SMART INDIA HACKATHON 2024

TITLE PAGE

- **Problem Statement ID – 1647**
- **Problem Statement Title -**

  Development of AI-ML based models for predicting prices of agri-horticultural commodities such as pulses and vegetable
- **Theme- Agriculture, FoodTech & Rural Development**
- **PS Category- Software**
- **Team ID-**
- **Team Name (Registered on portal)**

IDEA TITLE - ANNAPURANAM

Proposed Solution

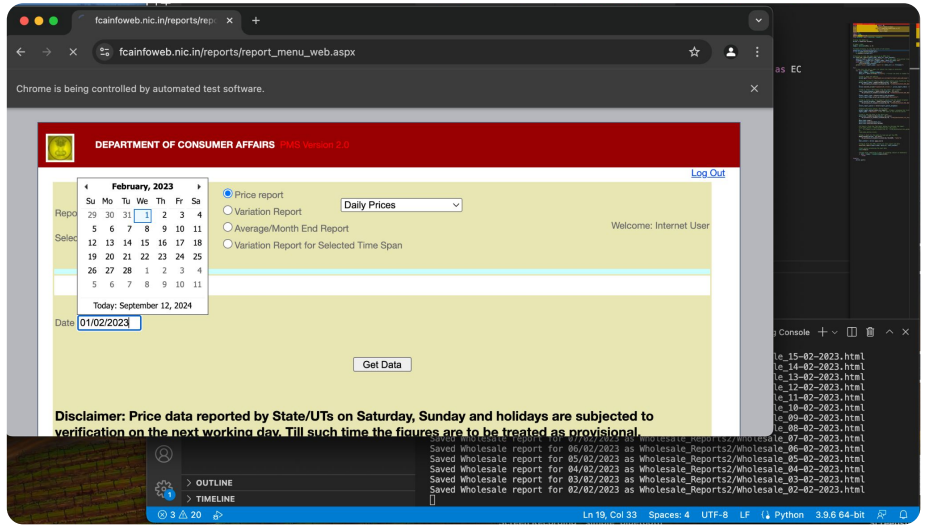
- **Detailed explanation of the proposed solution -**
  Develop a LSTM based machine learning model for price prediction based on inputs:
  - State of production | Commodity type | Time till next harvest
  - Weather inputs like rain and temperature variance since sowing season

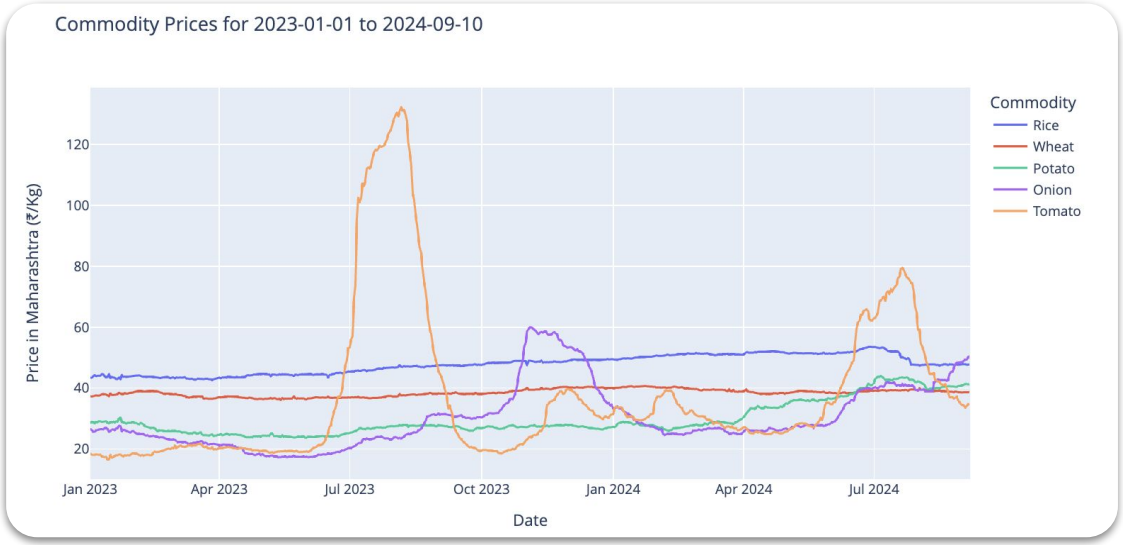
- **How it addresses the problem** -
  Show an interactive dashboard to monitor strong future fluctuation signals

- **Innovation and uniqueness of the solution -**
  Allow simple query through platform integrated LLMs that can write/execute python code at the backend.

