

CMPE 274 Hackathon

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Time Series Data Visualization

- Interactive charts and graphs display historical and current data on food security.
- Customizable metrics allow for targeted analysis of specific data points.
- Comparative tools enable the juxtaposition of different datasets to uncover trends.

Budget Document Analysis

- The LLM parses uploaded budget PDFs, summarizing key financial figures and narratives.
- Natural language processing enables the extraction of specific budget items related to food security.
- Insights from budget documents are linked to time series data to illustrate the direct impacts on food security.

Large Language Model Chat Interface

- Users interact with the LLM through a chat interface to ask questions about the budget data.
- The model can provide explanations, summaries, and even predictions based on the queried budget documents.
- The chat interface is designed for both technical and non-technical users, ensuring accessibility for all stakeholders.

Problem Solution

The dashboard addresses the following challenges:

- Data Overload: By synthesizing vast amounts of data into visual formats and digestible summaries, the dashboard mitigates information overload.
- Complex Document Analysis: The LLM automates the extraction of relevant data from complex PDFs, a task that is typically manual and error-prone.
- Real-time Insights: With the capability to analyze documents on-the-fly, the platform provides real-time insights that are crucial for timely decision-making.

Results :

The homepage of the Macroeconomic Researcher Food Security Time Series and Large Language Chat GPT Dashboard presents a clean and user-friendly interface designed for macroeconomic analysis. It serves as a central point for researchers to access and interact with economic data and gain insights using advanced AI tools.

Visual Design and User Interface

Minimalistic and Clutter-free Layout: The dashboard adopts a minimalist design, making it easy for users to focus on the critical data without unnecessary distractions.

Intuitive Navigation: Clear categorization in the sidebar allows users to easily switch between different economic indicators and datasets, such as 'Macroeconomic (USD)' and 'Agricultural Table'.

Responsive Graph: The prominent feature on the homepage is the responsive graph displaying the USA's GDP over time, indicating a user-focused approach to data representation.

Data Representation

Time Series Analysis: The graph prominently displayed on the main page is a time series representation of the USA's GDP in current US dollars. The data shows a general upward trend with certain inflection points that may correspond to historical economic events.

Interactivity: The inclusion of an interactive graph suggests that users can hover over, zoom in, and possibly click on data points to get more detailed information.

Country Selection: A dropdown menu for selecting a country implies that the graph can dynamically update to show data relevant to the chosen country, allowing comparative analysis across different macroeconomic environments.

Large Language Model Integration

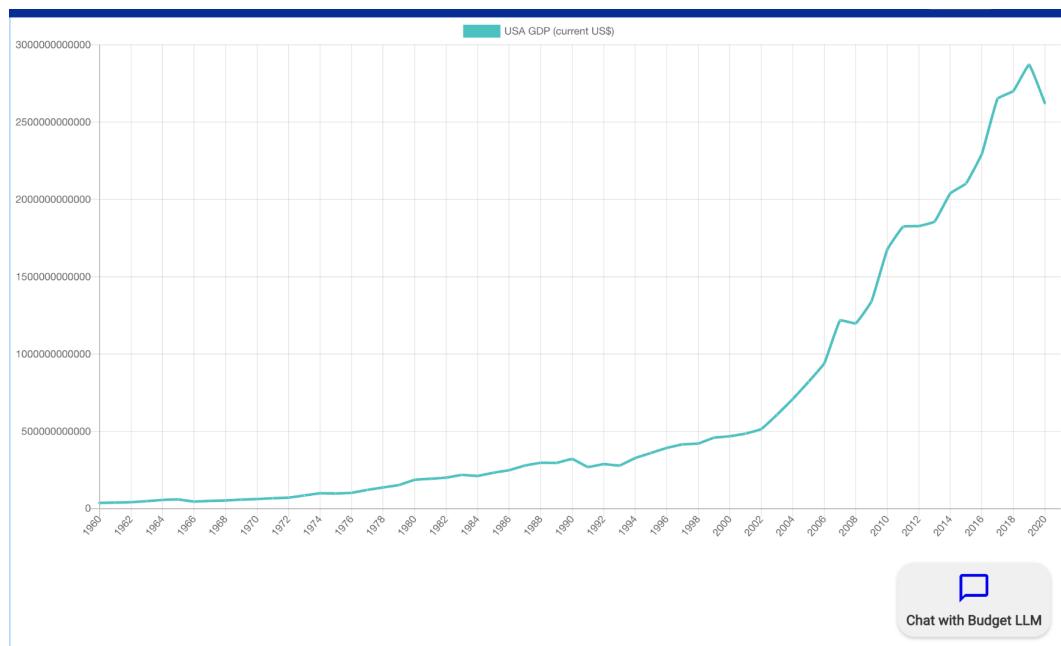
Chat with Budget LLM: A chat feature titled 'Chat with Budget LLM' suggests an integrated AI assistant capable of processing natural language queries. This allows users to engage in a conversational manner with the dashboard to extract data insights or query specific information.

