



DA 231 - O Project

RAW CROP

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In the constant changing environment we want to know which of the factor affect Agricultural growth in India

How do major factors like rainfall, underground water help crop produce

We also want to know does population literacy of a region is reduce the Agricultural productivity

- PySpark, Google Colab
- What is the trend of top 5 crops per region in each season for the years 2000-2014
- How has rainfall affected the production of kharif crops for the years 2000-2014?
- Effect of Literacy on crop production for each state in the years 2001, 2011-12
- For the crops Arecanut, Jowar, Jute, Rice show the performance of these crops across states for the time periods 2000-2014 when the rainfall is above or below average.
- How does water quality affect the crops of a region across the years 2012-2014?
- Grouping data in Zone wise and rainfall from Jun-Sept

$$E_{ij} = \sum (I_{ij} * C_{ij}) / \sum C_{ij}$$

where,

i is the crop and **j** is the region

C_{ij} - Area in % for individual Crop in individual area unit

I_{ij} - Ratio between the yield of any crop **Y_{ij}** of the individual Area (**i**) under the total area and the average yield rate (**Y_i**) of the entire area 'y' of any crop multiplied by 100

$$I_{ij} = Y_{ij} / Y_i$$

$$WQI = \sum W_i Q_i$$

where,

W_i - fraction of total unit weights for a particular unit weight (w_i)

$$W_i = w_i / (\sum w_i)$$

Q_i - subindex of i'th parameter

$$Q_i = 100 [V_i / S_i]$$

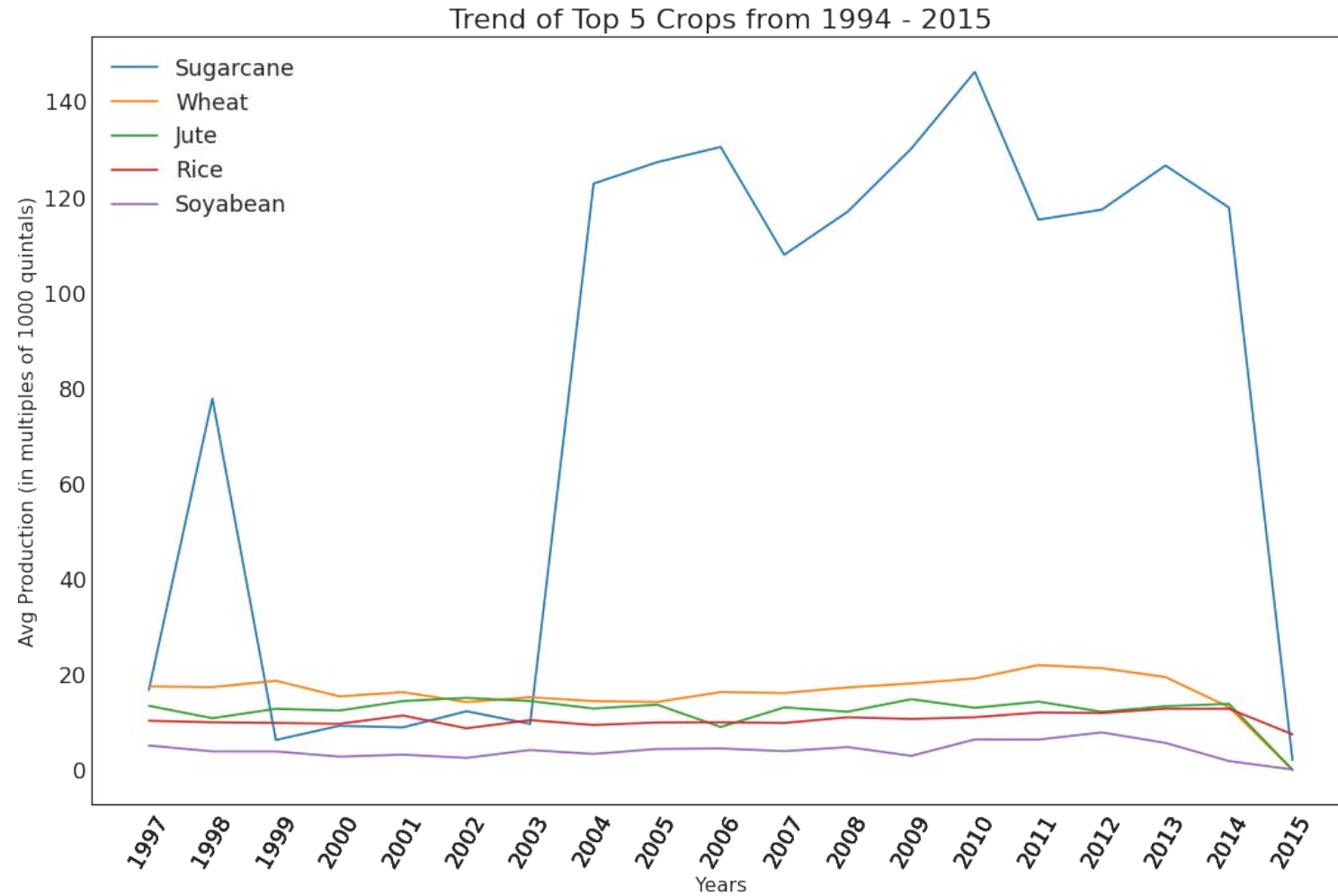
S_i - recommended standard for ith parameter