Where is tomato most expensive today ?

TECHNICAL APPROACH





- **Technologies to be used**

  Model Training: TensorFlow for LLM architecture
  Visualization: Plotly Dash/Streamlit
  LLM Integration: OpenAI
  Backend Execution: Flask or FastAPI
  Weather Data: OpenWeather API
  Database Storage: MongoDB

- **Methodology and process for implementation**

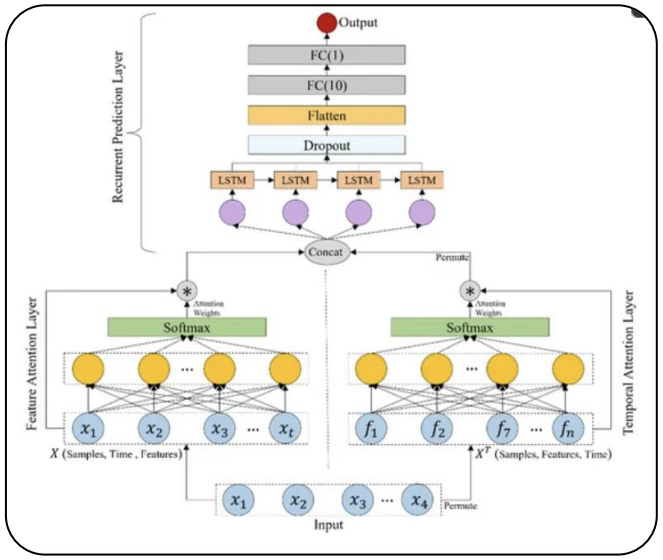
  1. **Collect and process relevant data ✅**
     (Took 3 hours for 2 year of daily records)
     - Automated scraping through public reports from ministry's website and processed in python.

  2. Build LSTM model by considering various feature evaluation

  3. Design interactive dashboard - Visualize prediction results and other relevant data

  4. Incorporate language models - Enable user queries

FEASIBILITY AND VIABILITY



- **Analysis of the feasibility of the idea**
  - **Technical Complexity:** LSTM implementation manageable within timeframe. Dashboard creation achievable using Plotly Dash
  - **Scalability -** Works for initial prototype scale, using the actual dataset updates in real-time by Ministry.
  - **LLM Integration -** LLM API integration straightforward via OpenAI. Simple natural language query support possible

- **Potential challenges and risks**
  - **Technical Complexity**: Fine-tuning the model for accurate predictions within the hackathon timeframe could be challenging.
  - **LLM Integration**: Generating accurate Python code from user queries might not be perfect, leading to incorrect executions.

- **Strategies for overcoming these challenges**
  - **Technical Complexity**: Implement a simplified LSTM model initially, fine-tune after demo.
  - **LLM Integration**: Predefined query templates/prompt to reduce complexity and avoid incorrect outputs.

IMPACT AND BENEFITS

- Made using Dall-e

- **Potential impact on the target audience**
  - **Policy Makers**: Get real-time analytics and forecasting for more effective interventions in commodity markets.
  - **Consumers**: Get stabilized prices and ensured better supply chain management.
  - **Farmers**: Provides actionable insights into price trends, helping them make informed decisions on when to sell or hold crops.

- **Benefits of the solution**
  - **Social**: Reducing income inequality and promoting fair pricing.
  - **Economic**: Improves market efficiency, reduces price volatility.
  - **Environmental**: Encourages sustainable farming practices by optimizing harvest timing.
  - **Technological**: Leads to greater adoption of AI and machine learning in farming.
  - **Consumer Protection**: Helps stabilize commodity prices, potentially reducing inflation and improving food security.

RESEARCH AND REFERENCES

- **Details / Links of the reference and research work**
  - **Prices Data**: https://fcainfoweb.nic.in/reports/report_menu_web.aspx
  - **Rainfall Data:** https://mausam.imd.gov.in/responsive/rainfallinformation.php
  - **Dashboard Samples:** https://streamlit.io/gallery
    - Assistant based: https://streamly.streamlit.app/
  - **Forecasting Agricultural Commodity Prices Using Dual Input Attention LSTM:** https://www.mdpi.com/2077-0472/12/2/256
  - **Icons and elements:** www.flaticon.com