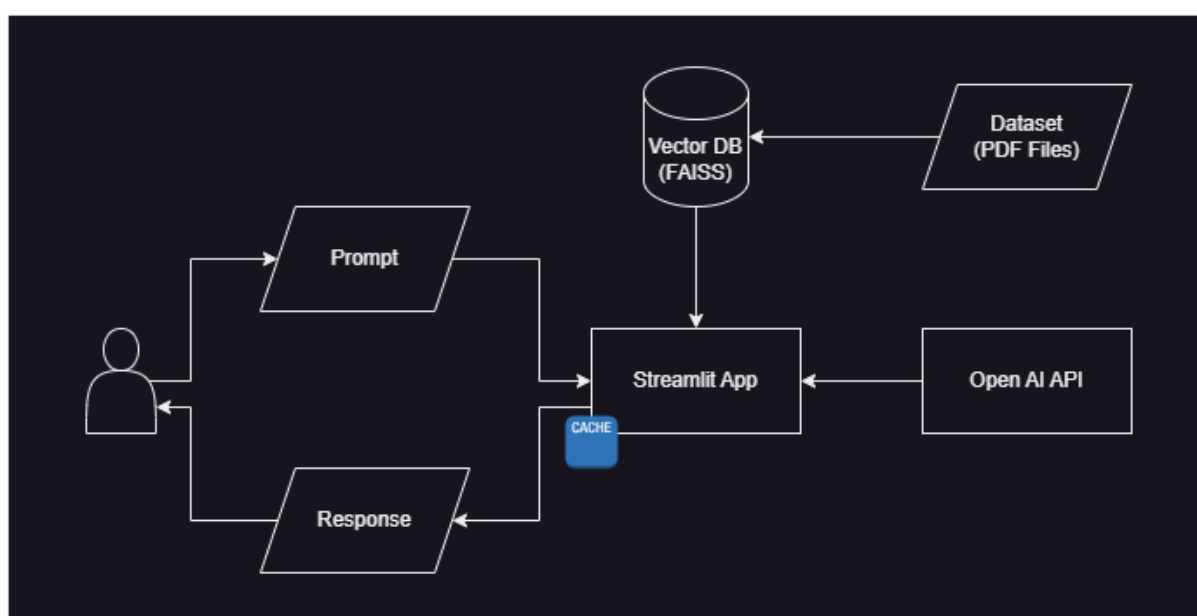


# Nexabytes Hackathon Report

## Project Overview

We created a simple AI chatbot application specialized in the state of Food Security and Nutrition. We implemented it using RAG architecture with the annual reports on Food Security and Nutrition as our dataset, creating a LLM-based application interface that answers questions from users based on the data provided.

## Architecture Diagram



As shown in the high-level design diagram above, we have a Streamlit application which implements end-to-end RAG architecture with a UI and query caching. On startup, the application first fetches the 2 PDF files as our dataset and uses OpenAI API for creating embeddings from it, ultimately storing it in FAISS, our choice of vector database.

When the user sends a prompt concerning the Food Security & Nutrition reports, the application first generates embeddings from the query and fetches the ten most relevant chunks from the vector database. With the added context, the application makes a call to the OpenAI API and receives a response from it accordingly. Finally, it stores the prompt-response pair in the cache and displays the response on the UI to the user. Furthermore, since the application maintains a cache, should the user send the same request, the application will send the response from the cache directly, saving calls to the API and database.

The chatbot also handles quantile data requests, providing them directly and in JSON format which can be used as the data source for visualization in Python separately.

The code for this project can be found on [GitHub](#).

## Sample Queries & Responses

Question: List major reasons for food insecurity in 2022.


# HungerLens Assist


 List major reasons for food insecurity in 2022.

 The major reasons for food insecurity in 2022 include:

- The global pandemic
- The war in Ukraine
- Rising prices of food, agricultural inputs, and energy
- Conflict
- Climate extremes
- Economic slowdowns and downturns
- Growing inequality

Question: : List major reasons for food insecurity in 2023.

 List major reasons for food insecurity in 2023.

 The major reasons for food insecurity in 2023 include:

1. Repercussions of the war in Ukraine and the price inflation for food, agricultural inputs, and energy.
2. Conflicts and weather-related events.
3. Inflationary pressures eroding economic gains and access to food.
4. A combination of income effect (improved access to food due to increased household disposable income and employment) and price effect (increases in food prices and general inflation eroding income gains).
5. Conflict, climate variability and extremes, and economic slowdowns and downturns, along with underlying factors such as lack of access to and unaffordability of healthy diets, unhealthy food environments, and high and persistent inequality.
6. Intensification of conflict, climate extremes, economic slowdowns and downturns, and growing inequality.

