Data Visualization Analysis of Factors effecting Current Agricultural Trends in the State of Telangana:

S.ASHWIN KUMAR,K.ANIRUDH SAI,P.ANKIT, P.AKHIL CHARY
Department of Computer Science And Engineering, Institute of Aeronautical Engineering (IARE), Hyderabad

Introduction:

Agriculture plays a pivotal role in the economy of Telangana and the better performance of this sector is vital for inclusive growth. Agriculture is a way of life, a tradition that has shaped the culture and economic life of the people of Telangana. Therefore, it will continue to be central to all strategies for planned socio-economic development of the State.

The category chosen is Zero Hunger and prompt selected for analysis addresses few of the important elements effecting precision farming. Our analysis mainly focuses on the key factors like overall rainfall recorded with respect to each Mandal, overall seasonal yield in selected years, seasonal yield of major crops like Bengal gram, groundnut and maize, and overall yield in two different agricultural seasons: rabi and kharif.

Prompt which we have chosen under the challenge theme is first prompt which deals with analysis addressing few of the important elements effecting precision farming.
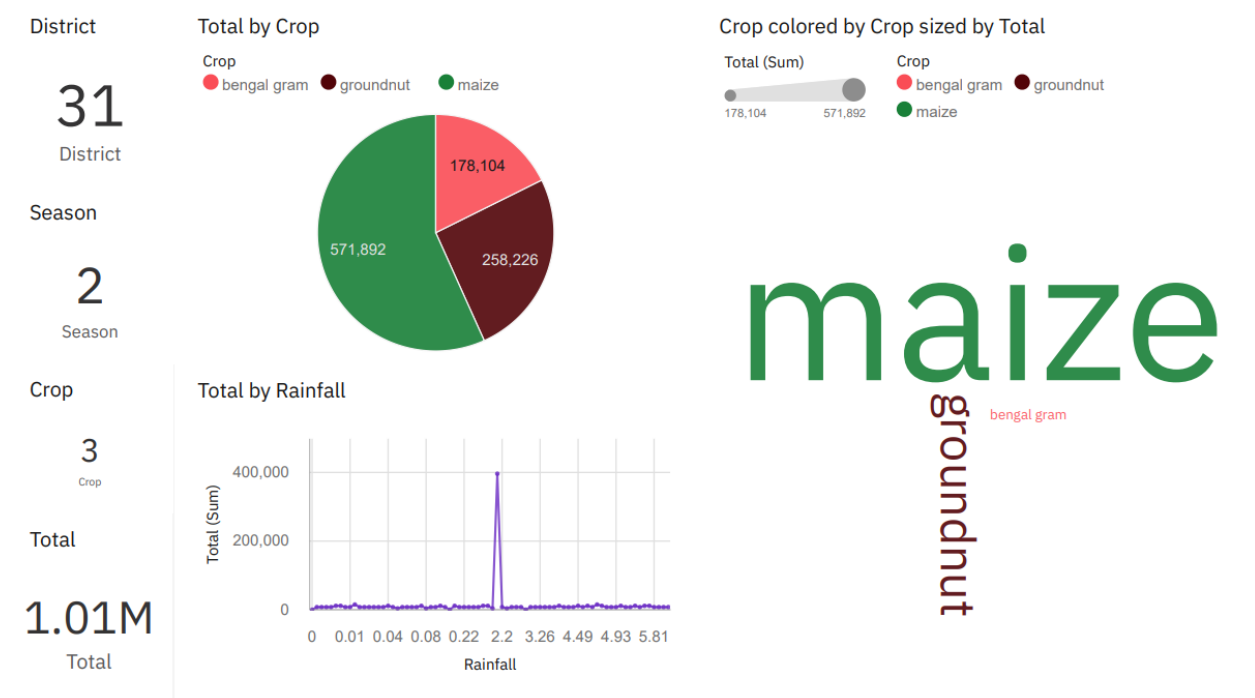
Data Analysis And Visualizations:
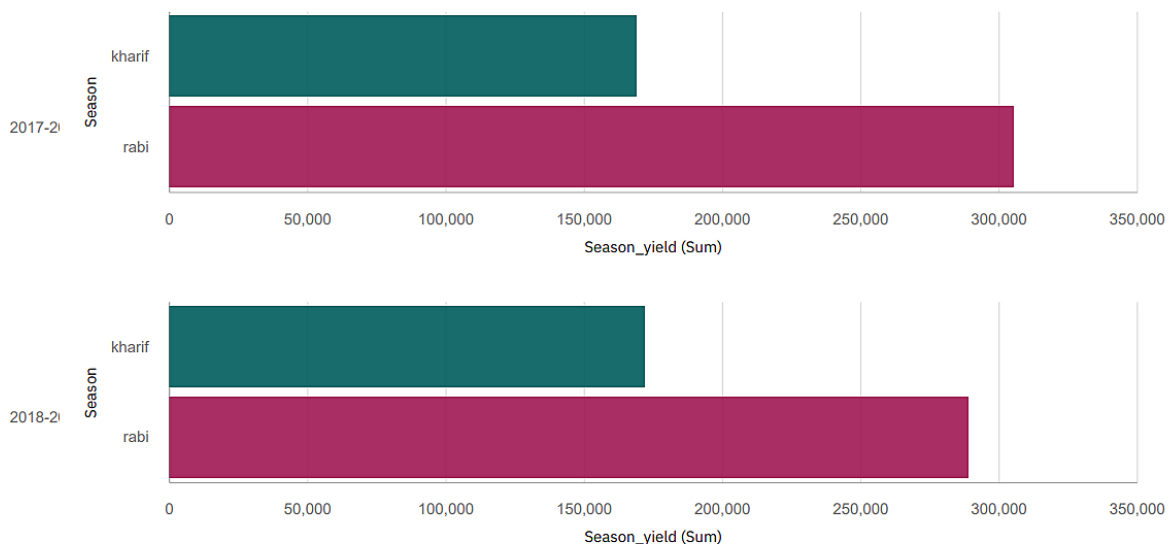
This is graphical representation of comparisons between overall seasonal crop yield in two cropping seasons: rabi and kharif in the particular year (in all years, maximum production was seen rabi season)


