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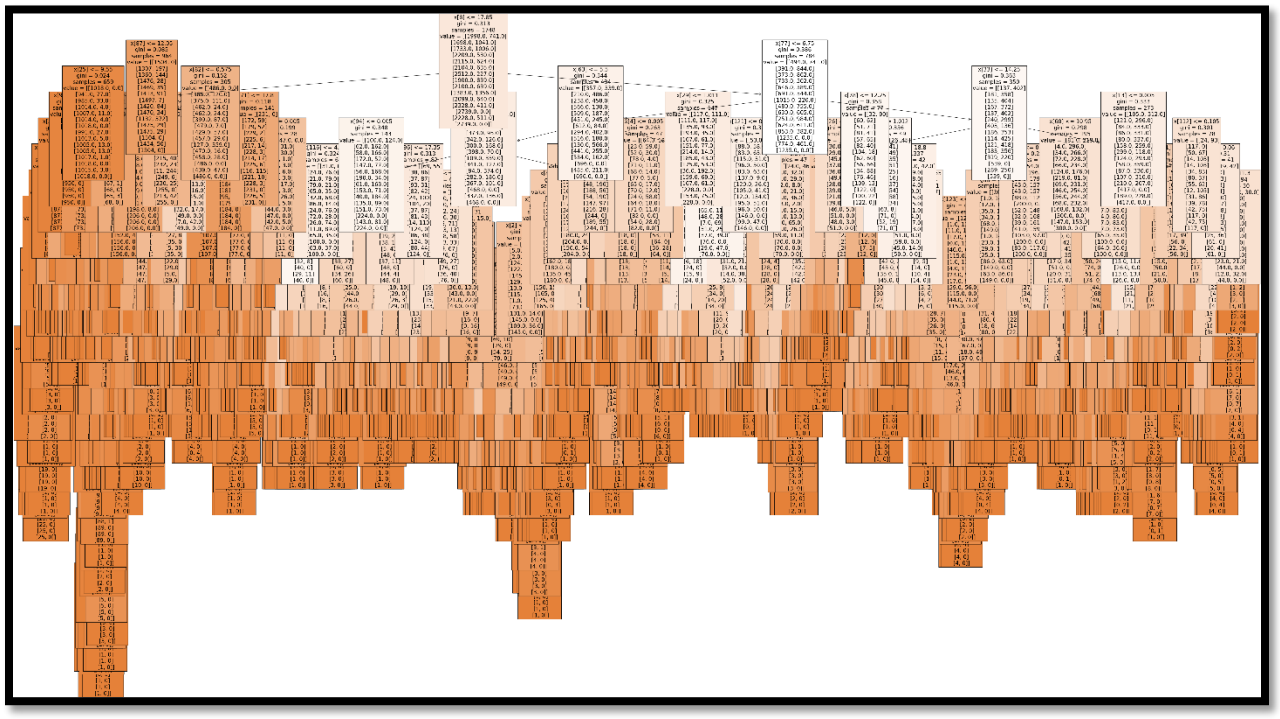
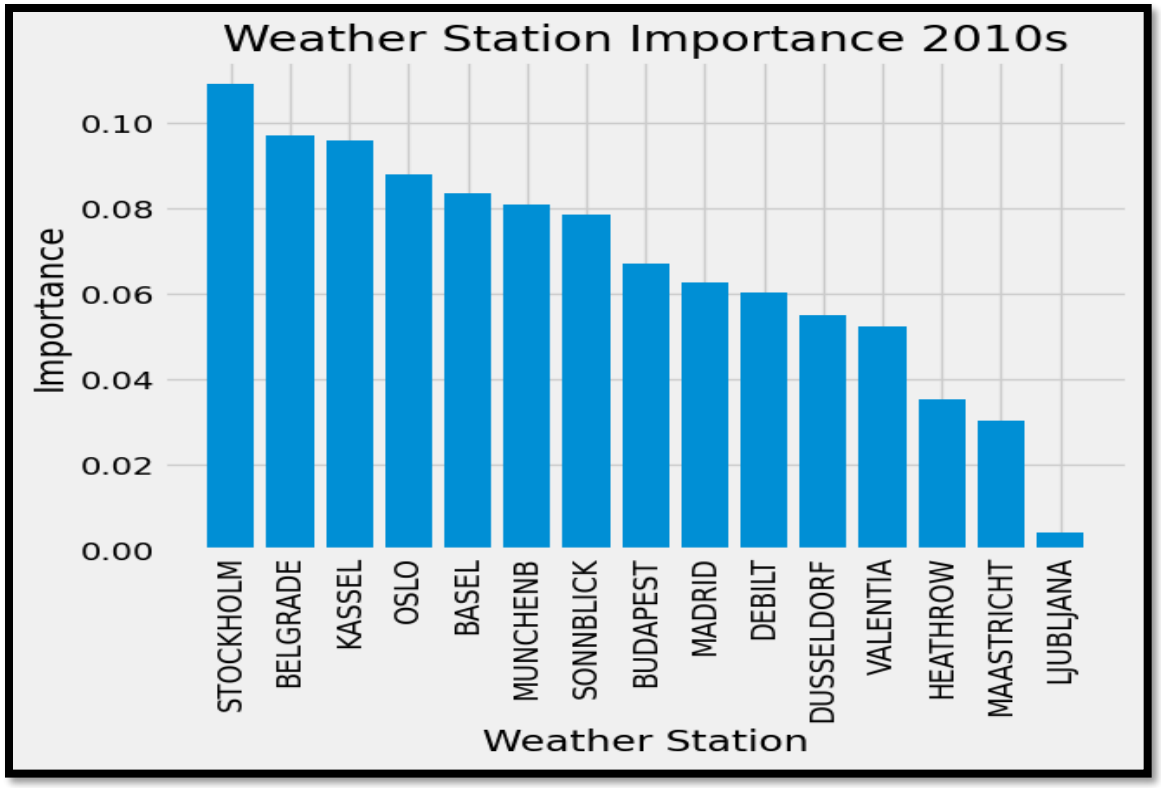
2.3: Complex Machine Learning Models and Keras Part 2

