ANALYZING THE IMPACT OF CLIMATE CHANGE ON GLOBAL CROP PRODUCTION: A COMPREHENSIVE POWER BI REPORT

OBJECTIVE

The goal of this project is to analyze historical crop production trends across countries and regions, leveraging time-series data from the World Bank to understand patterns, identify key trends, and assess the impact of climate variability on agricultural output.

This analysis will help students gain insights into global agricultural sustainability and the role of climate change in shaping crop yields.

DATASET DESCRIPTION

Source: World Bank Open Data

Dataset Name: Crop Production Index (2014-2016 = 100)

CONTENT OVERVIEW:

- Time Period: 1961 to 2022.
- Regions and Countries: Data includes individual countries and grouped regions (e.g., Africa Eastern and Southern).
- Indicator: The crop production index measures agricultural production for each year relative to the base period (2014-2016 = 100).
- Key Variables:

  - Country Name and Code: Names and ISO codes for countries.
  - Yearly Crop Production Index: Annual data for the crop production index.
  - Indicator Name and Code: Descriptions for reference.

TASKS

1. DATA PREPARATION

- Load the dataset into Power BI and explore its structure.
- Perform the following data cleaning steps:
  - Remove irrelevant columns (e.g., Unnamed: 68, 1960, and 2023).
  - Reshape the dataset from wide to long format for easier analysis.
  - Handle missing values appropriately (e.g., filter out years with no data or interpolate missing values).

2. DATA EXPLORATION AND ANALYSIS

- Global Crop Production Trends:
  Analyze changes in the global crop production index over time.
  Identify patterns and significant inflection points in global trends.
- Regional Insights:
  Compare crop production performance across countries and regions.
  Highlight top-performing and low-performing countries.
- Year-over-Year Growth Analysis:
  Calculate growth rates for each country's crop production index.
  Visualize trends in year-over-year growth globally and regionally.
- Clustering and Similarities:
  Group countries with similar crop production behaviors using Power BI clustering tools.
  Identify clusters of regions with consistent or volatile growth patterns.
- Impact of Decades on Agriculture:
  Summarize how crop production has evolved by decade.
  Explore the impact of global events (e.g., climate policies, economic downturns) on agricultural output.

EXPECTED DELIVERABLES

1. POWER BI DASHBOARD

- An interactive dashboard containing:
  - Global trends in crop production (line chart and map visualizations).
  - Regional comparisons using bar charts and heatmaps.
  - Year-over-year growth analysis for selected countries.
  - Clustering visuals to group countries with similar trends.'

2. SUMMARY REPORT

- A concise document (2-3 pages) summarizing:
  - Key insights derived from the dashboard.
  - Patterns and anomalies observed in the data.
  - Conclusions about the global and regional impacts of climate variability on crop production.

3. PRESENTATION

- A 10-slide presentation summarizing:
  - Objectives and dataset overview.
  - Key findings and visuals.
  - Actionable insights and policy recommendations.

PROPOSED DASHBOARD FEATURES IN POWER BI

1. Global Overview:
   - A world map displaying crop production indices for all countries.
   - A line chart summarizing global crop production trends over time.

2. Regional Insights:
   - A bar chart comparing top 10 and bottom 10 countries by crop production index.
   - A matrix/table showing crop production indices for specific regions and years.

3. Trend Analysis:
   - Line charts showing year-over-year trends for selected countries.
   - Heatmaps highlighting growth patterns across decades.

4. Clustering:
   - Scatter plots or clustered visuals to group countries with similar behaviors.

EVALUATION CRITERIA

Criteria	Weightage
Data Cleaning and Preparation	20%
Dashboard Design	30%
Insights and Conclusions	30%
Presentation and Documentation	20%

LEARNING OUTCOMES

By completing this project, you will:

1. Gain hands-on experience working with time-series data.
2. Learn to build effective and interactive Power BI dashboards.
3. Develop skills in analyzing and visualizing global and regional trends.
4. Understand the broader implications of climate variability on agriculture and food security.