Crop Yield & Weather Impact Analysis – India

Project Overview

This project analyzes Indian agricultural crop production data and studies its relationship with weather factors such as rainfall and temperature.

The goal is to understand long-term production trends, identify top-performing crops and states, and evaluate how climate variability impacts agriculture.

This project is built from a real agriculture domain perspective and demonstrates end-to-end data analysis using Python.

Objectives:

- Combine crop production data with rainfall and temperature data

- Clean and preprocess large-scale datasets

- Analyze production trends over multiple years

- Identify top crops and states by total production

- Study the impact of rainfall and temperature on crop production

#Dataset Details

The project uses three datasets:

 1. Crop Production Dataset

- State

- District

- Crop Year

- Season

- Crop

- Area

- Production

2. Rainfall Dataset

- Year

- Annual Rainfall (India-level)

3. Temperature Dataset

- Year

- Annual Average Temperature (India-level)

Total Records Analyzed: 8.8+ million rows

Tools & Technologies

- Python

- Pandas

- Matplotlib

- Jupyter Notebook

Data Processing Steps

1. Loaded raw datasets from multiple sources

2. Renamed and standardized column names

3. Handled missing values in production and rainfall

4. Merged crop, rainfall, and temperature datasets using year

5. Created a clean master dataset for analysis

Analysis Performed

- Descriptive statistics and data quality checks

- Correlation analysis between:

  - Rainfall vs Production

  - Temperature vs Production

- Year-wise production trend analysis

- Identification of:

  - Top crops by total production

  - Top states by total production

Key Insights

- Plantation and water-intensive crops like Coconut and Sugarcane dominate total production.

- Kerala, Andhra Pradesh, and Tamil Nadu are the highest producing states.

- Direct correlation between rainfall/temperature and production at national level is weak.

- Trend analysis shows Indian agriculture has become more resilient to rainfall variability over time.