V_i - monitored value of the ith parameter

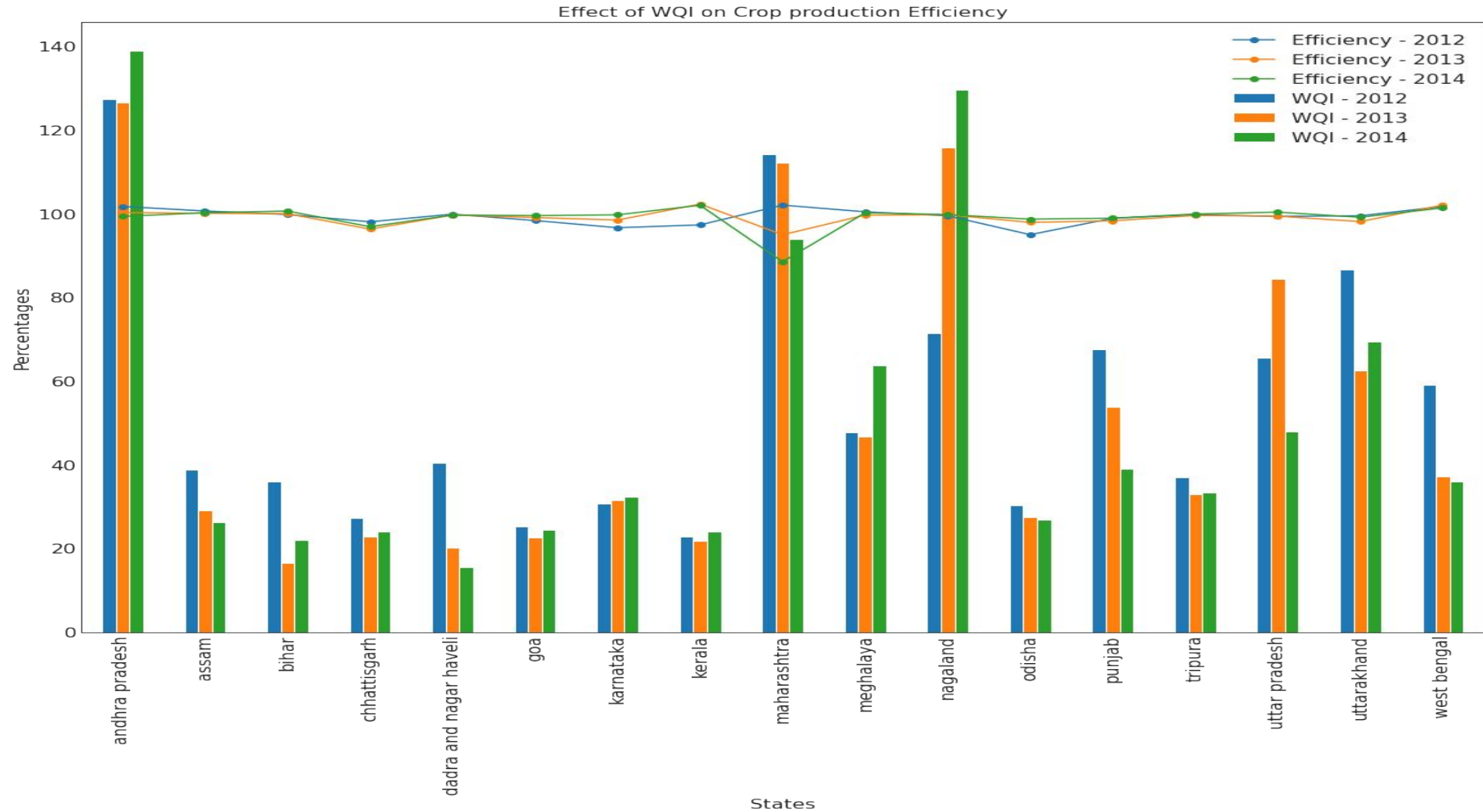
References:

- <https://link.springer.com/article/10.1007/s13201-017-0579-4>
- <http://www.indiaenvironmentportal.org.in/files/water%20quality%20index.pdf>
- <https://www.youtube.com/watch?v=HTkNmmMoUzE>
- <https://www.youtube.com/watch?v=LtXfIYYb8F4>
- <http://iitk.ac.in/iwd/wq/drinkingwater.htm>

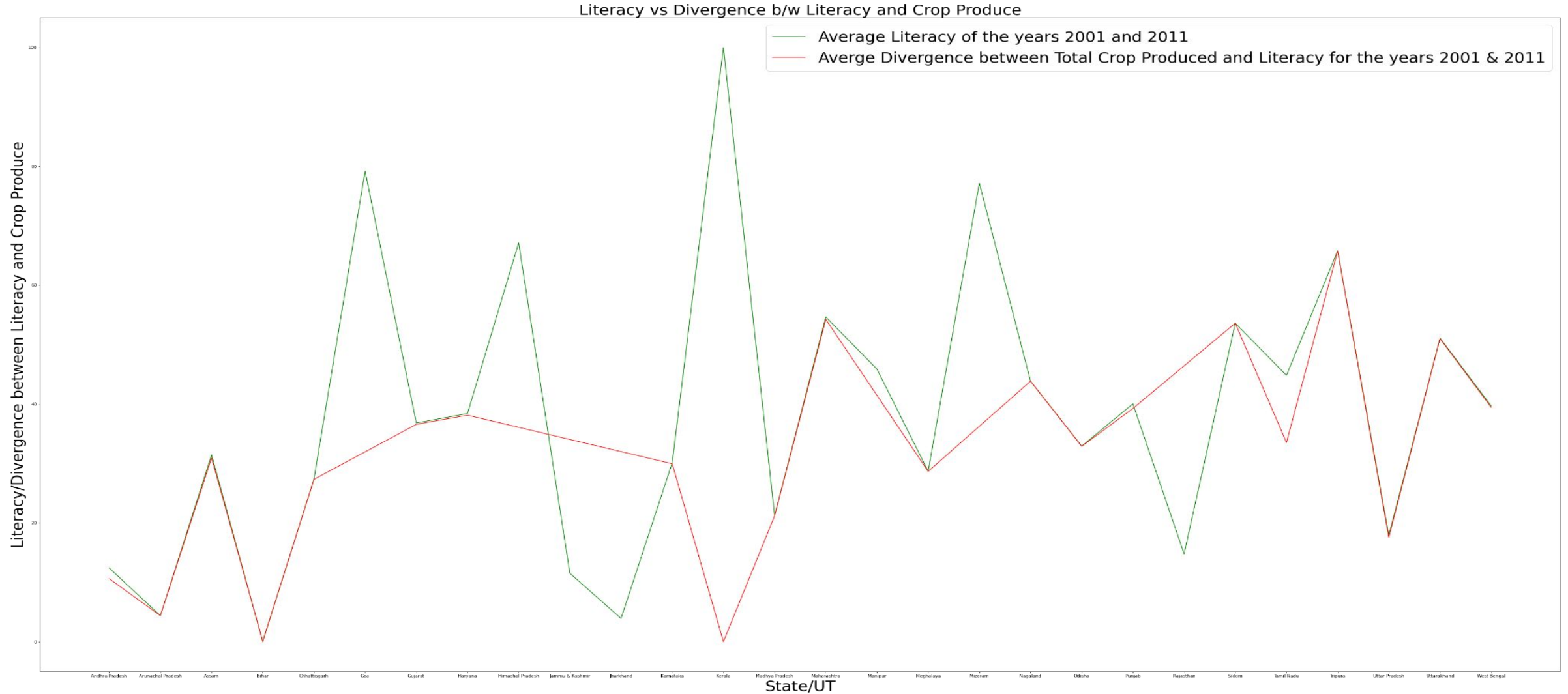
Top 5 Crops



WQI vs Production Efficiency



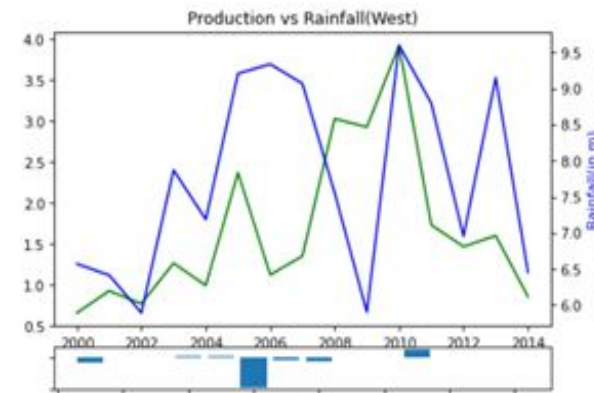
