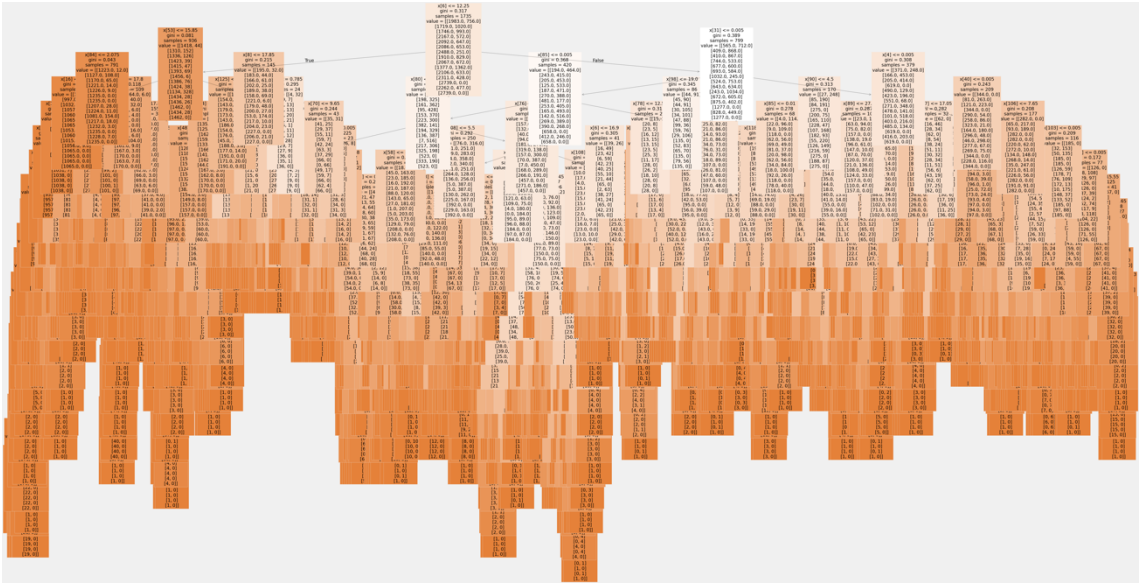
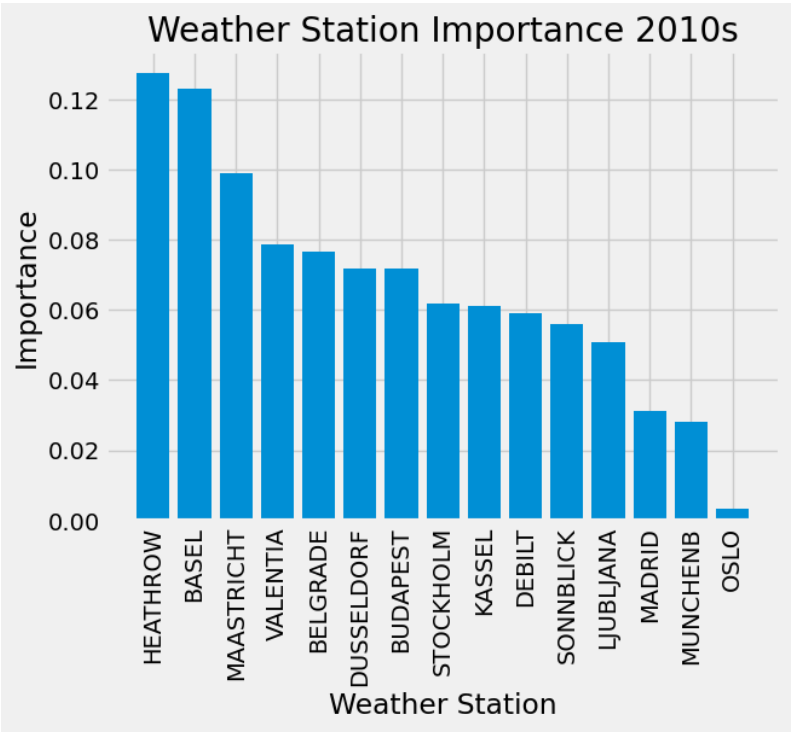
Giada Griso
September 6, 2024
Machine Learning Course
Exercise 2.3

Complex Machine Learning Models and Keras – Part 2

Random Forest Model

The data was reduced to a single decade: the 2010s. With n_estimators = 100 and automatic max_depth, the accuracy comes out at 58,7%. Please note that we didn't apply the np.argmax() method but kept all 15 columns in the y array instead. This resulted in a more complex decision tree.