Graphical represents the comparisons of seasonal yield with respect to various important crops like Bengal gram, groundnut and maize .(Maximum yield was of the crop Maize and Minimum Yield was of the crop Bengal Gram)

Rainfall by District colored by District
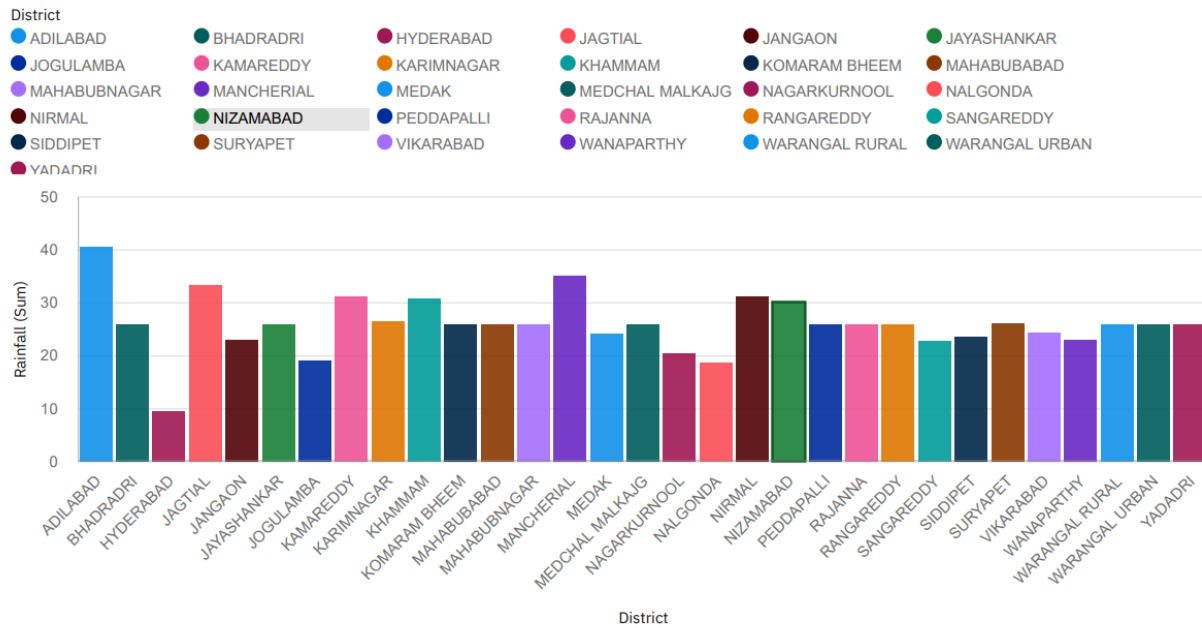
This is a coloured bar graph representation of rainfall (in mm) recorded in each district.
-The height rainfall was recorded in Adilabad District.