Random Forest Model: Climatewins – 2010-2019 (full sample)

The model was based on data from 2010-2019, hereby named 2010s and assumed all the weather stations in the ClimateWins dataset. The model observes n_estimators = 100 and automatic max_depth, the accuracy comes out at 60,13%. All the 15 15 columns in the y array were retained. The complex decision tree output is hereunder.

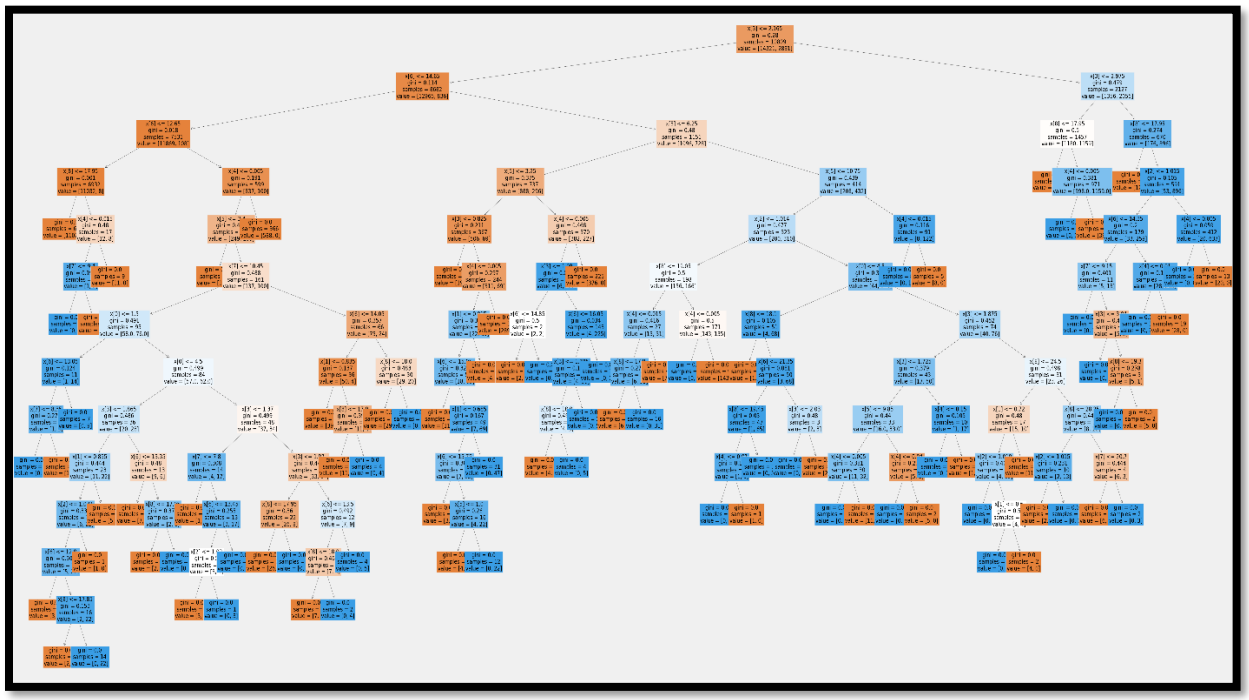


The correspondent bar graph showing the most important stations is presented hereunder. In their order, the stations ordered from the most important to the least important are as follows: Stockholm, Belgrade, Kassel, Oslo, Basel, MunchenB, Sonnblick, Budapest, Madrid, Debilt, Dusseldorf, Valentina, Heathrow, Maastricht, and Lubljana.

