LOWESS filter: LOWESS (LOESS) performs locally weighted polynomial regression around each target point, down‑weighting distant observations with a kernel and iteratively reducing the effect of outliers with robust weights. The span controls the degree of smoothing.

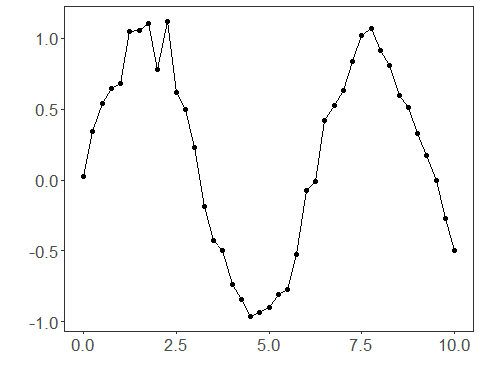
Objective: Apply the LOWESS filter (local smoothing) to reduce noise and spikes while preserving the series trend.

# Filter - LOWESS  
  
# Installing the package (if needed)  
#install.packages("tspredit")

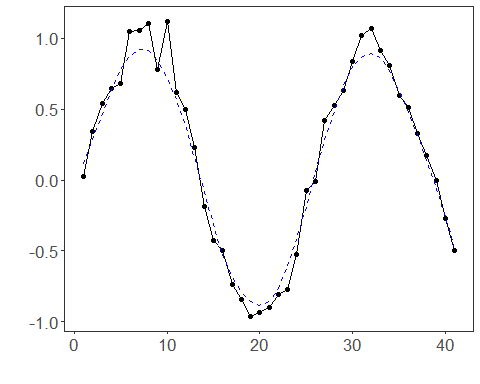
# Loading the packages  
library(daltoolbox)  
library(tspredit)

# Series for study with artificial noise and spikes  
  
data(tsd)  
y <- tsd$y  
noise <- rnorm(length(y), 0, sd(y)/10)  
spike <- rnorm(1, 0, sd(y))  
tsd$y <- tsd$y + noise  
tsd$y[10] <- tsd$y[10] + spike  
tsd$y[20] <- tsd$y[20] + spike  
tsd$y[30] <- tsd$y[30] + spike

# Noisy series visualization  
library(ggplot2)  
plot\_ts(x=tsd$x, y=tsd$y) + theme(text = element\_text(size=16))



# Applying the LOWESS filter  
  
filter <- ts\_fil\_lowess(f = 0.2)  
filter <- fit(filter, tsd$y)  
y <- transform(filter, tsd$y)  
plot\_ts\_pred(y=tsd$y, yadj=y) + theme(text = element\_text(size=16))



References - W. S. Cleveland (1979). Robust locally weighted regression and smoothing scatterplots. Journal of the American Statistical Association, 74(368), 829–836.