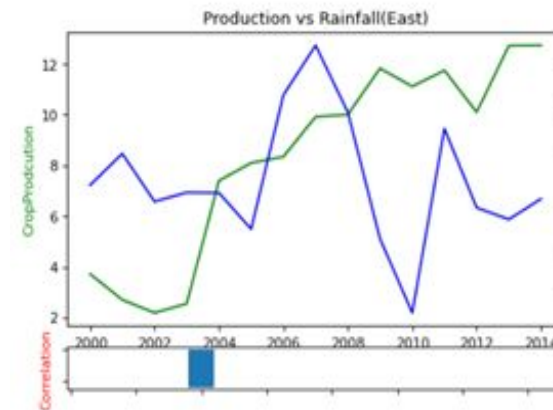
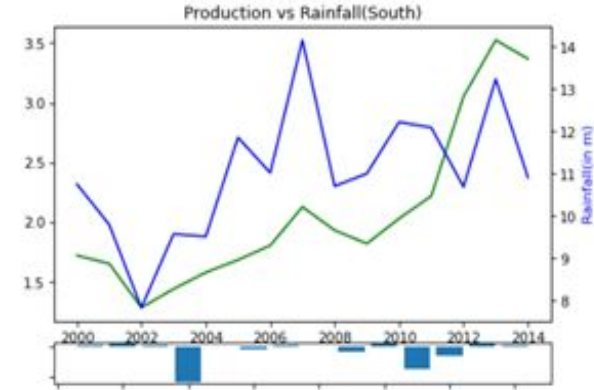
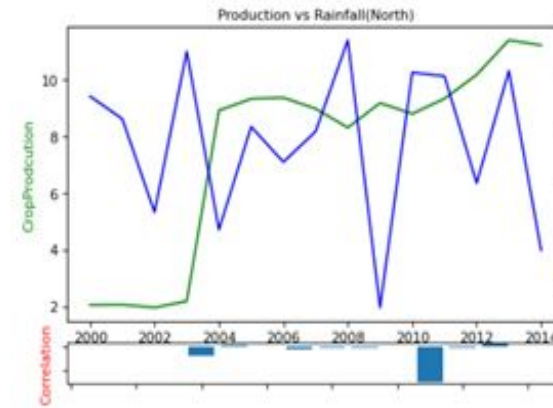
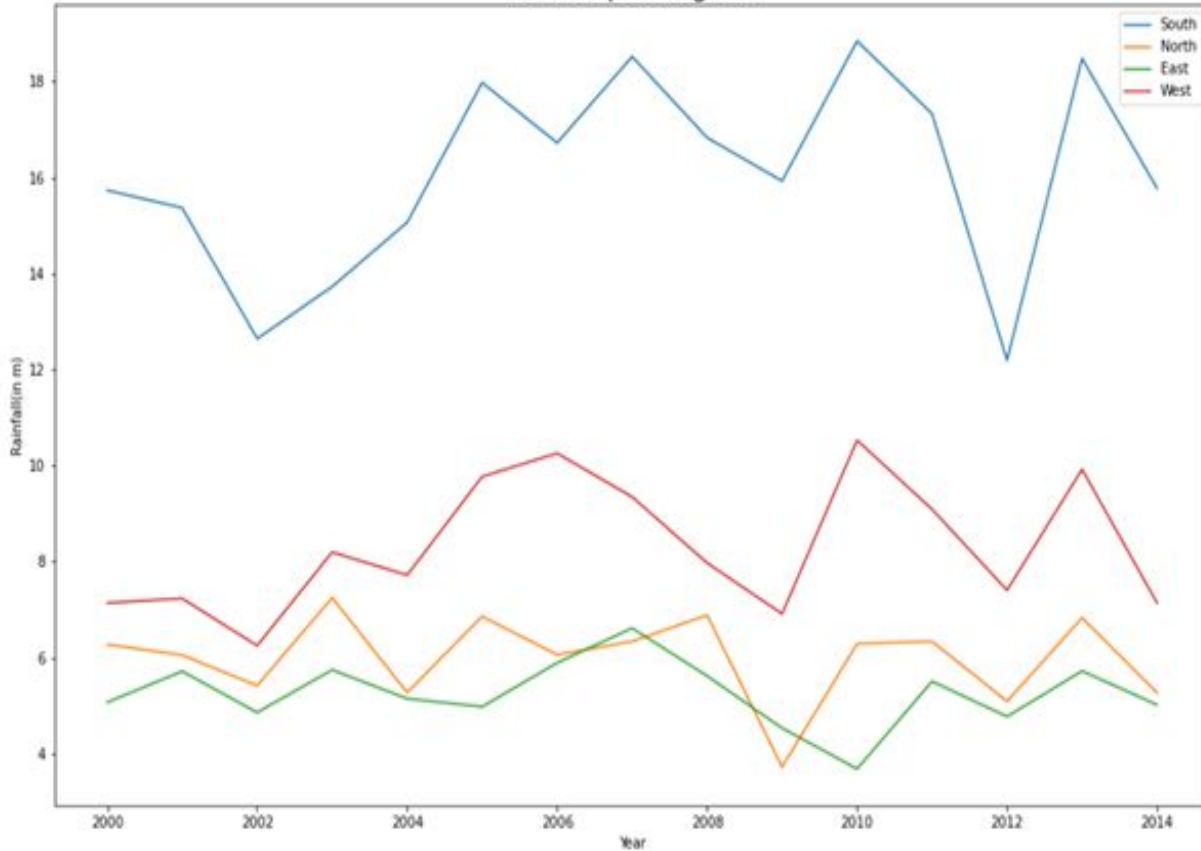
Literacy and Crop Produce