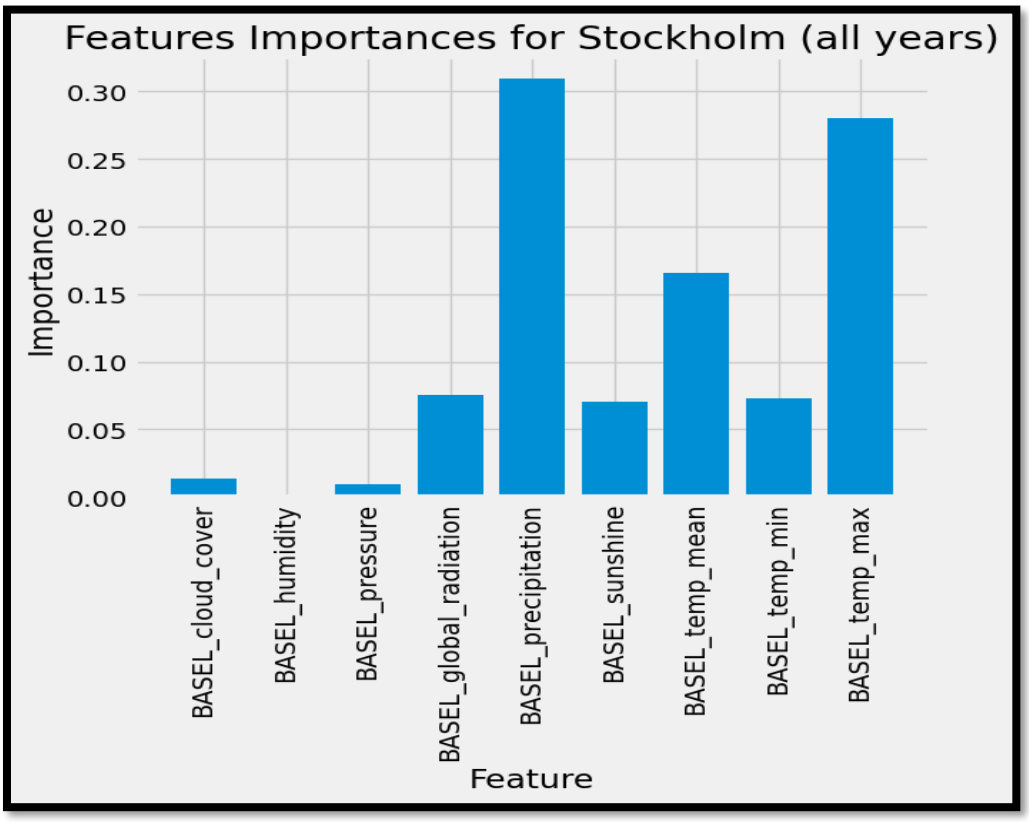


Based on this bar graph, 3 other RFMs are done for Stockholm, Belgrade and Kassel.

1. **Stockholm RFM results**



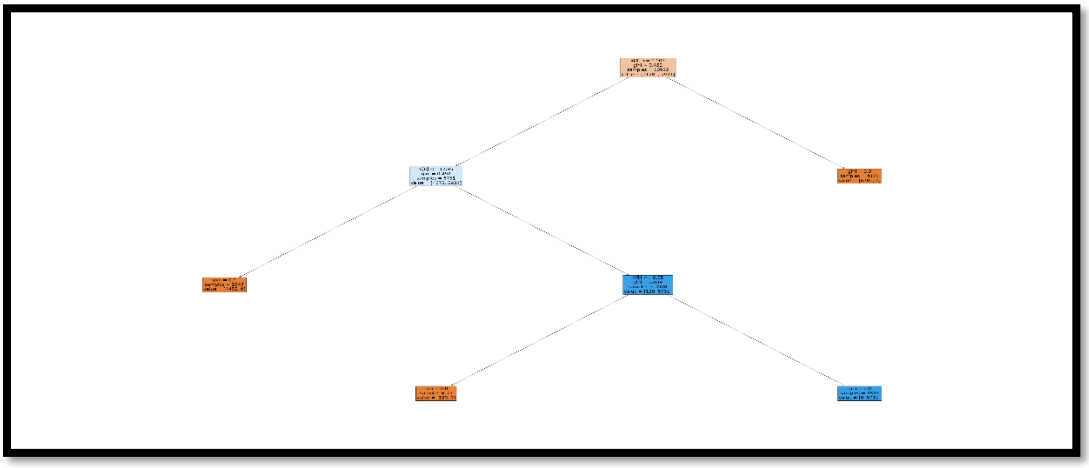
Results for the most important features for Stockholm