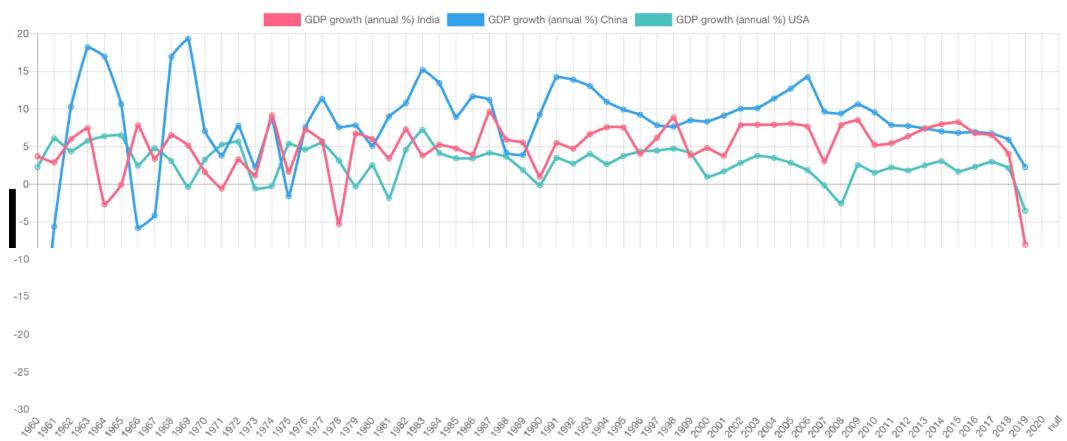
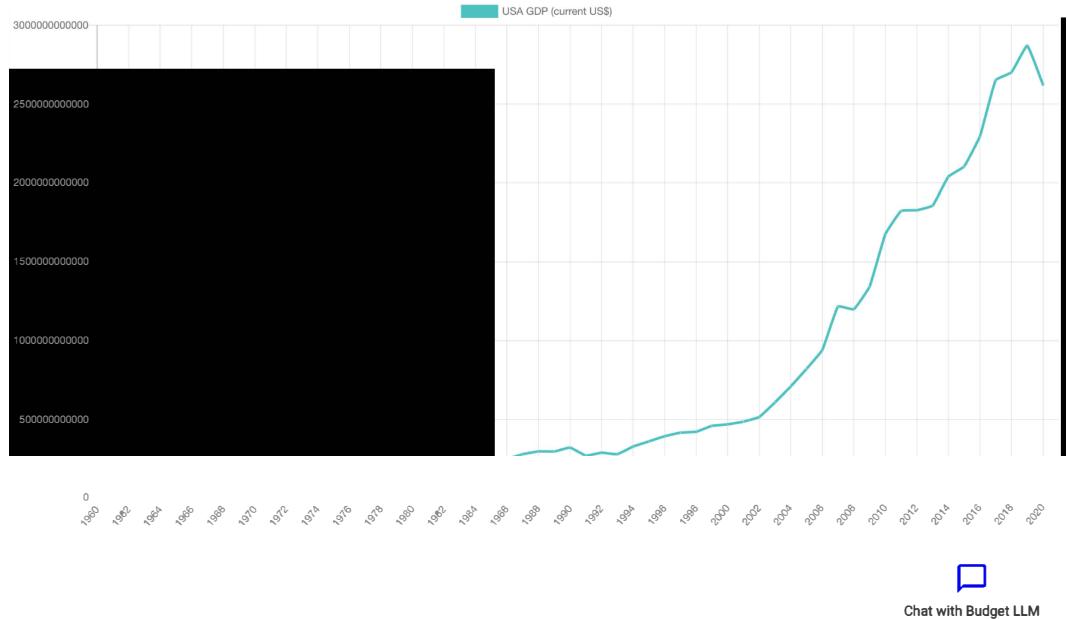
Actionable Insights: The LLM feature is positioned to provide actionable insights from budget files and other macroeconomic documents, streamlining the data analysis process and enhancing decision-making capabilities.