District colored by District sized by Season_yield
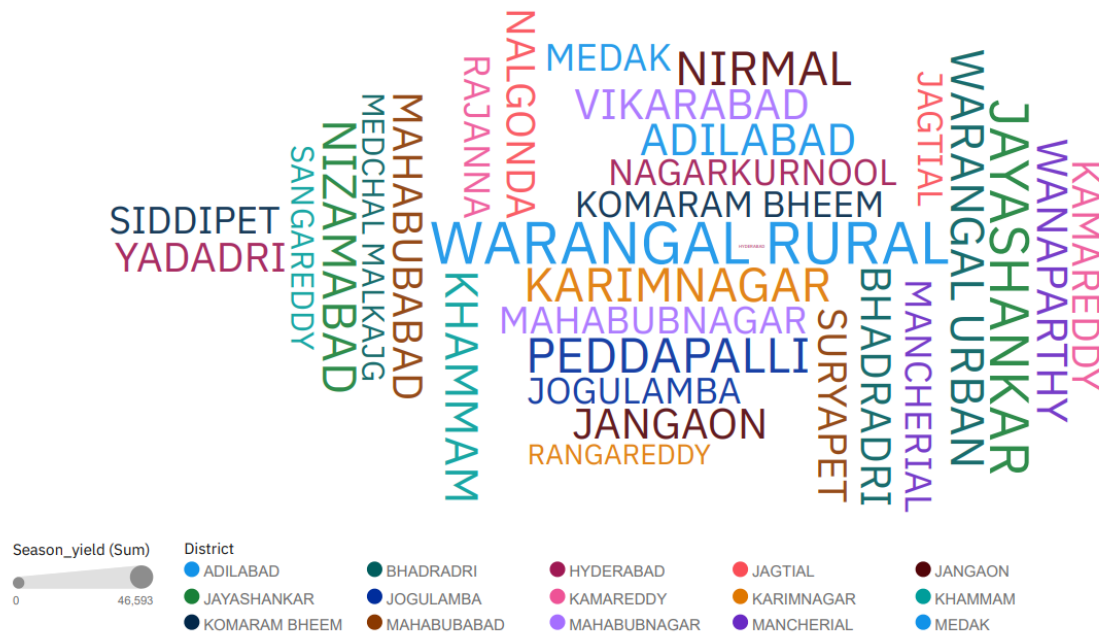
Analysis of data based on the seasonal yields of major districts of Telangana state.
-Maximum production is seen Warangal-Rural District.

Tools used:

Python

IBM cognos

MS excel

Code analysis:

Importing dataset-

1. Importing yield_data and weather_data using pandas

Data cleaning-

1. Detecting and removing the null values from the data sets.

Anomaly detection-

1. Detecting the outliers using box plotting techniques and removing them.

Detecting relationship between datasets-

1. Forming a relationship between "weather_data and yield_data" using "district, year and crop_season" columns.

Dataset merging-

1. Creating 3 sub datasets from weather data grouped by "year" i.e. 2017,2018,2019.

2. Taking average of Rainfall of each District of Telangana for same "crop_season".

3. For every "year,district and crop_season" columns of "yield_data" we assign a rainfall value from the respective sub datasets that are chosen by year and from the chosen dataset "rainfall" data is selected based on "district and crop_season" columns.

4. The new dataset created is then saved and used for further analysis.

Data visualization-

1. The data is visualized using line plots, bar plots, scatter plots to detect the trends in the data and relationships.

Data transformation-

1. Using label encoding we label encode the columns of the dataset that contain string values.

Fitting the data-

1. We use Random forest regressor model based on our findings in the previous sections.

2. The data is split into x and y variables to be given to the model for training.

3. X contains 'Dist_id', 'Season','Crop','Rainfall' values.

4. Y contains 'Season_yield' values.

5. The x,y variables are split into x_train,x_test,y_train,y_test variables using a test_size of 20 percent.

Training and testing-

1. The model fitting is done with the x_train and y_train variables.

2. We now test the model by predicting the data based on x_test data.

3. The predicted data is evaluated with y_test data.

Model evaluation-

1. The model is evaluated using r2_score and other methods such as plotting and classification reports.

2. We get a **r2_score of 0.85** approximately.

The graph shows the line plot of data predicted by model on data that the model has never seen.

