Overview

The Hodrick–Prescott (HP) filter decomposes a series into trend and cyclical components by penalizing changes in the trend’s second derivative. It is widely used in economics to obtain a smooth long-run trend.

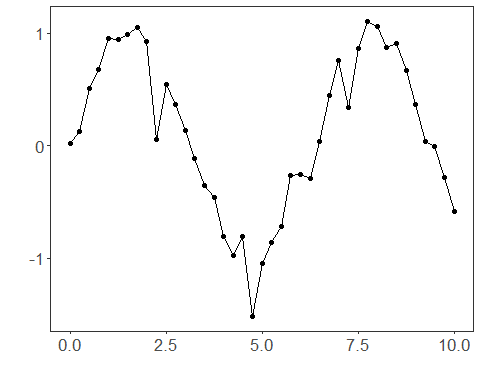
Notes - The smoothing strength is governed by a lambda parameter internally; higher lambda produces a smoother trend and stronger cycle removal. - HP can introduce endpoint bias; be cautious interpreting the last observations.

# Filter - Hodrick-Prescott  
  
# Install tspredit if needed  
#install.packages("tspredit")

# Load packages  
library(daltoolbox)  
library(tspredit)

# Prepare a noisy series example with 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

library(ggplot2)  
# Visualize noisy input  
plot\_ts(x=tsd$x, y=tsd$y) + theme(text = element\_text(size=16))



# Apply the HP filter (trend extraction)  
  
filter <- ts\_fil\_hp() # uses default lambda internally  
filter <- fit(filter, tsd$y)  
y <- transform(filter, tsd$y) # returns trend-adjusted output  
  
# Compare original vs trend component (or adjusted)  
plot\_ts\_pred(y=tsd$y, yadj=y) + theme(text = element\_text(size=16))