Accessibility and Engagement

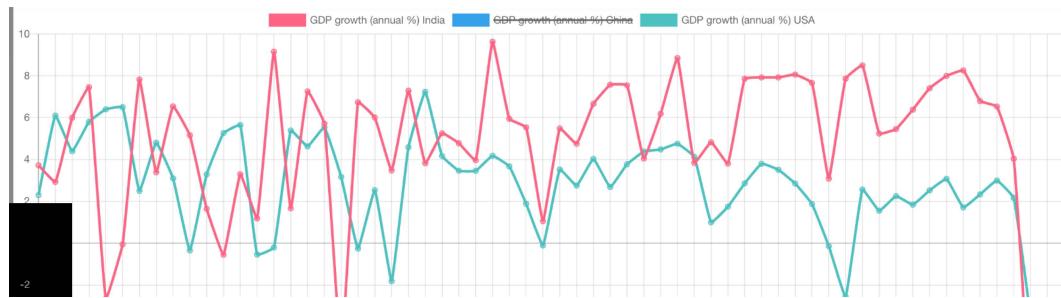
Accessible Data Insights: The dashboard lowers the barrier to entry for complex macroeconomic analysis, making it more accessible for users of varying expertise levels.

Engagement through Interaction: The 'Chat with Budget LLM' feature indicates an engaging, interactive element, inviting users to explore the data through conversational AI, potentially making complex data analysis more approachable and less technical.





Chat with Budget LLM



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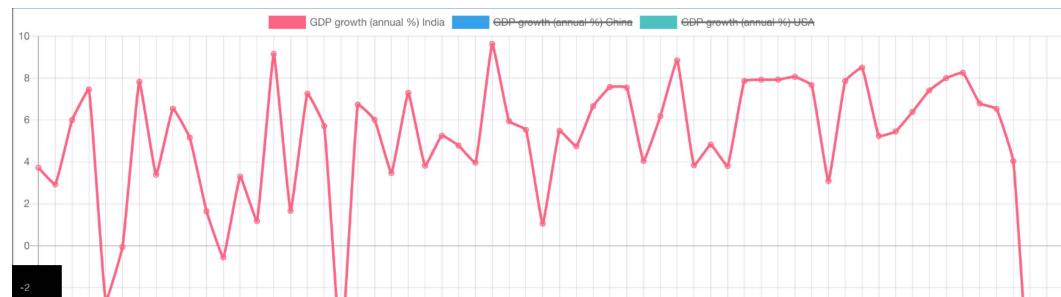
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GDP growth (annual %) India GDP growth (annual %) China GDP growth (annual %) USA