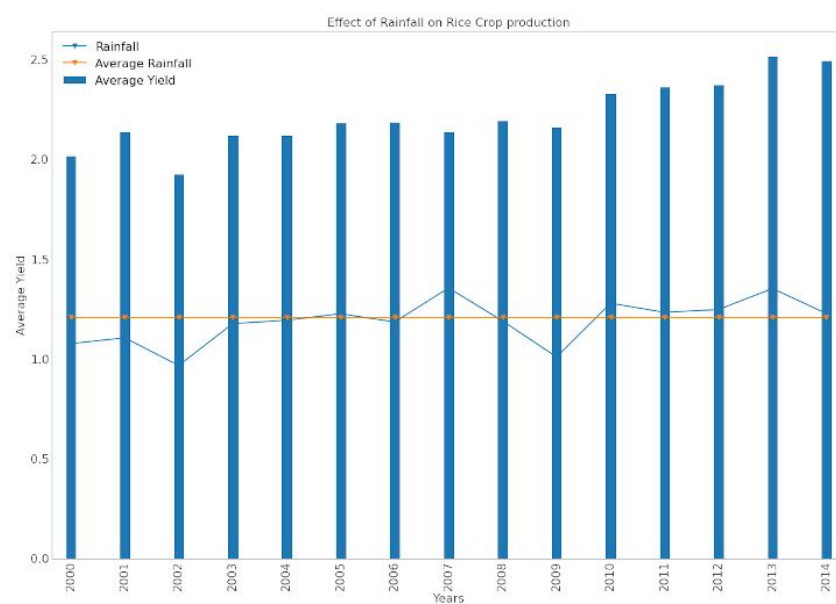
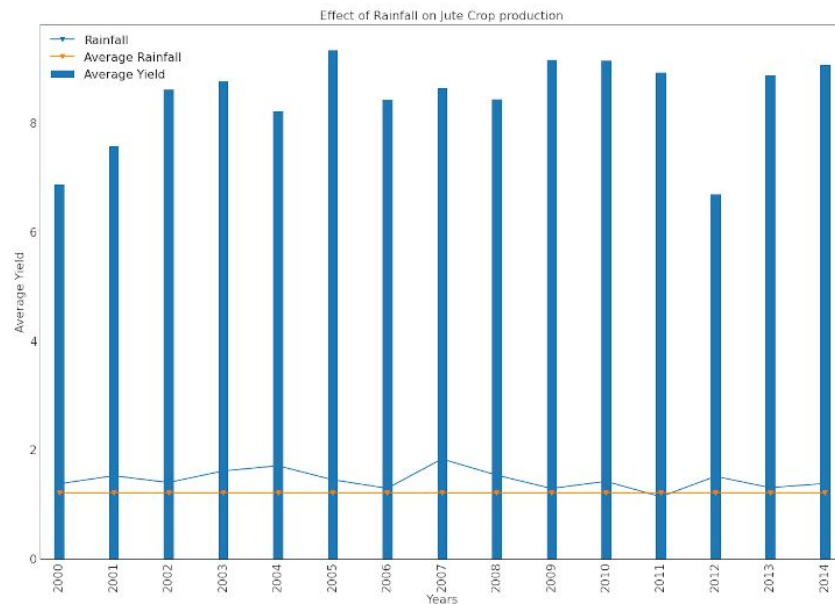
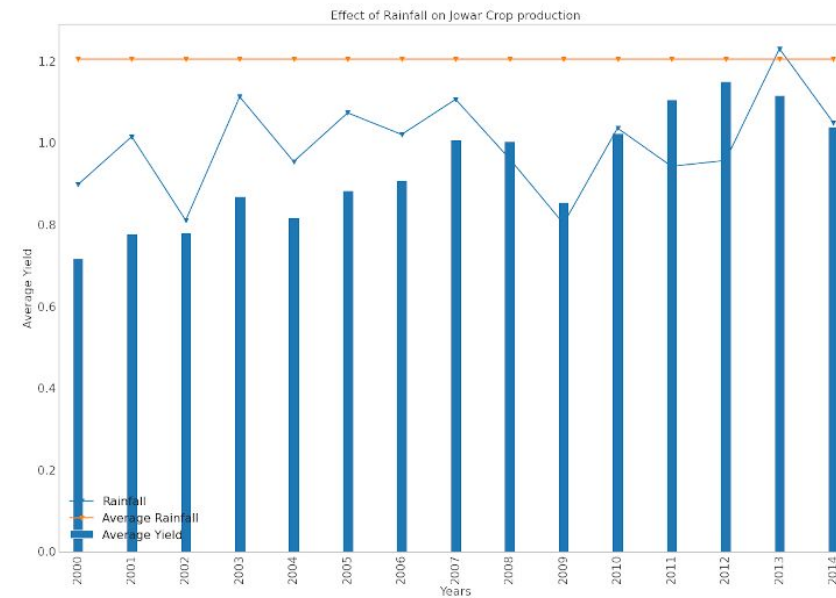
