

# ■ Market Price Realtime Analysis & Prediction Dashboard App

Empowering Farmers with Realtime Market Insights, AI-Driven Forecasting, and Q&A Bot

## ■ Project Overview

This ongoing project aims to provide a centralized, easy-to-use web platform for farmers, delivering **live agricultural market prices** (via API), advanced **AI-powered price predictions**, and a helpful AI chatbot for instant answers on market trends—all powered by robust, scalable modern tech.

## ■ About the Dataset

- **Scope:** Daily prices of agricultural commodities in India, 2001–2025
- **Records:** 75,000,000+ rows | **Commodities:** 374 | **Varieties:** 1,504 | **Markets:** 1,500+
- **Included:** Vegetables, fruits, grains, spices, & more—across every Indian state
- **Source:** [Govt. of India Open Data Platform](#) (GODL-India License)

## ■ Column Schema

| Column Name    | Description                             | Type    |
|----------------|---|---------|
| State          | Indian state of the market              | String  |
| District       | District of the market                  | String  |
| Market         | Name of the mandi (wholesale market)    | String  |
| Commodity      | Name of the commodity                   | String  |
| Variety        | Specific type/variety                   | String  |
| Grade          | Quality grade (e.g., FAQ, Medium, Good) | String  |
| Arrival_Date   | Date (YYYY-MM-DD, ISO 8601)             | Date    |
| Min_Price      | Minimum price (INR/quintal)             | Decimal |
| Max_Price      | Maximum price (INR/quintal)             | Decimal |
| Modal_Price    | Most frequent price (INR/quintal)       | Decimal |
| Commodity_Code | Unique commodity code                   | Numeric |

- **Usage:** Time-series analysis, forecasting, supply chain studies, market visualization, policy research

## ■■ Real-time Data API

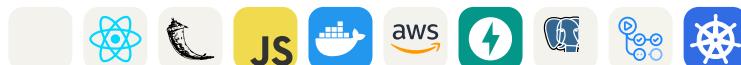
Along with historical data, the dashboard will use the Government of India's official API for continuous real-time price feeds—ensuring the dashboard is always up-to-date for farmers and stakeholders.

## ■■ Project Structure

```
market-price-realtime-analysis-prediction-dashboard-app/
    ■■■ src/                      # Main application code
    ■■■ test_code/                 # Test scripts & validation
    ■■■ data_processing_pipeline.py # RAM-friendly batch ETL pipeline
    ■■■ inverse_data_processing_pipeline.py
    ■■■ row_data_conversion.py
```

```
solid_model.ipynb          # ML experiment notebook  
requirements.txt  
config.json  
README.md
```

## ■■ Technologies & Skills



Python | React/JS | Flask | FastAPI | Docker | AWS EC2/S3 | Kubeflow | GitHub Actions | PostgreSQL

**AI / ML:** - Pandas, NumPy, Scikit-learn, TensorFlow - Model for price prediction per commodity (feature input: State, District, Market, Commodity, Variety, Grade, Arrival\_Date, Min\_Price, Max\_Price, Modal\_Price, Commodity\_Code)

**Web & API:** - Flask + FastAPI backend, React.js SPA frontend - Hosted on AWS EC2 (scalable, cloud-ready, secure)

**Deployment / DevOps:** - Docker containerization for portability - Kubeflow for full ML/data pipelines orchestration - **GitHub Actions** automates testing & pipeline checks on every push

**AI Assistant Bot:** - Built on Langchain, prompt engineering for robust natural language Q&A

## ■ Key Challenge & Smart Solution

### Problem:

**75M+ rows (7–8 GB!!):** Traditional approaches caused **RAM** crashes and slowdowns — especially when cleaning, converting, and prepping data for ML.

### My Solution:

- **Chunk-based ETL:** Used S3 for cloud storage and streamed data in manageable batches to avoid "out-of-memory" errors. - Processed only the most recent 15 years (~2.5 GB, row-sampled). - Wrote cleaned batches back to S3, keeping processing fast, modular, and reproducible—no matter the hardware.

"Large data? No sweat—custom batch pipelines + cloud streaming for scalable, failure-proof analytics." ■

## ■ Pipeline & Modules

1. **Data Processing Pipeline** (`data_processing_pipeline.py`)
2. Batch reads/processes huge rows in RAM-safe chunks—S3 in, S3 out!
3. **Inverse Data Processing** (`inverse_data_processing_pipeline.py`)
4. Restores original structure from processed data, supporting validations & explainability.
5. **Raw Data Conversion** (`raw_data_conversion.py`)
6. Preps data for ML by transforming, cleaning, and encoding core columns.
7. **ML Model Pipeline** (`solid_model.ipynb`)
8. Full EDA, feature engineering, training, validation, and export for price prediction.
9. **AI Query Bot**
10. Rapid, language-based Q&A for anything a farmer wants to ask.
11. **Web Dashboard**
12. **Frontend:** React SPA for intuitive access
13. **Backend:** Flask APIs for both live and historic data
14. **Automation & MLOps**

15. **GitHub Actions:** Runs CI and automated pipeline testing on every code push
  16. **Docker/Kubeflow:** For pipelined, reproducible deployment and scaling on AWS EC2
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## ■ Coming Soon

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- Live streaming of prices from official API
- Advanced, commodity-specific forecasting models
- Full-featured AI bot
- Improved maps/visual charts for better farmer experience
- User portals for feedback/community input

**Many new features and improvements are still in development!**

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## ♥■ Contribution

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Love agri-tech or have feedback?

**Star, follow, and contribute!**

We welcome contributors in ML, backend/frontend, and data engineering alike.

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Made with ♥■ by Vijay Takbhate | Building for impact & community