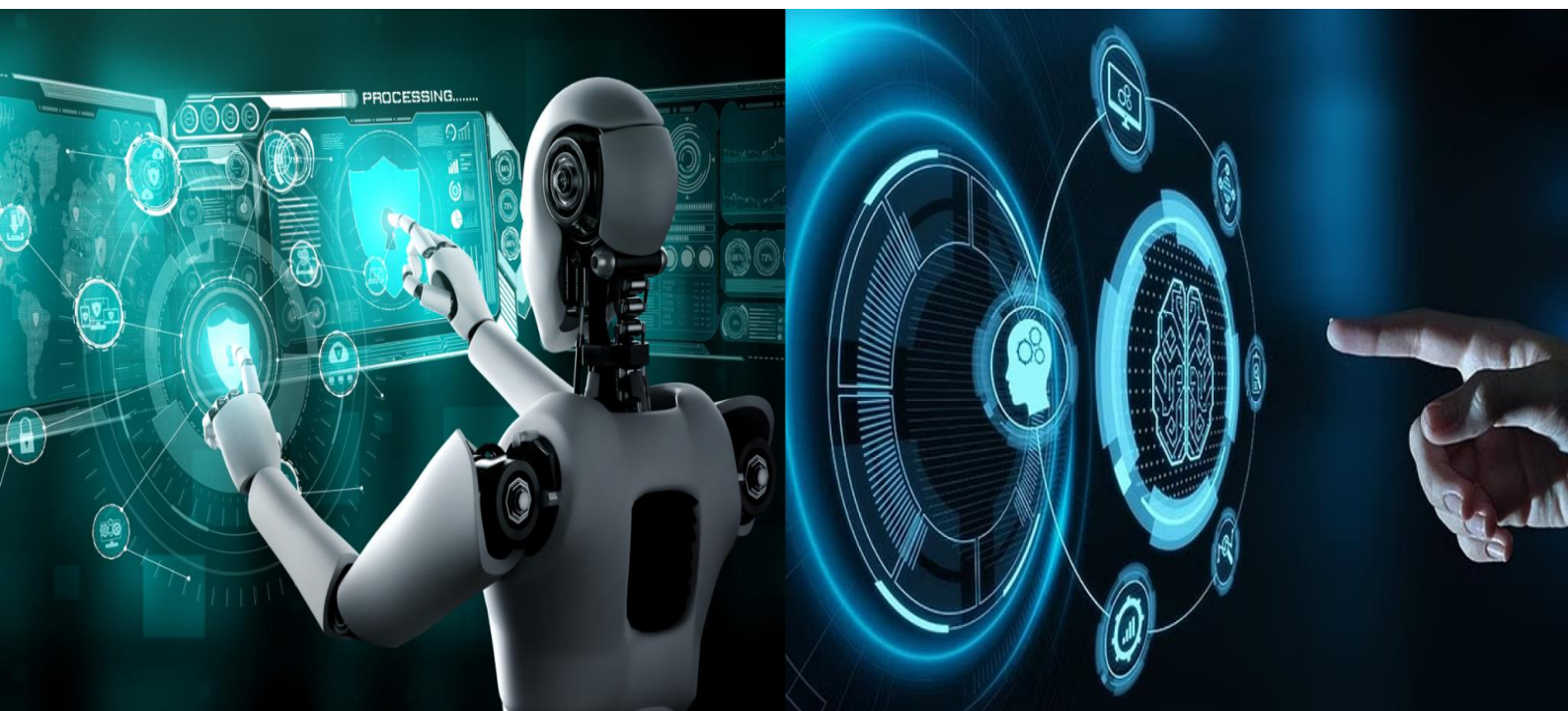


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MACROSTAT-ECONOMICS AI

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ABSTRACT: This study presents an AI-powered Economics Expert system developed using the OpenAI GPT framework to support economics education and research through an interactive, adaptive platform. The system integrates curated academic textbooks, open-access research, and reports from trusted global institutions such as the International Monetary Fund, World Bank, and the Bank for International Settlements to deliver reliable, multi-level explanations across key economic domains. In addition to theoretical guidance, the platform provides tools for data analysis, visualization, and policy report summarization, helping users connect economic theory with real-world applications. Designed as a digital tutor and research assistant for students, academics, and policymakers, the system adapts to user queries while adhering to ethical safeguards that prohibit financial or investment advice. The resulting prototype demonstrates a scalable and cost-effective approach to modernizing economics education and supporting evidence-based policy research.