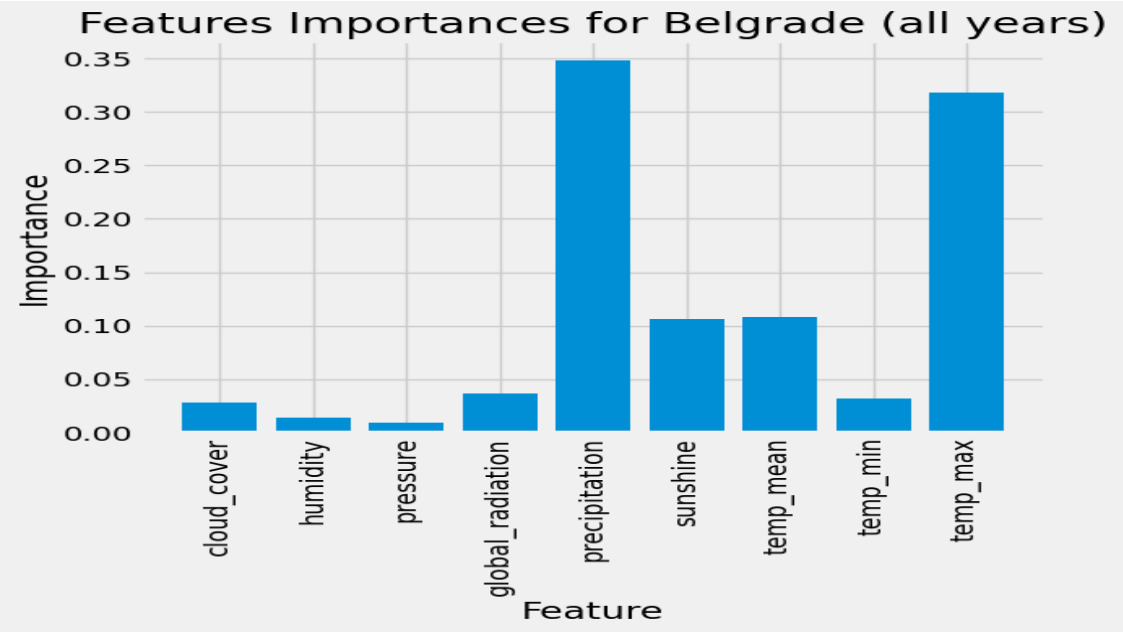
Comment:

Based on n_estimators = 100, automatic max_depth, the accuracy is at 100%. The 3 most important features for Stockhol (in descending order) are temp_max, precipitation, and temp_mean.

