Distributional Modelling in R

08 - Quantile Regression - Exercises

In this example we analyze weather data obtained from German meteorological stations, provided by the Deutscher Wetterdienst (DWD, https://www.dwd.de/). A precompiled R data frame can be download with the following R code

```
R> download_data <- function(data = "WeatherGermany10.rds.rds") {
+     file <- paste0("https://nikum.org/dmr/Data/", data)
+     tdir <- tempfile()
+     dir.create(tdir)
+     download.file(file, file.path(tdir, data))
+     return(readRDS(file.path(tdir, data)))
+ }
R> WeatherGermany10 <- download_data("WeatherGermany10.rds")
```

1. First, determine the weather station with the highest average maximum temperature. Then, subset the data specifically for this location.

2. Repeat the process for the station with the lowest minimum temperature, creating another subset for this station.

3. For both stations, estimate quantile regression models, using the **qgam** package, that decompose the time trend into yearly and seasonal components. Visualize the 5% and 95% quantiles for the yearly and seasonal trends of both stations in a single plot, and provide interpretation.

4. In the subsequent step, re-estimate the models using a GAMLSS with a normal distribution, utilizing the **gamlss2** package. Apply the same formula for both parameters. Subsequently, compute the quantiles using the estimated GAMLSS models and compare them to the quantiles obtained from the quantile regression models.