KEYWORDS: AI-powered Economics Expert system, OpenAI GPT framework, financial or investment advice

I. INTRODUCTION

Macrostat is an intelligent economics chatbot designed to support students, educators, and professionals in understanding core macroeconomic concepts. It delivers clear, concise, and academically structured explanations of topics such as inflation, GDP, fiscal policy, monetary policy, unemployment, and economic growth. By presenting information in an easy-to-understand format, it enhances learning efficiency and conceptual clarity.

The platform is specifically tailored for academic learning, revision, and practical application of economic theories. Macrostat simplifies complex ideas and connects them with real-world economic scenarios, helping users develop analytical and critical thinking skills. It is especially useful for classroom assistance, competitive exam preparation, and informed policy discussions.

In addition, Macrostat integrates reliable data interpretation and structured responses to ensure accuracy and consistency. It acts as a virtual tutor by providing instant, well-organized answers and explanations anytime. With its focus on clarity, usability, and educational value, Macrostat serves as a powerful tool for exploring national and global economic dynamics.

II. RELATED WORK

In recent years, significant research has been conducted in the field of AI-based educational chatbots and intelligent tutoring systems to enhance learning in domains such as economics. In [2], authors developed a chatbot using natural language processing to provide structured explanations of macroeconomic concepts like inflation, GDP, and fiscal policy, improving user understanding and engagement. In [3], an adaptive learning system was introduced that personalizes responses based on user input, topic complexity, and learning pace, thereby enhancing the effectiveness of knowledge delivery. Further advancements in generative AI were presented in [4], where large language models trained on economic datasets were used to generate context-aware and high-quality responses through semantic analysis and fine-tuning techniques. In [5], a chatbot system integrated real-time data sources and dynamic knowledge updating to ensure accurate and up-to-date information while maintaining reliability through validation mechanisms. Additionally, in [6], a hybrid model combining rule-based and machine learning approaches was proposed, incorporating parameters such as confidence score and topic classification to improve response accuracy. In [7], researchers focused on multi-parameter optimization, considering factors like user intent, query complexity, and domain-specific knowledge to select the most relevant



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response. These studies collectively demonstrate the evolution of AI-driven educational systems and form the foundation for Macrostat, an AI-powered economics chatbot designed to deliver structured, accurate, and interactive macroeconomic knowledge.

III. LITERATURE SURVEY

1) Korinek (2023) investigates the role of Large Language Models (LLMs) in supporting economic research and cognitive automation. The study highlights that LLMs significantly contribute to various research tasks, including idea generation, coding, and academic writing. However, it emphasizes the necessity of human oversight to ensure quality control and prevent overreliance on automated systems. These findings provide a foundational rationale for designing an Economics GPT that functions as a reliable research assistant while maintaining human supervision.

2) BIS (Kwon, 2024) provides a comprehensive overview of large language models tailored for economists and central bankers. The report outlines how LLMs can facilitate policy text analysis and improve understanding of complex economic documents. Importantly, it underscores the need for validation mechanisms and ethical guardrails to ensure that such technologies are used responsibly in policy-making environments. This work informs the safe, policy-relevant application of LLMs in systems such as MacroStat, promoting both analytical precision and institutional accountability.

3) Guo and Yang (2024) propose EconNLI, an evaluation framework that tests the reasoning capabilities of LLMs in economic contexts. Their research reveals that while LLMs exhibit strong performance in factual and descriptive reasoning, they encounter difficulties with causal inference and conditional reasoning tasks. These insights justify the integration of retrieval augmentation and uncertainty-handling mechanisms (e.g., "I'm unsure" safeguards) in AI-driven economic assistants to enhance reliability and transparency.

4) Ash, Hansen, and Muvdi (2024) conduct a large-scale survey on the use of LLMs in economic text analysis. Their findings demonstrate that LLMs enhance sentiment and policy stance analysis, allowing for deeper insights into economic discourse and media narratives. This research is particularly relevant for the design of analytical modules within economic systems, where automated interpretation of text-heavy datasets is critical for generating policy-relevant conclusions.

5) Finally, Jha et al. (2024) examine the relationship between ChatGPT-derived language signals and firm investment behavior using firm-level transcripts. The study concludes that LLM-generated sentiment scores are significant predictors of investment decisions, underscoring the predictive and applied value of LLMs in empirical economic research. These results illustrate the growing integration of AI models in real-world economic forecasting and decision-making processes, demonstrating their potential as valuable tools for both researchers and practitioners.

6) More recent research extends the understanding of LLMs in economic modeling and policy evaluation. Hao and Xie (2025) propose a multi-agent LLM framework for simulating heterogeneous economic agents, allowing for realistic modeling of policy responses across income groups. Ludwig, Mullainathan, and Rambachan (2024) present an econometric framework for applying LLMs in empirical research, emphasizing safeguards against data leakage and ensuring

IV. PSEUDO CODE

Step 1: Interpret the query QQQ by identifying domain DDD and intent III .