Rainfall vs yield
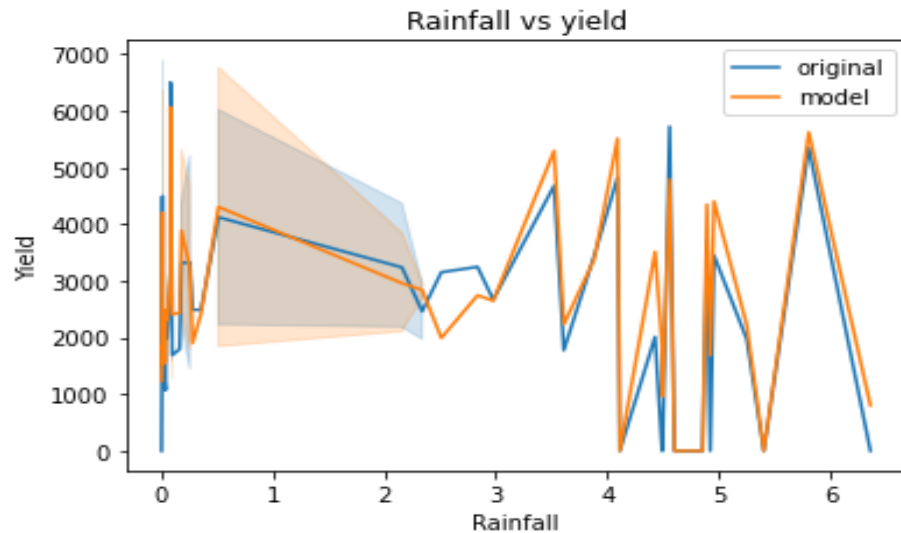
Conclusion:

After the data visualization and analysis, the findings which we have observed are, there was an increase in trend of overall seasonal yield from 2016-17 to 2017-18, but a significant fall was seen in coming years (2018-19). When it comes to the overall production of major crops in two different cropping seasons kharif and rabi, the highest yield was seen of the crops of maize and the least yield was seen for the crop of Bengal gram. The analysis of seasonal yield over selected years proves that maximum seasonal yield can be seen in rabi season. The highest rainfall was observed and recorded in northern regions of the Telangana State, Jainad Mandal in Adilabad district, topping the charts, providing the evidence of higher prospects of greater yield of productions in those nearby regions.

The two policies which we have come up on basis of our data visualization and analysis are:

The agricultural practices of Organic farming indulged within Telangana can act as a catalyst to increase the gross production of crops and their management. Current practices of Organic farming like- Protecting soil quality by using organic materials and encouraging biological activity. Indirect supply of crop nutrients by using soil microorganisms. Determination of nitrogen in the soil using pulses. Some organic methods like crop rotation, natural predators, and organic fertilizers are used for controlling weeds and pests. Step by step farming involves some substantial discourse- The first is crop selection, which means choosing the right crop according to the season. After that, some important points are land preparation; selecting the right seeds

and sowing process, watering, and the addition of natural fertilizers.

 Other policies of Integrated farming must be introduced in a large scale to help with maximization of yield, Rejuvenation/amelioration of systems productivity and achieve agriculture-ecological equilibrium. Control the built-up of insects-pest, diseases and weeds while reducing the use of chemical fertilizer and other harmful agrochemicals and pesticides. Integrated farming techniques are extremely useful in the mitigation of negative impact of agriculture or livestock on environment. Areas need to be emphasized are increasing the focus for small farm economy utilizing market intelligence along with the State Governments involvement in fixing the MSP.

Strengthening National Agricultural Research system by allocating budget at least 3% of GSDP will give an impetus to the holistic crop production in the state with an overall ecosystem including various stakeholders and allied sectors. More emphasis for value addition and value chain management. I-Skill development through capacity building and disaster management as mentioned in NDMA may be further strengthened and real time mechanism to be evolved for relief measures through RS & GIS technologies can developed further