Question: Explain malnutrition in warzones.



Explain malnutrition in war zones.



Malnutrition in war zones is caused by a combination of factors including conflict, which likely disrupts food production and distribution systems, limits access to and the affordability of healthy diets, and exacerbates unhealthy food environments and inequality. Other contributing factors include climate variability and extremes, economic slowdowns and downturns, lack of access to and unaffordability of healthy diets, unhealthy food environments, and high and persistent inequality.

Question: Explain the impact of increased prices on food security.



Explain the impact of increased prices on food security.



Increased prices affect food security by making it more difficult for people to access the food they need. This difficulty arises from the inflation of food prices, agricultural inputs, and energy costs, among other factors. Higher food prices can lead to an increase in the number of people experiencing extreme poverty, exacerbating hunger and undernourishment. The document highlights that the world food import bill reached an all-time high in 2022, driven mostly by higher prices, which contributes to higher local and national food prices and overall inflation. Additionally, the cost of a healthy diet increased globally, making it even more challenging for a significant portion of the global population to afford a nutritious diet. This situation is further complicated in regions affected by political instability, conflicts, and climate events, which can lead to food shortages and increased food insecurity.

Question: Compare list of food insecurity reasons in 2021 and 2022.



Compare list of Food insecurity reason in 2021 and 2022.



The reasons for food insecurity in 2021 compared to 2022 are multifaceted and include both persistent and evolving factors. In 2021, food insecurity was significantly influenced by the economic impacts of the COVID-19 pandemic, which led to substantial income losses, particularly for the poorest households, thereby affecting their access to food. The pandemic produced a global economic recession that ended three decades of progress in poverty reduction and contributed to an estimated increase of close to 90 million people facing hunger from 2019 to 2020. The recovery from these pandemic-induced contractions was partial and highly uneven across and within countries, with low- and lower-middle-income countries experiencing a much slower pace of recovery. Disadvantaged segments of the population were still struggling to recover from the income losses suffered during the peak of the pandemic, contributing to a further increase of about 38 million in the estimated number of people experiencing hunger in 2021.

In 2022, the situation reflects both positive and negative developments. On the positive side, there was an economic recovery that likely contributed to an increase in household disposable income, improving access to food for many, particularly the poorest households. This recovery is evidenced by a global employment increase and a significant decline in global unemployment. However, the trend in hunger in 2022 was also negatively affected by the price effect, where

In 2022, the situation reflects both positive and negative developments. On the positive side, there was an economic recovery that likely contributed to an increase in household disposable income, improving access to food for many, particularly the poorest households. This recovery is evidenced by a global employment increase and a significant decline in global unemployment. However, the trend in hunger in 2022 was also negatively affected by the price effect, where increases in food prices and general inflation could erode income gains and worsen access to food, particularly for the poorest segments of the population who spend a larger share of their income on food.

Additionally, in February 2022, the war in Ukraine erupted, involving two major producers of agricultural commodities in the world, which sent shockwaves through commodity and energy markets, weakening the recovery and adding even greater uncertainty. This war, along with the COVID-19 pandemic, contributed to significant increases in international food and energy prices, exacerbating inflationary pressures. These factors, combined with ongoing issues such as conflicts, weather-related events, and the repercussions of the war in Ukraine, including price inflation for food, agricultural inputs, and energy, continued to exacerbate food insecurity in 2022.

Question: Explain quantitative differences in numbers between 2021 and 2022.



Explain quantitative differences in numbers between 2021 and 2022.



The document outlines several quantitative differences in numbers between 2021 and 2022 across various metrics related to hunger, food insecurity, diet affordability, child malnutrition, employment, and undernourishment in different regions. Here are the key differences highlighted:

**1. Global Hunger and Undernourishment:**

- The prevalence of undernourishment (PoU) in Africa increased from 19.4% in 2021 to 19.7% in 2022, translating into 11 million more people facing hunger.
- In Asia, the PoU decreased from 8.8% in 2021 to 8.5% in 2022, a reduction of more than 12 million people facing hunger.
- In Latin America and the Caribbean, the PoU decreased from 7.0% in 2021 to 6.5% in 2022, indicating 2.4 million fewer people facing hunger.
- The Caribbean saw an increase in the PoU from 14.7% in 2021 to 16.3% in 2022.

**2. Food Insecurity:**

- The prevalence of severe food insecurity globally declined slightly from 11.7% in 2021 to 11.3% in 2022, equivalent to 27 million fewer people.