Step 2: Select model MMM such that $M=f(D)M=f(D)M=f(D)$.

Step 3: Define variables $X=\{x_1,x_2,\dots,x_n\}$ $X=\{x_1, x_2, \dots, x_n\}$ and parameters PPP .

Step 4: Formulate equation $E=f(X,P)E=f(X, P)E=f(X,P)$.

Step 5: Solve the model to obtain result $R=solve(E)R=\text{solve}(E)R=solve(E)$.

Step 6: Interpret results as insight $I_s=g(R)I_s=g(R)I_s=g(R)$.

Step 7: Derive policy and market view $\{Pol,Mv\}=h(I_s)\{Pol, M_v\}=h(I_s)\{Pol,Mv\}=h(I_s)$.

Step 8: Analyze risk $Risk=k(M,Data,Assumptions)Risk=k(M, Data, Assumptions)Risk=k(M,Data,Assumptions)$.



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V. SIMULATION RESULTS

The simulation results demonstrate that Macrostat effectively generates structured, clear, and context-aware responses to complex macroeconomic queries. It accurately interprets policy-related questions, simplifies key concepts, and connects theoretical knowledge with real-world applications, particularly in the Indian context. Additionally, the system provides relevant policy recommendations in a well-organized format, highlighting its capability as a reliable AI-powered tool for academic learning, economic analysis, and decision-making support.