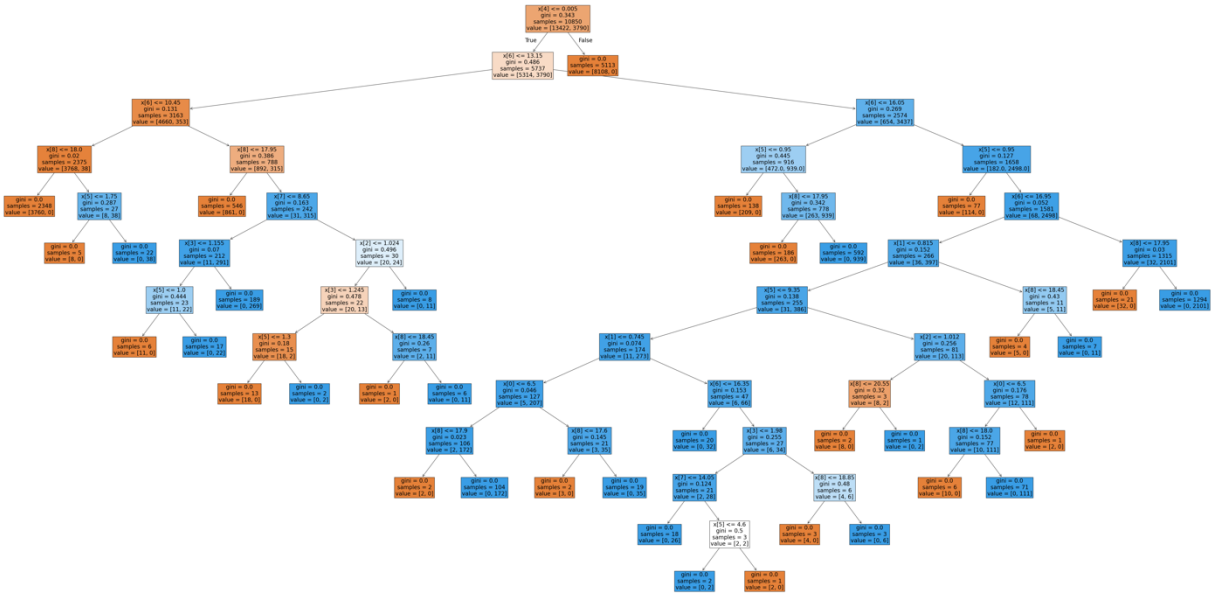


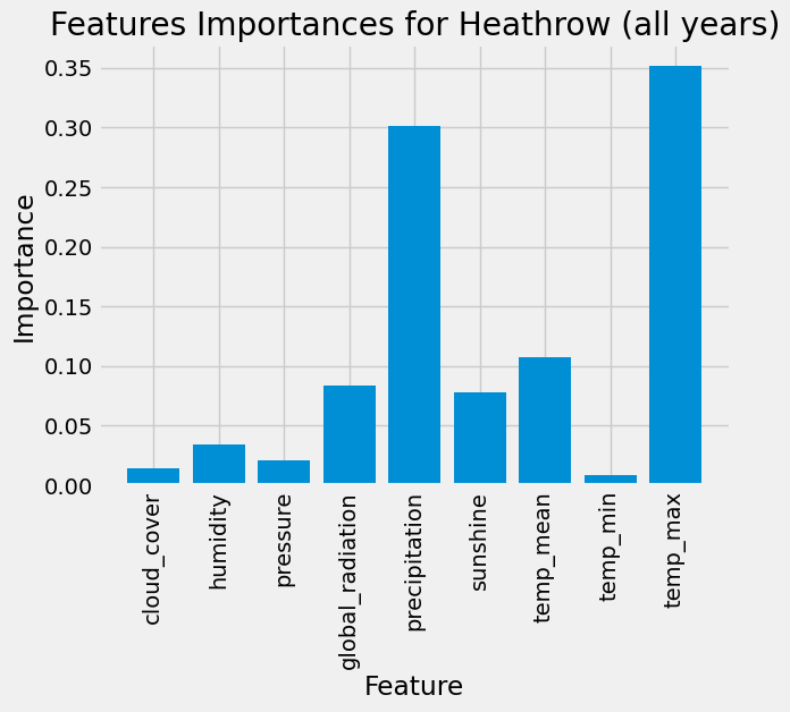


The 3 most important features resulted in: Heathrow, Basel and Maastricht.

For each of these 3 stations, another random forest model was created, this time using data from every year in the observations set.