Chat with Budget LLM



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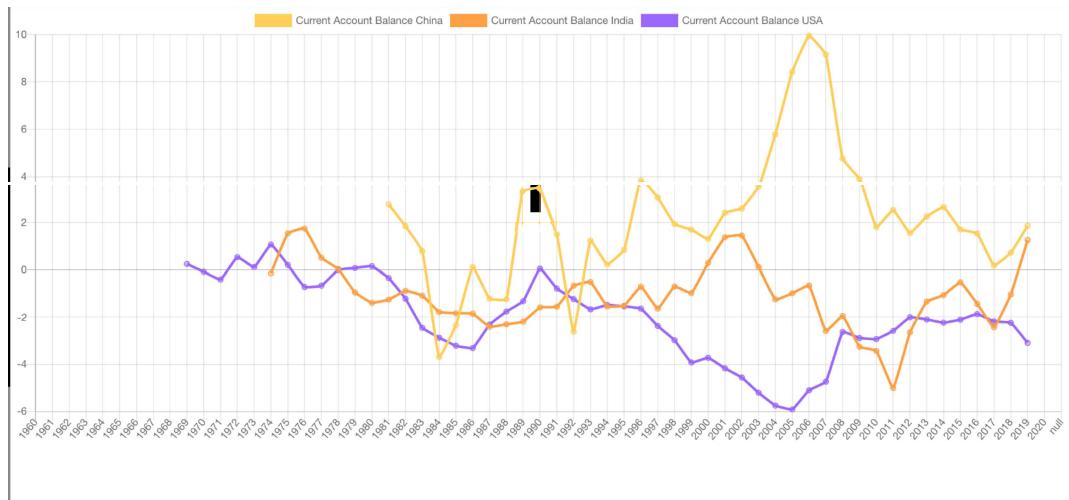
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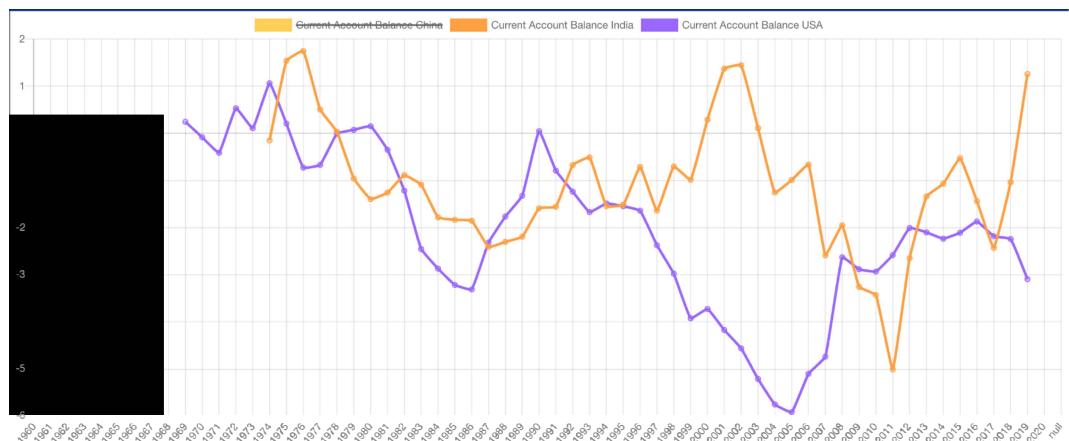
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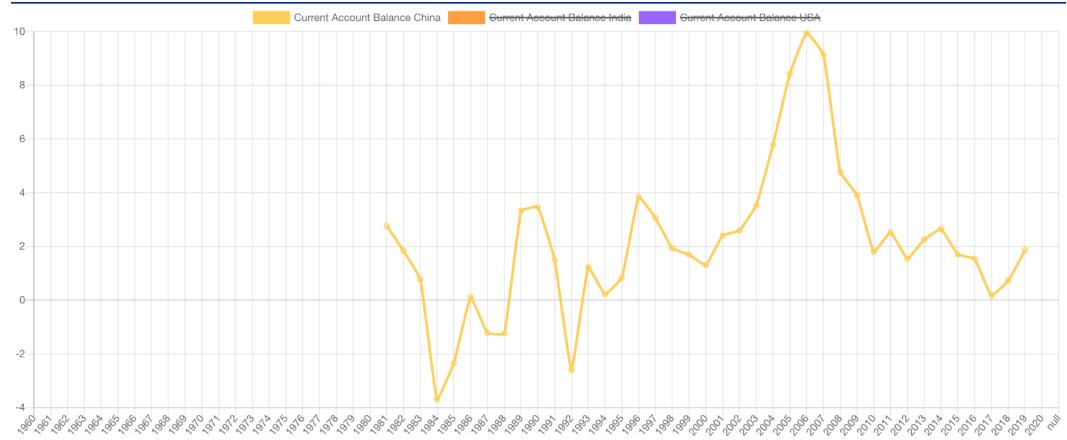
Chat with Budget LLM



Chat with Budget LLM



Chat with Budget LLM



Chatbot Interface Design :

Minimalist and Non-intrusive: The chatbot interface is designed to be minimalist and non-intrusive, appearing as an expandable chat window at the bottom of the screen. This ensures that the chat feature is accessible without overwhelming the main content of the dashboard.