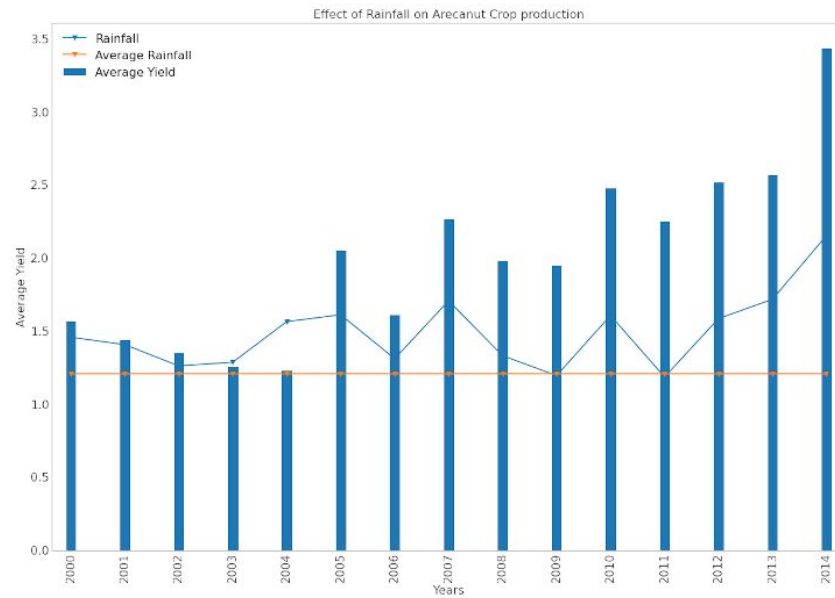
Relation between Rainfall and Crop Production in Kharif