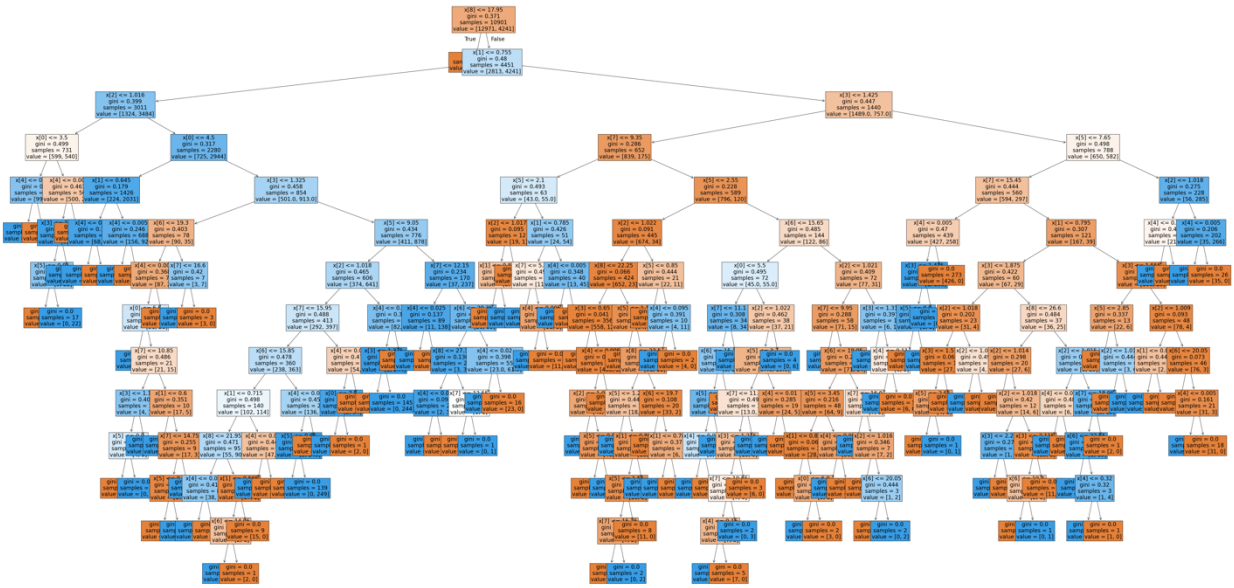
1. Heathrow Results

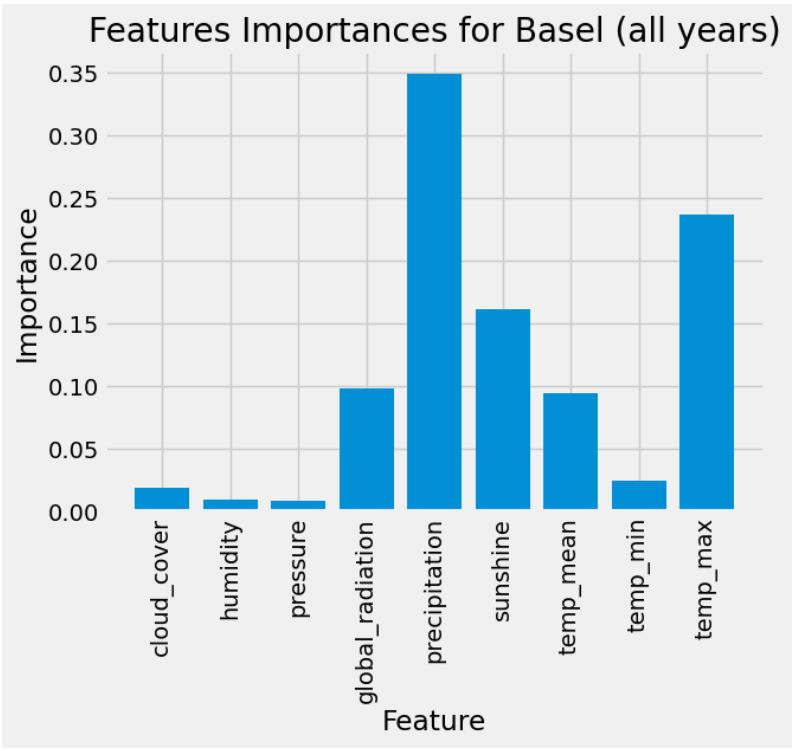




With n_estimators = 100 and automatic max_depth, the accuracy comes out at 100%. The 3 most important indicators are (in descending order): temp_max, precipitation, and temp_mean.

