

# Total Yield Analysis for Telangana for years 2016 - 2019

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## INTRODUCTION

Agriculture is a key activity of human being since it provides basic needs such as food, clothing and shelter. It has been demonstrated that every 1% increase in agricultural yield translates into a 0.6–1.2% decrease in the numbers of absolute poor households in the world. There are a variety of factors associated with crop yield and the risks involved with farming. The four most important factors that influence crop yield are soil fertility, availability of water, climate, and diseases or pests. Out of all these factors, availability of water has the most direct impact on the crop yield. Too little precipitation can cause crops to wither and die, whereas excessive rainfall (especially when it follows irrigation) will also have adverse effects on crop growth. Other than this, one of the most overlooked and yet an important factor is the climate of the area where the crop is being grown. Climatic conditions extend beyond just “wet” and “dry”. While annual precipitation is an important aspect of climate, there are other aspects to consider as well, such as minimum and maximum temperature of the district, windspeed and weather patterns. Planting crops outside the specific climate that they require can negatively impact the crop yield.

## METHODOLOGY

STEP - 1

- Collect Data from various sources based on our problem statement.

STEP - 2

- Combine and clean the datasets.

STEP - 3

- Explore the dataset using visualizations tools such as Excel, Tableau and Power BI.

STEP - 4

- Perform Principal Component Analysis (PCA) to identify the factor that has most impact on the yield.

STEP - 5

- Perform Linear Regression on the dataset to predict total yield using Python.

STEP - 6

- Optimize the model using XGBoost and Cross Validation to get better predictions.