Rainfall per Regions



Relation between Rainfall and Crop Production

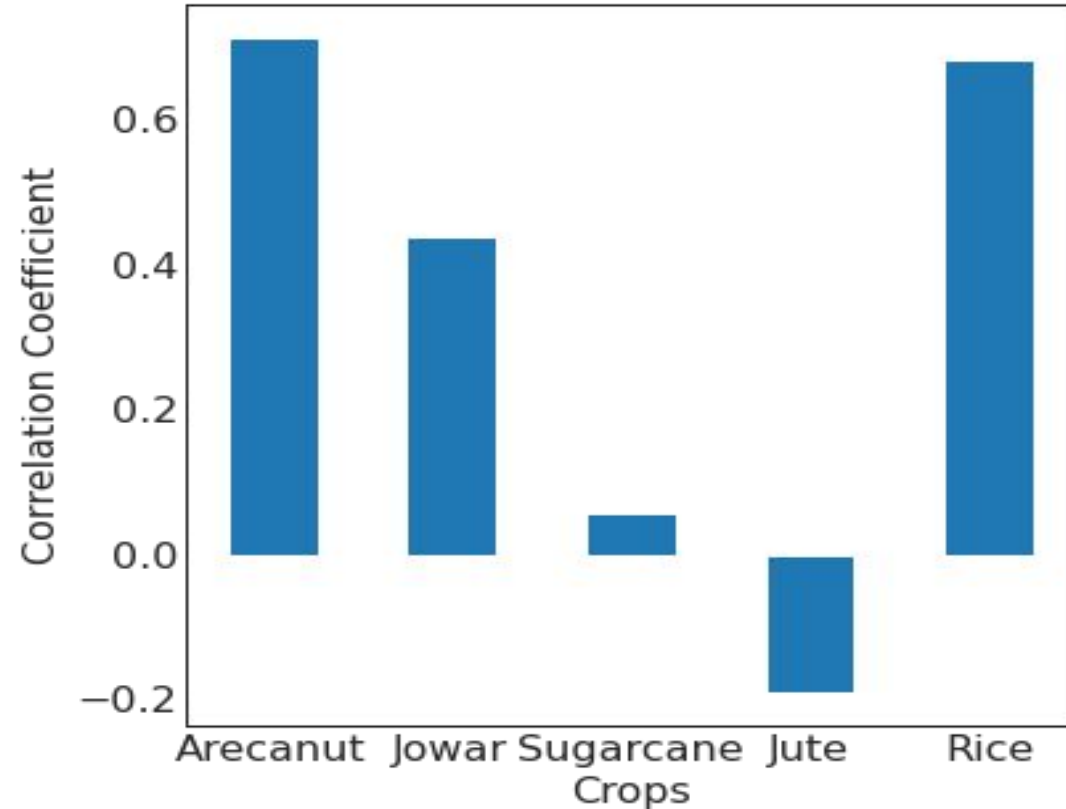


Relation between Rainfall and Crop Production

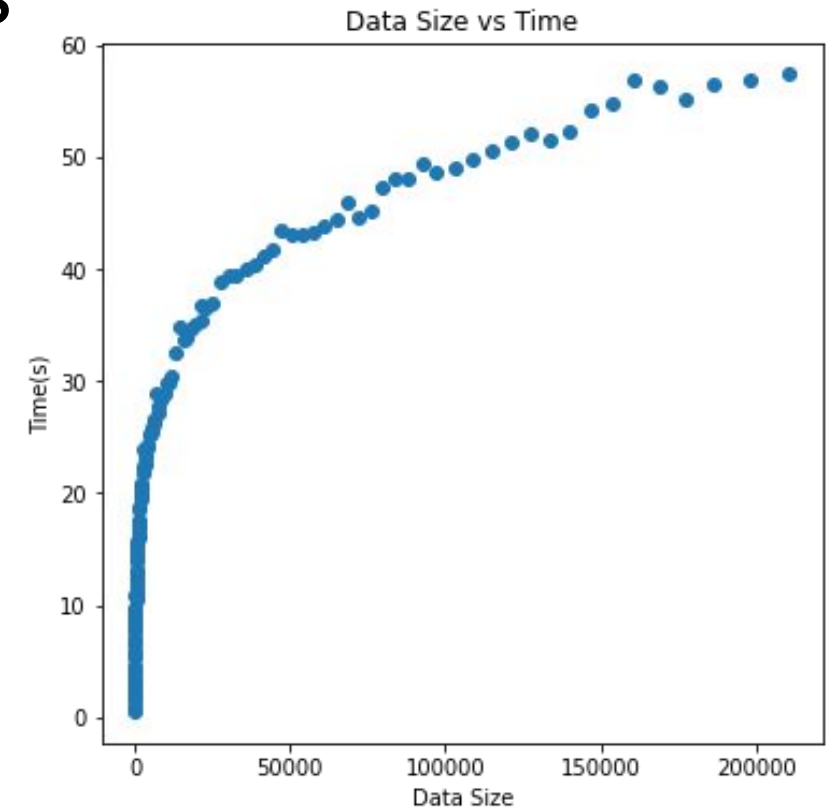


- Arecanut and Rice show strong positive correlation
- Sugarcane shows moderate positive
- Jute sows inverse relation

Crop Production Correlation with Rainfall in Rainy Season



- Overall evaluation time: ~6mins 15secs
- Evaluation with varying data size for code for crop performance
 - Follows $O(\log n)$
- Addition of new crop -
 - Best Case: ~0.35s (~10 additional records)
 - Worst Case: ~3s (~12000 additional records)



- Rainfall Data separated by in-consistent state, region
- Water data not in consistent format
- Creating Agricultural efficiency (E)
- Creating Water Quality Index (WQI)
- Some of the state's crop production data was abnormally high for these two years, maybe due to previous years correction or some unknown reasons
- Good to have Soil and fertilizers used data for wider analysis



Thank you