2. **Belgrade RFM Results**

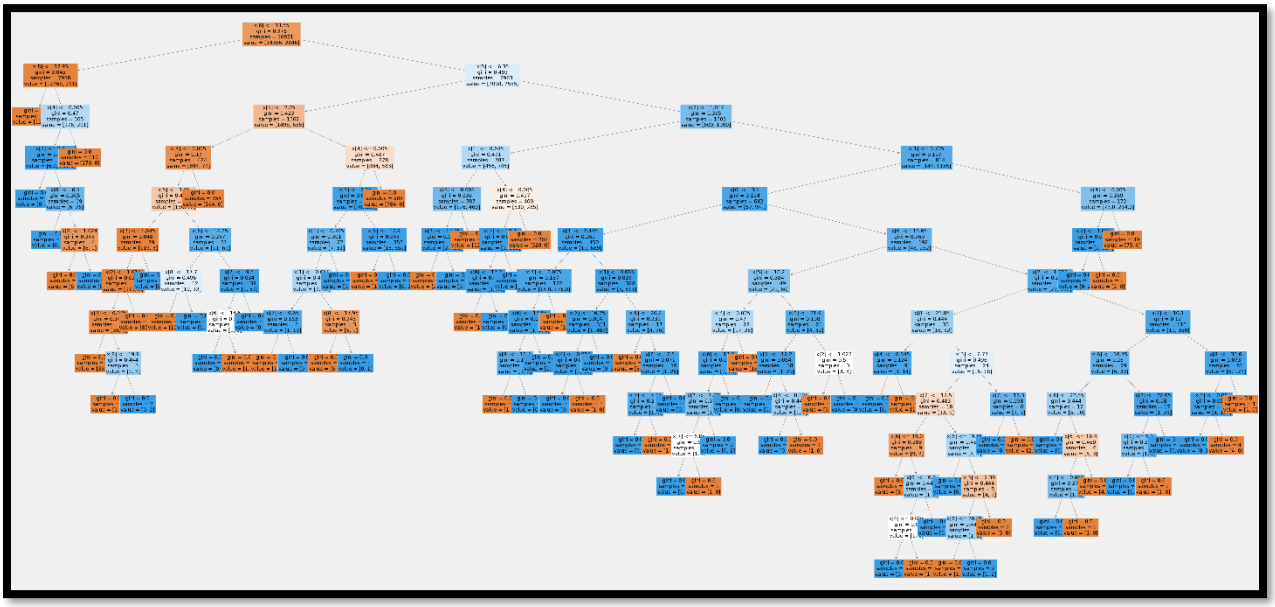


The most important features for Belgrade are shown in the bar graph hereunder:

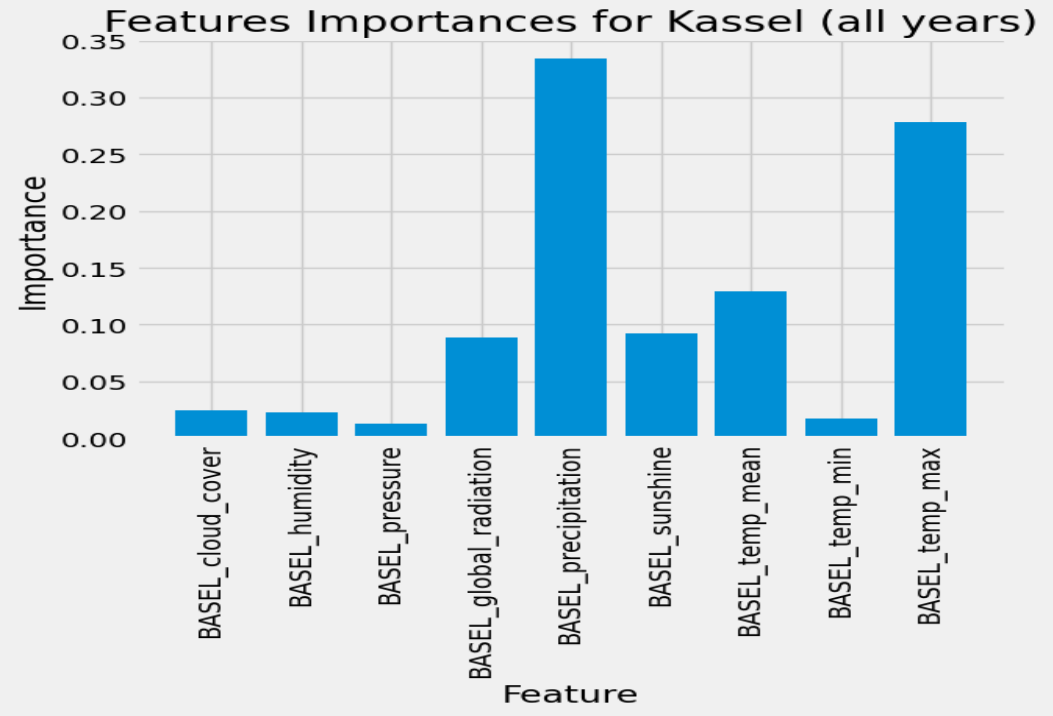


Based on n_estimators = 100, automatic max_depth, the accuracy is at 100%. The 3 most important features for Begrade in descending order are precipitation, temp_max, and temp_mean/sunshine.

3. Kassel RFM results



The most important features for Kassel are shown hereunder.



Based on n_estimators = 100, automatic max_depth, the accuracy is at 100%. The 3 most important features for Kassel in descending order are precipitation, temp_max, and temp_mean.

Conclusions

Based on the RFMs for the 3 most important stations (Stockholm, Belgrade, and Kassel), the most important features are precipitation, temp_max, and temp_mean.

Ideally, in projecting future weather conditions, precipitation shall be affected by climate change, and it plays a major role defining the weather outcomes for the stations studied. With climate change worsening, other places are likely going to receive either more than normal rains (with the possibility of causing cyclones and floods) or less rains and cause droughts and affect food security I different areas. At the same time, temperatures (max_temp and temp_min) are also important in forecasting future weather conditions given the notable global warming. This might imply that temperatures might become extreme, especially getting hotter, causing heat waves and changes in precipitation across the different stations.