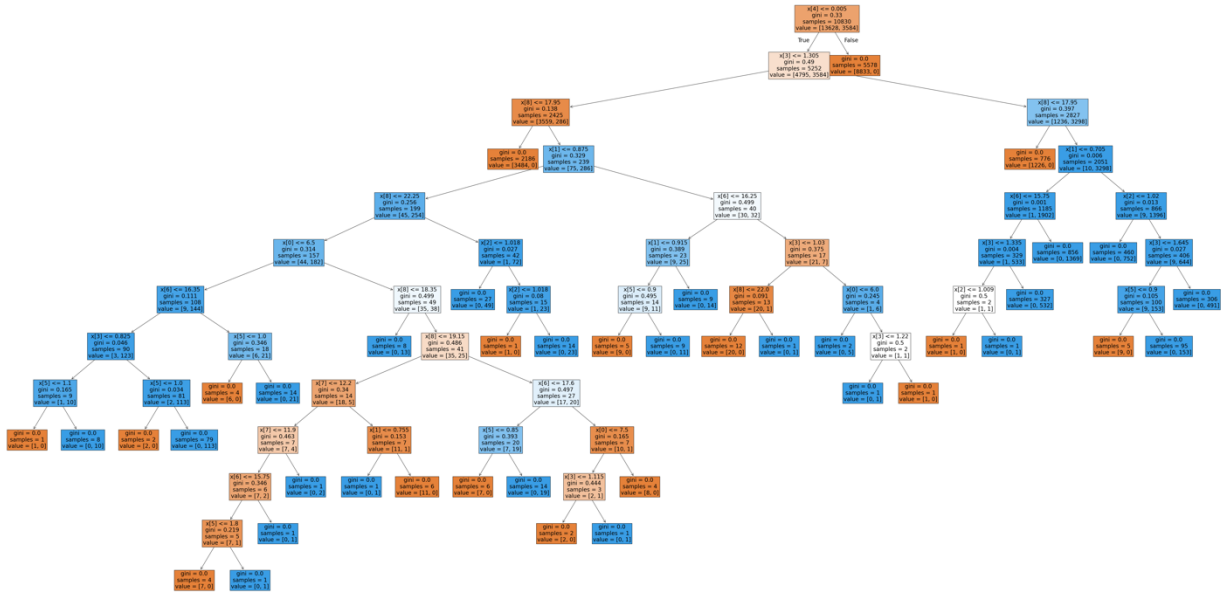
2. Basel Results

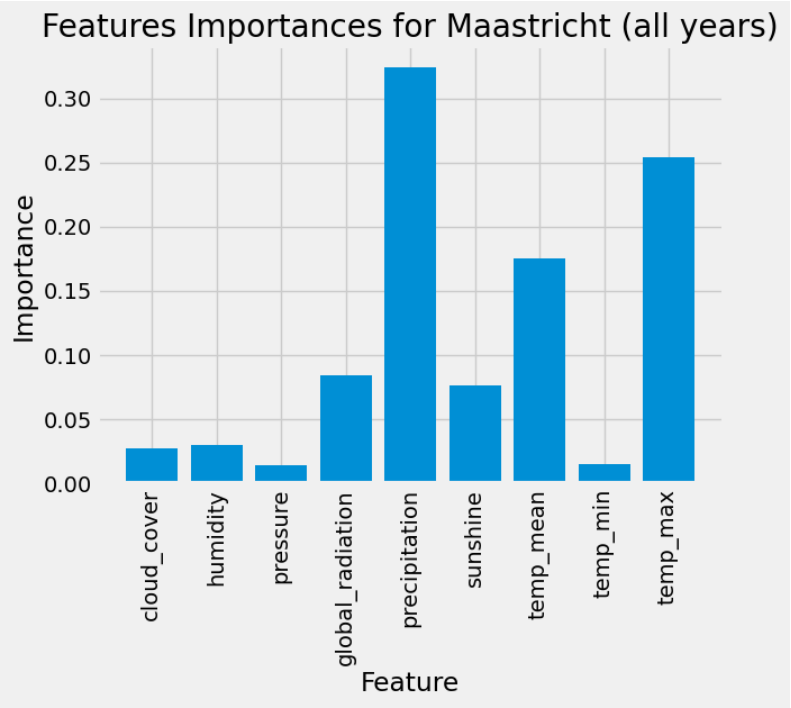




With n_estimators = 100 and automatic max_depth, the accuracy comes out at 100%. The 3 most important indicators are (in descending order): precipitation, temp_max, and sunshine.

3. Maastricht





With n_estimators = 100 and automatic max_depth, the accuracy comes out at 100%. The 3 most important indicators are (in descending order): precipitation, temp_max, and temp_mean.

Conclusions

The consistent importance of **precipitation** and **temp_max** across all examined weather stations suggests that these indicators will play a key role in predicting and adapting to future climate variability. In addition, considering the rising trend in mean temperatures over time – which aligns with global climate change –, it becomes even more critical to focus on temperature-related indicators such as temp_max and **temp_mean** alongside precipitation.

As the global climate gets warmer, higher maximum and mean temperatures are likely to become more frequent and extreme, influencing not only heat waves but also other weather phenomena like droughts, storms, and even shifts in precipitation patterns. In fact, the rising temperatures could intensify

precipitation events in some regions while reducing rainfall in others, making precipitation tracking essential for understanding local impacts. Thus, investing in climate-tracking equipment for **temperature and precipitation monitoring** becomes paramount to ensuring preparedness for the evolving nature of weather patterns.