



AgroChill: Time-Series Forecasting for Optimizing Crop Trade

Helloworld 2.0



Problem Understanding

Challenge:

Managing perishable goods in the agricultural market. Fresh produce is often subject to price fluctuations and spoilage, leading to potential loss.

Objective:

Predict weekly fresh produce prices 1 month ahead to help AgroChill decide when to freeze or sell produce at the best market price.



Data Analysis

Data Overview:

Weather Data: Daily temperature, rainfall, humidity, and their impact on crop yield.

Price Data: Weekly prices of various commodities in different regions.

Approach:

Cleaned and merged weather and price data to create a unified dataset.

Engineered features such as lagged prices, weather-based attributes, and time-based features .





Model Selection

Chosen Model: Linear Regression using Darts
RegressionModel.

Reasoning: Linear regression is interpretable, fast to train, and works well for seasonally driven time-series data.

External Regressors: Weather features (temperature, rainfall, humidity) were included as external regressors to improve prediction accuracy.

Data Pipeline Strategy

- **Automated Data Ingestion:** Weekly weather and price data are pulled via APIs, ensuring continuous updates.
- **Data Merging & Cleaning:** Weather and price data are merged, duplicates and missing values are handled through imputation and removal.
- **Weekly Aggregation:** Data is aggregated by week to ensure consistency and smooth out daily fluctuations.
- **Real-Time Updates:** Data pipeline adapts to new data with automatic model retraining and rolling forecasts.





Feature Engineering

- **Weather Features:** Temperature, rainfall, and humidity directly affect crop yield and pricing.
- **Lagged Features:** Previous prices were used as predictors for future prices, accounting for autocorrelation.
- **Time-Based Features:** Day of the week, month, and seasonal indicators to capture periodic trends.

Model Training:

- Trained the model on historical data to predict the price for the next 4 weeks using a rolling window.

System Design & Scalability

Modular Design:

The system is divided into distinct components:

- Data ingestion pipeline.
- Data preprocessing and feature engineering.
- Time-series forecasting model.
- API layer for real-time prediction and data updates.

Scalability:

- The design allows easy scaling to support additional regions and commodities.
- The Dockerized solution ensures scalability for cloud-based deployment (AWS, GCP, etc.).



Business Insights & Recommendations

Market Trends & Price Prediction:

Forecasting: The system predicts price trends for the next 4 weeks, helping AgroChill decide when to freeze or sell produce.

Example: If a price spike is predicted, AgroChill can choose to sell fresh produce.

Storage & Freezing Strategy:

Recommendation: When price predictions show a drop in the coming weeks, the system suggests freezing produce to avoid potential loss.

Seasonality Insights:

Identifying Trends: The model captures seasonal fluctuations in prices (e.g., higher prices during holiday seasons or peak demand periods).





Thank You

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Q & A

