TABLE OF CONTENTS

# SUMMARY

## Conclusions/ Insights

## Challenges

## Future work

# CHAPTER 1. Introduction to datasets (Data acquisition)

## FAOSTAT ( [FAOSTAT](https://www.fao.org/faostat/en/#data/QV))

### Description

### Data screenshot

### Dataset from https://www.globalhungerindex.org

## Weather/Climate Data

## (Downloaded from [Data Catalog | Climate Change Knowledge Portal (worldbank.org)](https://climateknowledgeportal.worldbank.org/download-data))

### Description

### Data screenshot

### Gross enrolment ratio, primary to tertiary, both sexes (%)

### ( <https://databank.worldbank.org/> )

## How to Cite this Dataset

## Daniel Kaufmann and Aart Kraay (2023). Worldwide Governance Indicators, 2023 Update ([www.govindicators.org](http://www.govindicators.org/)), Accessed on 10/18/2023.

# CHAPTER 2. Data Preparation

## Cleaning data

### Approach 1

### Approach 2

## Data Visualization

### Plot world maps of Gross Agri Production and GDP (year = 2007)

### Sorted data in table format(Top 5, Bottom 5)

# CHAPTER 3. Data Analysis

## Which countries stand high on the Global Hunger Index scores and low on agricultural production per capita (year = 2007)?

### Data visualization

### Find top 3 agricultural production per capita countries

### Find bottom 3 agricultural production per capita countries

### Extract the relevant countries

## What are the key factors affecting agri production?

### Avg temperature

### 1.1 Visualization

### Precipitation

### Visualization

### Land usage

### 3.1 Visualization

### No of hot days

### Visualization

### Fertilizer

### Visualization

### Research Spending

### Visualization

### Corruption(In Zimbabwe), investments in infrastructure, IMF loans(In control), paved roads, quality of transportation, high school education

### Find which of the above factors correlate with top 10 agri prod per capita countries

### Correlation analysis, Regression modeling or hypothesis testing

### Can any of the factors determined above strongly explain high GHI score and low agri production?

### Causal analysis

### Provide insights – discuss factors which can be controlled or outside of countries control

## Which country is most efficient at utilizing their agricultural land? (Maybe scrap this)

### Find top 3, bottom 3 efficient countries

### Analyze if any factor is contributing to their agricultural efficiency

# CHAPTER 4. Predict future trends in agricultural production( for high GHI scored countries)

## Linear regression

### Time Series Prediction

### Multi variate regression prediction

## Try out other ML models

### Decision Tree

### Random Forest

### Support Vector Machines

### Predict future trends in specific agri products

### (e.g. Rice, beans, bananas, almonds, potatoes, maize)

# CHAPTER 5. Conclusion

## Summarize findings

## Provide insights how some developing countries can improve their agricultural production

## Refer to Table 1.

Table : Correlation values of high-producing nations

## 

Table 2: T-Test Results

## 

## Suggestions for low-producing nations:

## **Average Temperature**: We can see from scatter plot that low-producing nations have high avg temperature( ranging from 22.5 to 27 degree celsius). So, they can focus on crops which favour high temperature.

## **Gross enrolment ratio, primary to tertiary, both sexes (%):** We can infer from the scatter plot that high-producing nations have high education enrolment ratio. So, the government in low-producing nations can form policies which encourage higher enrolment in education

## **Area:** Area available for agriculture is a factor beyond a nation's control. But we can see from plot, even with lower amount of area assigned for agriculture, they have higher agri production per capita.

## **Fertilizer Use Per Capita:** High-producing nations use high amounts of fertilizer per capita. Hence, the governments of low-producing nations can find ways of utilizing more fertilizer in their agricultural land.

## **Water Use Efficiency:** High and low producing nations have same water use efficiency. How are they producing more?

## **Agriculture share of Government Expenditure:** Even with lower agriculture share of government expenditure, high-producing nations have more production per capita.