## RESULT

41.43

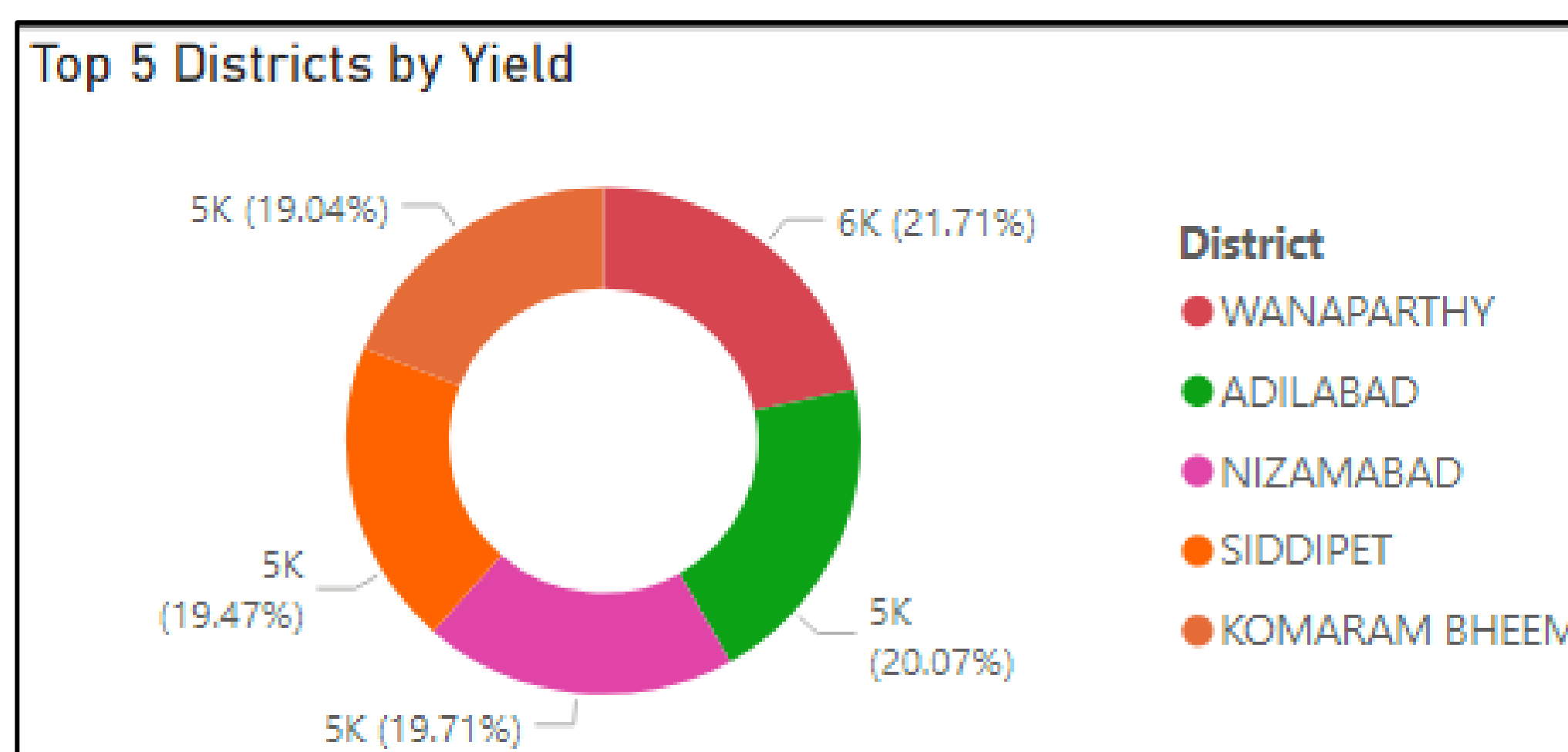
Max. Temp

14.84

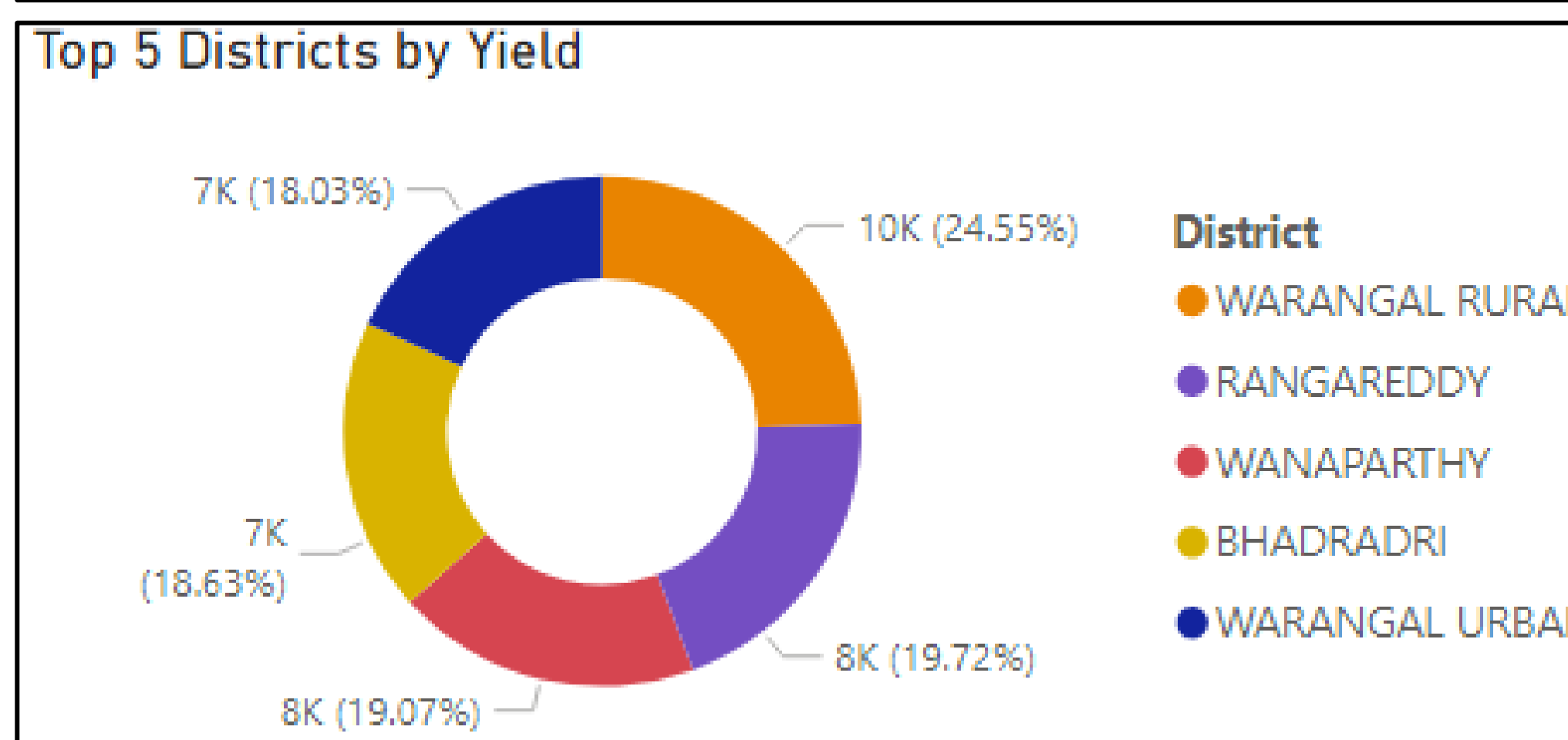
Min Temp

Figure 1 : Average Maximum and Minimum Temperature for Telangana over the 3 years