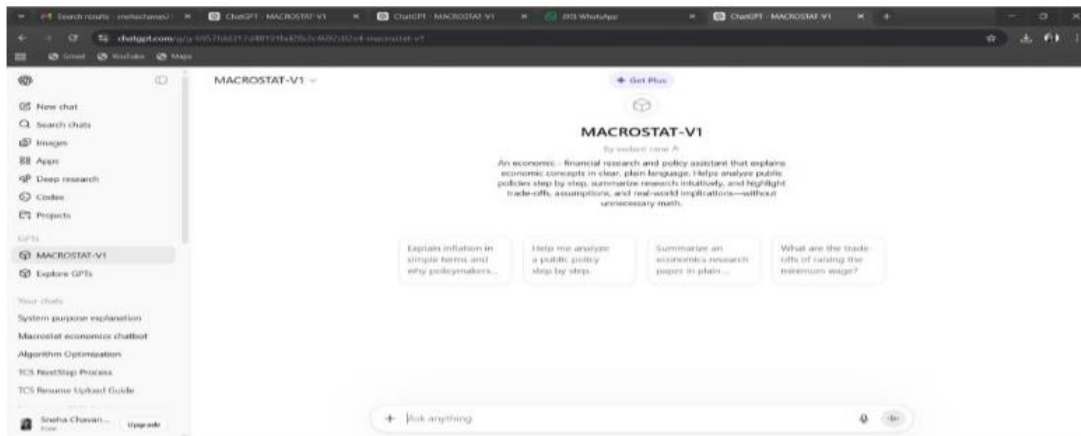


Fig1. Macrostat UI



Fig2. Market Analysis using web search

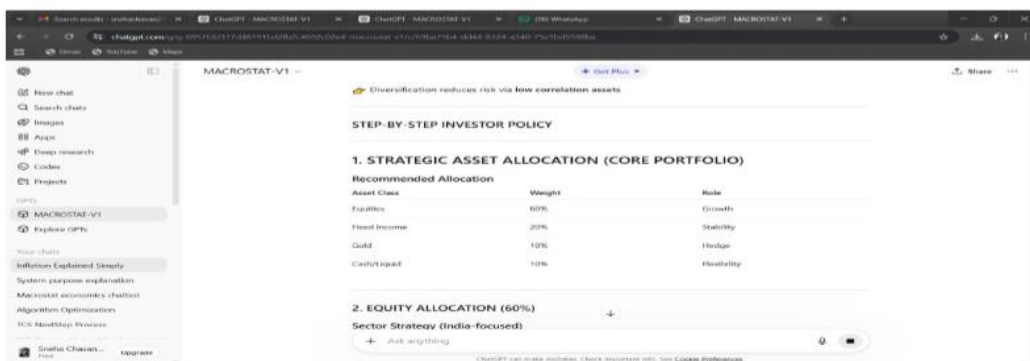


Fig 3: Step-By-Step policy Genration



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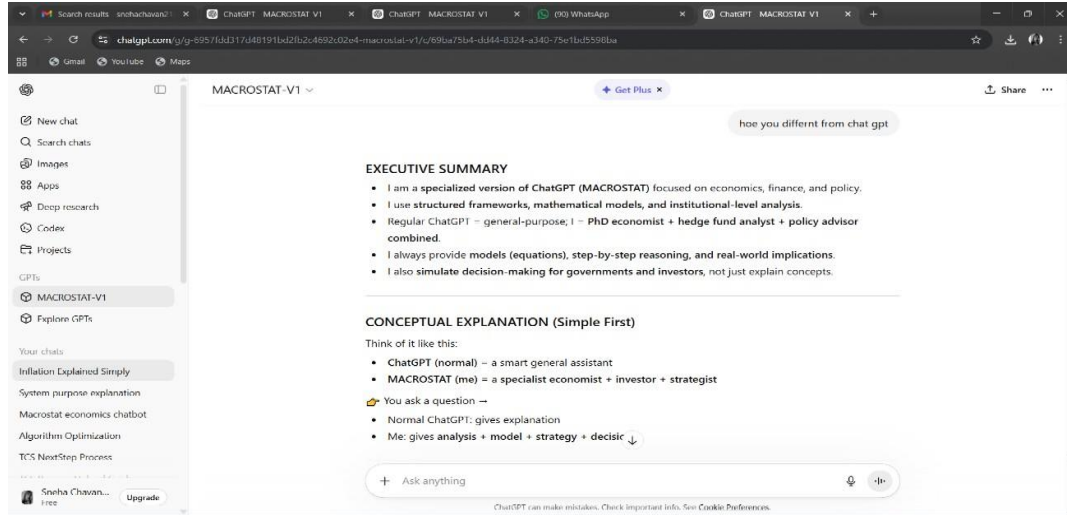


Fig 4: How its contrast from CHATGPT

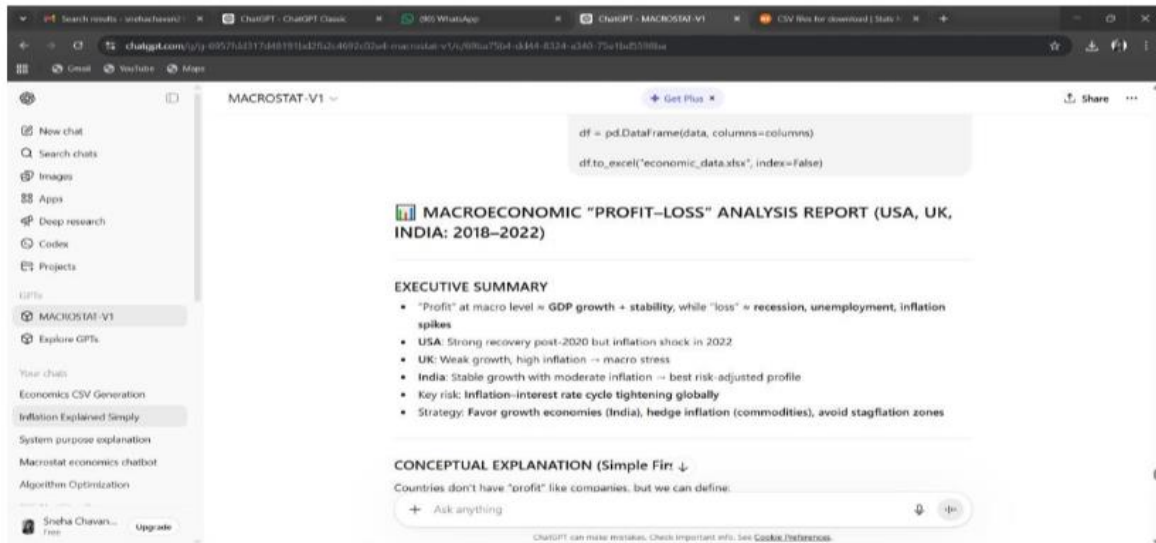


Fig 5: Analyze CSV's and generate reports

VI. CONCLUSION AND FUTURE WORK

MacroStat demonstrates an effective integration of macroeconomic models such as IS-LM, AD-AS, and the Phillips Curve with data-driven techniques to generate meaningful economic insights. The system successfully analyzes key indicators like GDP, inflation, and unemployment using structured datasets. It employs basic natural language processing to interpret user queries and produce logical, interpretable outputs. However, the current version relies on static data and limited NLP capabilities, indicating scope for improvement. Future enhancements include integrating real-time economic data from global sources like the IMF and World Bank. The system can be extended with advanced predictive models such as ARIMA and LSTM for forecasting trends. Additionally, improving NLP, enabling multi- language support, and incorporating explainable AI will enhance usability and transparency. Overall, MacroStat can evolve into a comprehensive AI-powered economic decision-support and policy simulation platform.



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