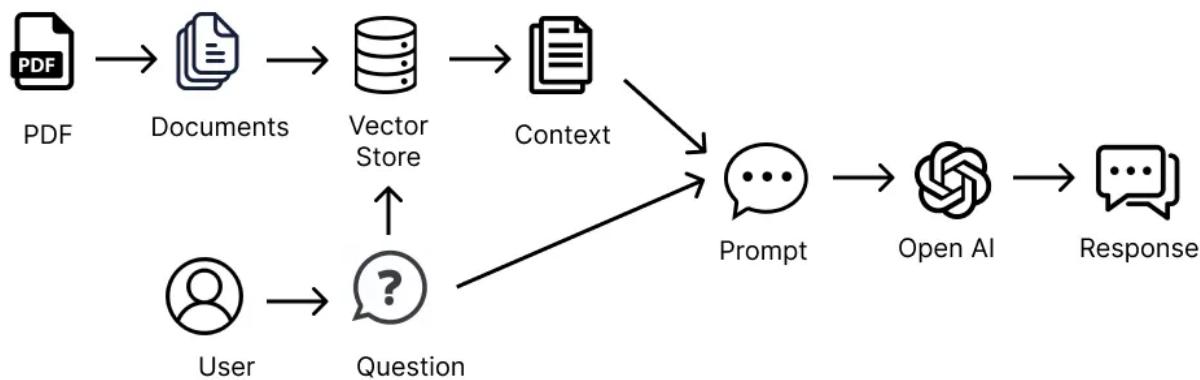
Accessibility: A prominent button labeled "Chat with Budget LLM" is available at the bottom right, suggesting an easy and quick way for users to engage with the chatbot at any point during their interaction with the dashboard.

Conversational UI: The chat window design is modeled on popular messaging platforms, with a clear area for the user to type their message and a send button to dispatch queries to the chatbot.

Integration: The chatbot is seamlessly integrated into the dashboard interface, suggesting that users can interact with it without navigating away from the data visualization or other dashboard functionalities.

Prompting Engagement: The chat window includes a placeholder text, "Type a message...", which serves as a call to action, encouraging users to interact with the chatbot for queries or assistance.

Chatbot Architecture :



PDF: This is the starting point where the system receives PDF documents. These documents contain the budget data that the chatbot will use to answer user queries.

Documents: The PDFs are converted into a readable format for the system. This typically involves extracting the text from the PDFs and possibly some preprocessing to clean and organize the data.

Vector Store: The processed documents are then converted into vectors. Vectorization is a process of converting text into a numerical format that machine learning models can understand. This might involve techniques like word embedding, where words or phrases from the text are mapped to vectors of real numbers.

Context: The vectors are used to understand the context of the content within the documents. This context is essential for the chatbot to provide accurate and relevant responses. The context may involve specific information, such as financial data in the case of budget PDFs.

User: This represents the end-user who will interact with the chatbot.

Question: The user poses a question to the chatbot. This question is typically in natural language and related to the content of the PDF documents.

Prompt: The user's question is converted into a prompt that the chatbot can understand. This step may involve additional processing to ensure that the prompt is in a format suitable for the LLM.

OpenAI: The prompt is sent to the OpenAI's LLM (like GPT-3 or an equivalent model). The LLM uses the context provided by the vector store to understand the prompt and generate a relevant response.

Response: The LLM sends back a response, which is then relayed to the user. This response aims to answer the user's question using the information gleaned from the PDF documents.

Chatbot results :

Prompt : Economic Sustainability Statements

The screenshot shows a chatbot interface. At the top, there is a blue header bar with the text "Economic Sustainability Statements". Below this, a message box contains the text: "The budget proposed several near-term and long-term actions to promote economic sustainability, such as energy efficiency and savings measures, coal gasification, agro-forestry, and support for research and development." At the bottom of the interface, there is a input field with the placeholder "Type a message..." and a blue "Send" button. In the bottom right corner, there is a small circular icon with a speech bubble symbol and the text "Chat with Budget LLM".

Prompt : Social Security

coal gasification, agro-forestry, and support for research and development.

Social Sustainability Statements

The documents mention initiatives related to social sustainability such as provision of safe drinking water and sewerage management, use of recycled water for growing organic fruits and vegetables, solid waste management, digital connectivity, low carbon development strategy, solar power, drones, artificial semiconductor and its eco-system, space economy, genomics and pharmaceuticals, green energy, clean mobility systems, energy transition and climate action, and disaster resilient infrastructure.

Social Security

The president proposed the creation of a Senior Citizen Welfare Fund, in the Finance Bill, for appropriation of unclaimed deposits of about 3,000 crore in the PPF, and approximately 6,000 crore in the EPF corpus. He also proposed the Pradhan Mantri Jeevan Jyoti Bima Yojana which covers both natural and accidental death risk of 2 lakhs, and the Pradhan Mantri Suraksha Bima Yojana which covers accidental death risk of 2 lakh for a premium of just 12 per year. He also proposed the Atal Pension Yojana, which will provide a defined pension, depending on the contribution, and its period.