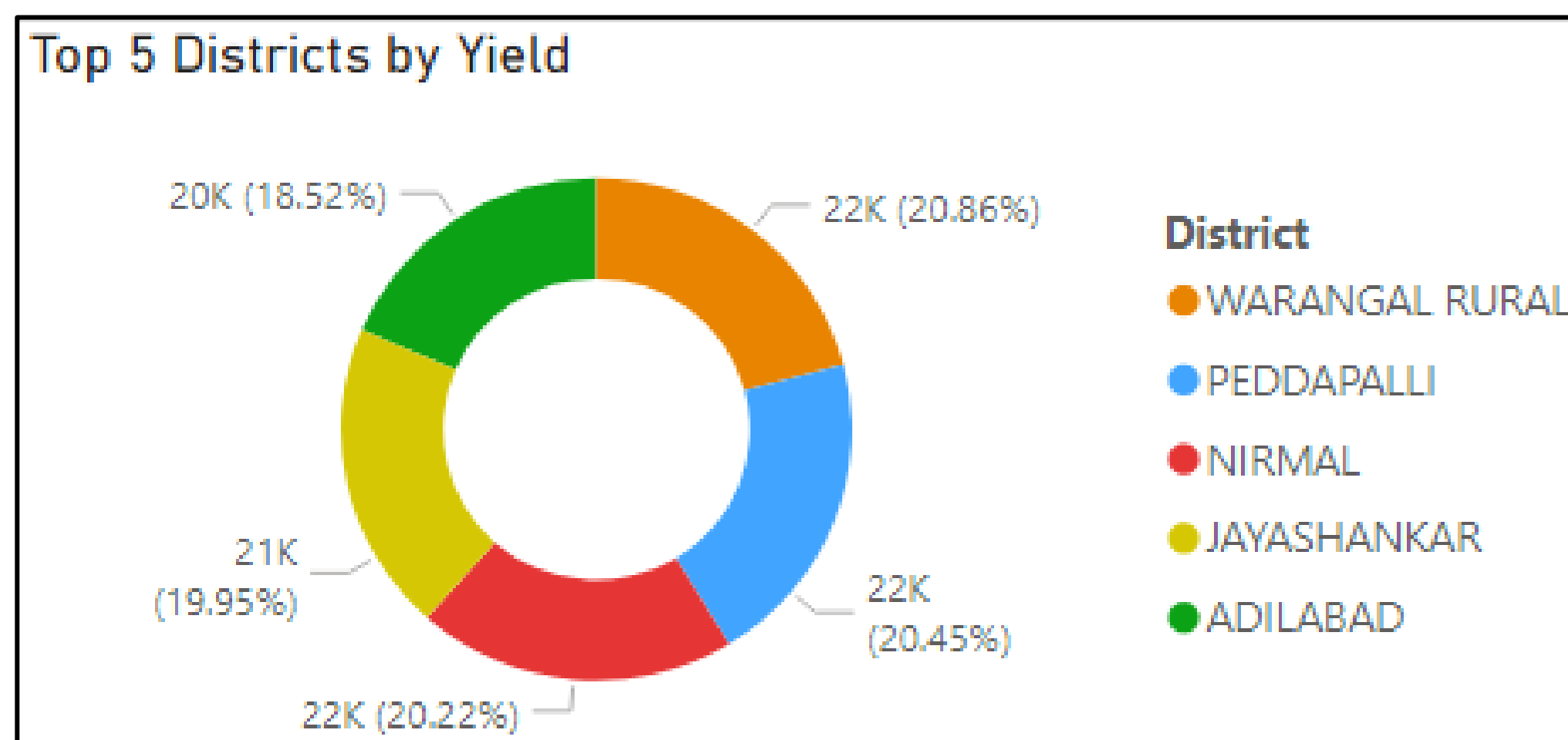
Graph 1



Graph 2



Graph 3

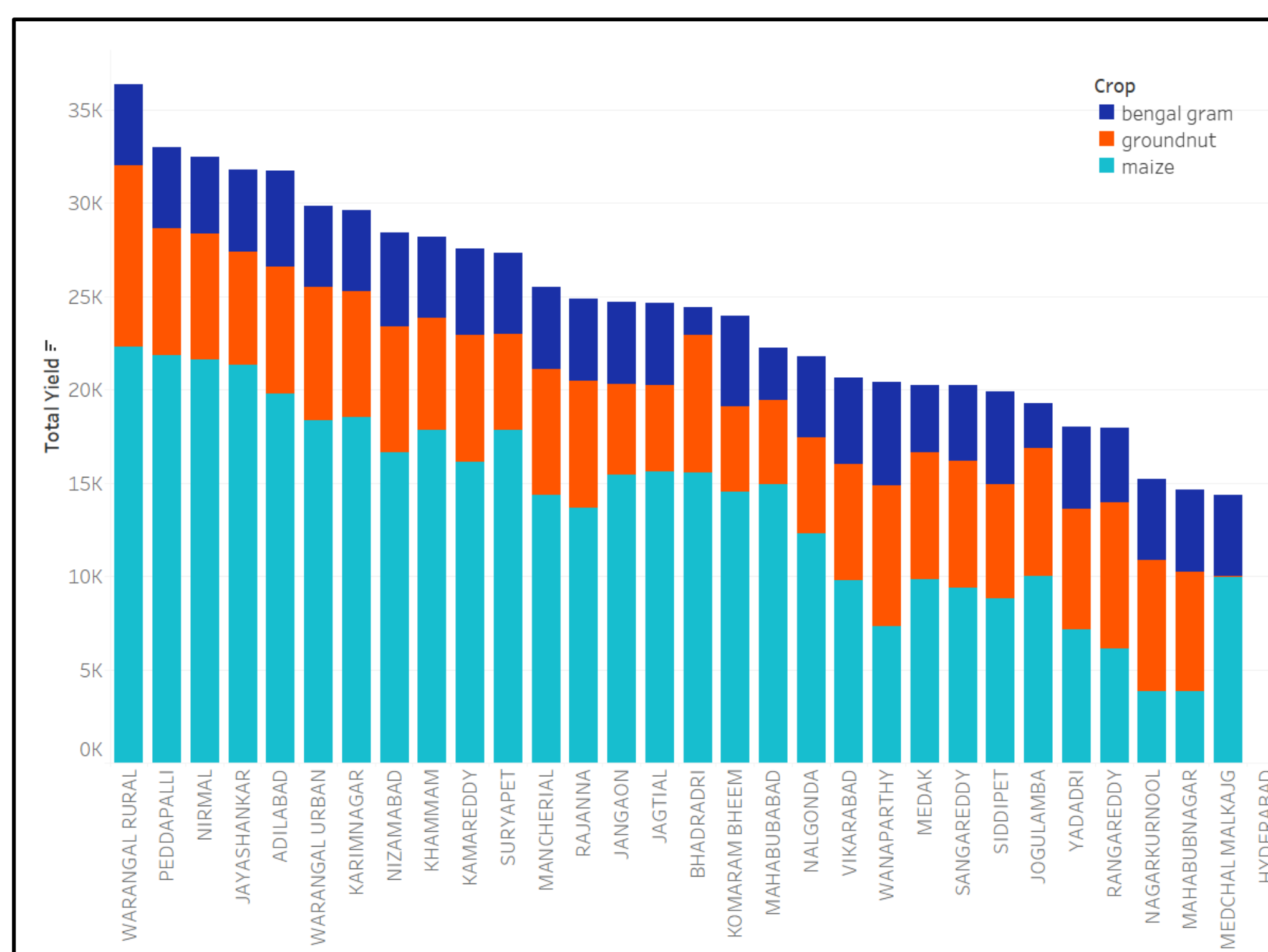


Graph 1: Top 5 Districts with highest yield for Bengal Gram

Graph 2: Top 5 Districts with highest yield for Groundnut

Graph 3: Top 5 Districts with highest yield for Maize

Graph 4



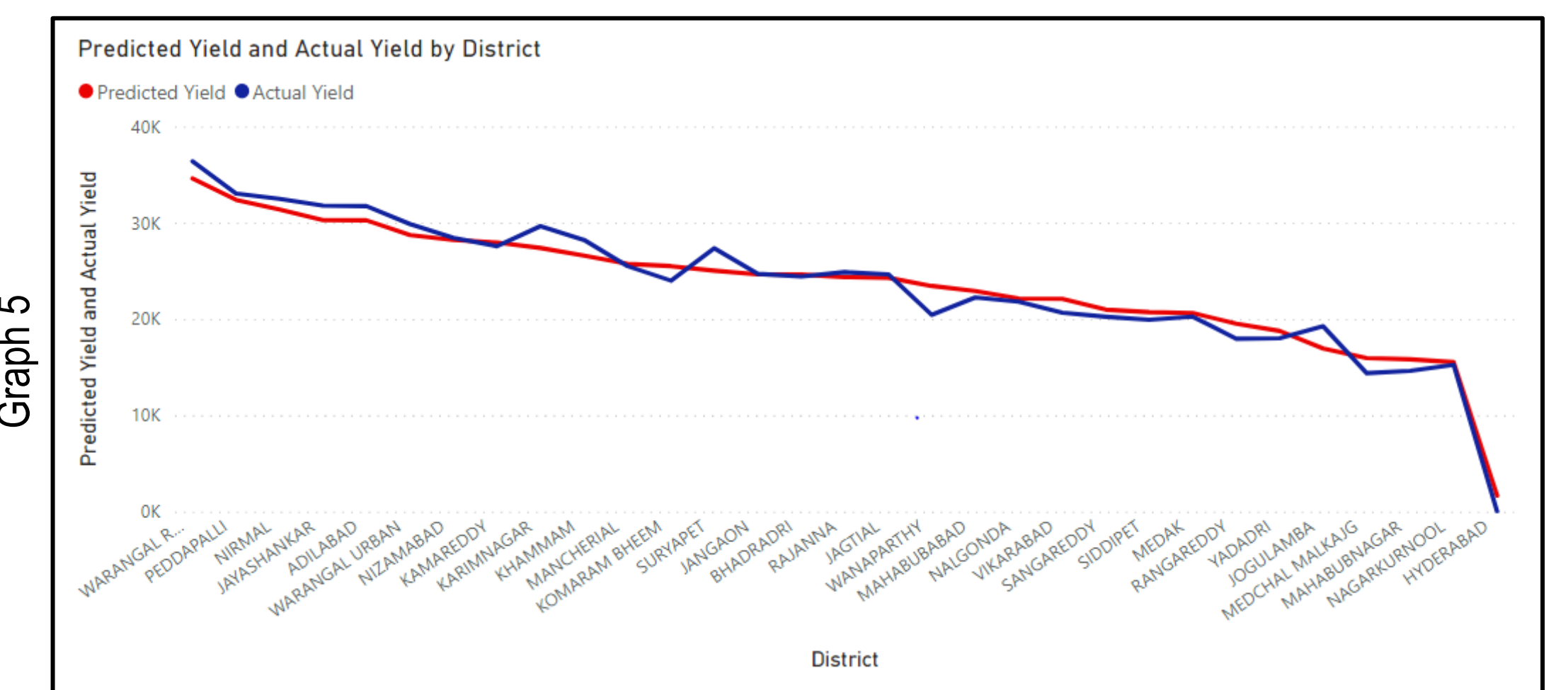
Graph 4 : Total yield for each crop in all of the 31 districts of Telangana

## CONCLUSION

	0	1	2	3	Variability (%)	Cummulative Variability (%)
PC1	Total Rainfall	Max. Temp	Min Temp	Crop	0.468911	0.468911
PC2	Min Temp	Max. Temp	Total Rainfall	Crop	0.250953	0.719863
PC3	Crop	Total Rainfall	Max. Temp	Min Temp	0.181818	0.901682

Figure 2 : Dimensionality Reduction using PCA to capture 85% or more variability