**2. Food Insecurity:**

- The prevalence of severe food insecurity globally declined slightly from 11.7% in 2021 to 11.3% in 2022, equivalent to 27 million fewer people.
- Moderate or severe food insecurity in Latin America and the Caribbean decreased from 40.3% in 2021 to 37.5% in 2022, representing 16.5 million fewer people.

**3. Affordability of a Healthy Diet:**

- The average global cost of a healthy diet increased to 3.96 purchasing power parity (PPP) dollars per person per day in 2022, up from 3.56 PPP dollars in 2021.

**4. Child Malnutrition:**

- The document does not provide a direct comparison between 2021 and 2022 for child malnutrition rates.

**5. Employment:**

- Global employment increased by 2.3% in 2022 from a 0.2% annual growth rate between 2020 and 2021.
- Global unemployment declined to 205 million in 2022, down from 216 million in 2021.

These points highlight the changes in various indicators related to food security, nutrition, and employment between 2021 and 2022.

Question: Explain the impact of increase in prices on food security, comparing 2021 and 2022.




Explain the impact of increase in prices on food security, comparing 2021 and 2022.





The impact of the increase in food prices on food security between 2021 and 2022 was significant and negative, contributing to a rise in hunger and food insecurity globally. This period saw the world food import bill reaching an all-time high, driven mostly by higher prices, which, along with soaring fertilizer prices due to rising energy and natural gas prices, contributed to higher local and national food prices. These factors exacerbated overall inflation, making food less affordable for many people worldwide. The repercussions of the war in Ukraine, along with price inflation for food, agricultural inputs, and energy, conflicts, and weather-related events, kept hunger levels far above pre-pandemic levels globally. Specific regions experienced varying impacts; for example, Southern Africa saw an uptick in hunger due to inflation and domestic challenges, while Middle Africa's increase in hunger was mainly due to food inflation and extreme climate events. In contrast, Southern Asia saw an improvement in food security conditions due to sustained economic growth, especially in agriculture. The immediate effect of rising food prices was to exacerbate food insecurity among the most vulnerable groups, with the average cost of a healthy diet globally increasing significantly. Despite a slight improvement in the number of people who could not afford a healthy diet in 2021, the cost of a healthy diet increased globally, likely exacerbating challenges in achieving food security.

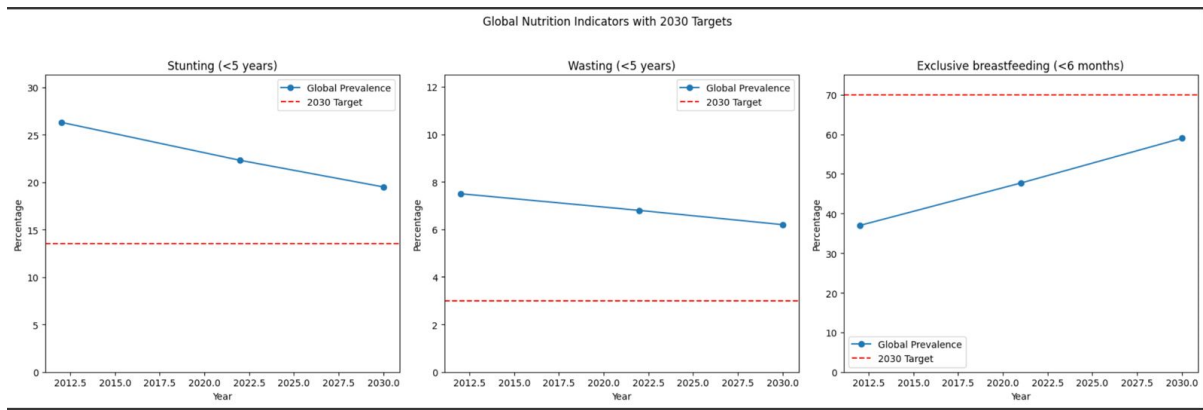


Question: Low birthweight, stunting, prevalence of undernourishment, global hunger, overweight, anaemia, exclusive breastfeeding (<6 months), give me the JSON data for the seven global nutrition targets mentioned above by 2030.

 Low Birthweight, stunting, Prevalence of undernourishment, global hunger, overweight, anaemia, exclusive breastfeeding(<6 months) give me the json data for THE SEVEN GLOBAL NUTRITION TARGETS mentioned above by 2030

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      "2019 Prevalence": "29.9%",
      "2030 Projection": "32.3%"
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      "2030 Projection": "59%"
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}
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### Global Nutrition Targets by 2030