Type a message... Send

Chat with Budget LLM

Prompt : Rural Development

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Rural Development

In the year 2018-19, for creation of livelihood and infrastructure in rural areas, total amount to be spent by the Ministries was 14.34 lakh crore, including extra-budgetary and non-budgetary resources of 11.98 lakh crore. This expenditure created employment of 321 crore person days, 3.17 lakh kilometers of rural roads, 51 lakh new rural houses, 1.88 crore toilets, and provided 1.75 crore new household electric connections.

Type a message... Send

Chat with Budget LLM

Prompt : How Farmers benefit from the budget?

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How Farmers benefit from the budget?

Farmers benefit from the budget through programmes to direct the benefits of structural changes and good growth to reach farmers, input sovereignty through Paramparagat Krishi Vikas Yojana, resilience for 6.11 crores farmers insured under PM Fasal Bima Yojana, provision of any annual supplement of the income to the farmer through PM-KISAN, connectivity through PMGSY, financial inclusion, doubling farmers' incomes by 2022, energy sovereignty through KUSUM, cultivation of pulses, expansion of micro-irrigation through Krishi Sinchai Yojana, farm credit, MGNREGA, and the creation of a Unified National Agriculture Market.

Type a message... Send

Chat with Budget LLM

Prompt : What is economic conditions of State and Central Government?

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Chat with Budget LLM

Prompt : How poor and marginalized communities benefit from budget?

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How poor and marginalized communities benefit from budget?

Poor and marginalized communities benefit from budget through increased spending on education, health, rural development, housing and urban development, women and child development, water resources, and anti-poverty programs.

Send

Chat with Budget LLM

Prompt : How women and poor children benefit from Budget?

Poor and marginalized communities benefit from budget through increased spending on education, health, rural development, housing and urban development, women and child development, water resources, and anti-poverty programs.

What are poverty reduction strategies?

Poverty reduction strategies include providing access to means for livelihood and employment, substantial reduction of poverty, electrification of villages, connecting unconnected habitations with all-weather roads, providing medical services in each village and city, dealing with the problem of black money, promoting digital economy and fintech, technology enabled development, energy transition, and climate action, and relying on a virtuous cycle starting from private investment to crowding in private investment helping public capital investment.

How women and poor children benefit from Budget?

The Budget has allocated funds for the education sector including mid-day meals, health sector, rural development activities including MGNREGA, housing and urban development, women and child development, and Water Resources and Namami Gange. It has also set aside a sum of ₹ 100 crore for generating awareness and improving the efficiency of delivery of welfare services meant for women.

Type a message... Send

▢ Chat with Budget LLM

Prompt : what is India budget for this year

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what is India budget for this year

The India budget for this year is estimated to be ₹ 17,94,892 crore.

Type a message... Send

 Chat with Budget LLM

If asked prompts outside the context of the document

restoring macroeconomic stability, creating the conditions for sustainable poverty elimination, job creation and durable double-digit economic growth, devolving a 42% share of the divisible pool of taxes to States, and transferring grants and plan transfers to the States.

will india ban rice export

India has not announced any plans to ban rice export.

cmpe 280 course

CMPE 280 is not mentioned in the given sources.

SJSU

SJSU is not mentioned in the given sources.

what is Langchain

Langchain is not mentioned in the given sources.

how can we integrate LLM with cromadb

I don't know.

what are vector databases

Type a message... Send

 Chat with Budget LLM

Conclusion :

In conclusion, Food Security Time Series and Large Language Chat GPT Dashboard represents a transformative tool for stakeholders in the field of food security and economic research. By fusing a user-friendly interface with powerful analytics, it dramatically simplifies the process of data visualization and interpretation. The dashboard's integration of time series data with the sophisticated capabilities of a Large Language Model allows users to interact with and derive insights from complex datasets in a conversational manner, a feat that traditionally required extensive domain expertise and substantial time investment.

The dashboard serves as a bridge between intricate macroeconomic data and actionable intelligence, offering a dynamic and interactive experience that can adapt to the evolving needs of researchers, policymakers, and analysts. It stands as a testament to the potential of combining cutting-edge technology with user-centric design to address some of the most pressing challenges in global food security. As the tool continues to evolve, it promises to not only enhance the efficiency and effectiveness of research in this critical area but also to empower decision-makers to craft policies that are informed by comprehensive, data-driven insights.