Graph 5



Graph 5 : Comparison of the Actual Yield and Predicted Yield using the model

## POLICY RECOMMENDATION

Since, Telangana is not surrounded by any of the major water bodies, the major sources of water is the rainfall and the rivers flowing through the state. The first strategy and the actions relate to 'Rain Water Harvesting and Ground-water Conservation/Recharge'.

### URBAN AREAS:

The ground water conservation in urban areas emphasizes on roof-top rainwater harvesting systems on buildings along with combined recharge systems to be implemented.

### RURAL AREAS:

In respect of ground-water conservation in rural areas, the emphasis is more on rehabilitation of village ponds and reservoirs for water storage and conservation.

### INDUSTRIAL AREAS:

In industrial areas, we should ensure careful implementation of the rain water harvesting and promote use of the ground water recharge techniques. The polluted effluent of industries be treated for its maximum reuse and recycle. Due to risk of ground-water pollution, 'recharge well method' should not be encouraged.

## REFERENCES

- <https://data.telangana.gov.in/search/type/dataset>
- [https://scikit-learn.org/stable/modules/model\\_evaluation.html#scoring-parameter](https://scikit-learn.org/stable/modules/model_evaluation.html#scoring-parameter)
- <https://www.kaggle.com/alexisbcook/xgboost>
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