## GLOSSARY

## Value of gross production has been compiled by multiplying gross production in physical terms by output prices at farm gate. Thus, value of production measures production in monetary terms at the farm gate level. Since intermediate uses within the agricultural sector (seed and feed) have not been subtracted from production data, this value of production aggregate refers to the notion of "gross production". Value of gross production is provided in both current and constant terms and is expressed in US dollars and Standard Local Currency (SLC). The current value of production measures value in the prices relating to the period being measured. Thus, it represents the market value of food and agricultural products at the time they were produced. Knowing this figure is helpful in understanding exactly what was happening within a given economy at that point in time. Often, this information can help explain economic trends that emerged in later periods and why they took place. Value of production in constant terms is derived using the average prices of a selected year or years, known as the base period. Constant price series can be used to show how the quantity or volume of products has changed, and are often referred to as volume measures. The ratio of the current and constant price series gives a measure of price movements. US dollar figures for value of gross production are converted from local currencies using official exchange rates as prevailing in the respective years. The SLC of a country is the local currency prevailing in the latest year. Expressing data series in one uniform currency is useful because it avoids the influence of revaluation in local currency, if any, on value of production.

## Credit to Agriculture represents the private domestic investment in Agriculture which is an important pillar of the Investment in agriculture composed of the 4 combinations of domestic against foreign and public against Private.

## FDI is an investment which aims to acquire a lasting management influence (10 percent or more of the voting stock) in an enterprise operating in a foreign economy. FDI may be undertaken by individuals, as well as business entities.The foreign direct investor most often is aiming to gain access to natural resources, to markets, to labour supply, to technology, to ensure security of supplies or to control the quality of a certain product. FDI can be decomposed into two types of investments: mergers and acquisitions (MA) and greenfield investments. The latter type results in the creation of new entities and the setting up of offices, buildings, plants or factories from scratch in a foreign economy.

## FDI is the sum of equity capital, reinvested earnings and other FDI capital. Equity capital comprises equity in branches, all shares in subsidiaries and associates (except non-participating, preferred shares that are treated as debt securities and are included under other FDI capital) and other contributions such as the provision of machinery. Reinvested earnings consist of the direct investor's share (in proportion to equity participation) of earnings not distributed by the direct investment enterprise. Other FDI capital (loans) includes the borrowing and lending of funds, including debt securities and trade credits between direct investors and direct investment enterprises.

## FDI inflows and outflows are important for tracking the direct invesment conditions each year. Outward Foreign Direct Investment (FDI) flows record the value of cross-border direct investment transactions from the reporting economy during a year. It represents transactions affecting the investment in enterprises resident abroad. whereas, Inward Foreign Direct Investment (FDI) flows record the value of cross-border direct investment transactions received by the reporting economy during a year. It represents transactions affecting the investment in enterprises of a specific industry resident in the reporting economy.

## 𝐴𝑔𝑟𝑖𝑐𝑢𝑙𝑡𝑢𝑟𝑒 𝑆ℎ𝑎𝑟𝑒 𝑜𝑓 𝐺𝑜𝑣𝑒𝑟𝑛𝑚𝑒𝑛𝑡 𝐸𝑥𝑝𝑒𝑛𝑑𝑖𝑡𝑢𝑟𝑒𝑠 = 𝐺𝑜𝑣𝑒𝑟𝑛𝑚𝑒𝑛𝑡 𝐸𝑥𝑝𝑒𝑛𝑑𝑖𝑡𝑢𝑟𝑒𝑠 𝑜𝑛 𝐴𝑔𝑟𝑖𝑐𝑢𝑙𝑡𝑢𝑟𝑒 𝑇𝑜𝑡𝑎𝑙 𝐺𝑜𝑣𝑒𝑟𝑛𝑚𝑒𝑛𝑡 𝐸𝑥𝑝𝑒𝑛𝑑𝑖𝑡𝑢𝑟𝑒𝑠 × 100

## Water Use Efficiency (WUE) is defined as the value added of a given major sector1 divided by the volume of water used. Following the United Nations International Standard Industrial Classification of All. (Unit: US $ per cubic m)

## Water use: water that is received by an industry or households from another industry or is directly abstracted. [SEEA-Water (ST/ESA/STAT/SER.F/100), par. 2.21]

## Water use for irrigation (km³/year) o Annual quantity of water used for irrigation purposes. It includes water from renewable freshwater resources, as well as water from over-abstraction of renewable groundwater or abstraction of fossil groundwater, direct use of agricultural drainage water, (treated) wastewater, and desalinated water. [AQUASTAT Glossary

## ([Metadata-06-04-01.pdf (un.org)](https://unstats.un.org/sdgs/metadata/files/Metadata-06-04-01.pdf))