FFT regression anomaly detector: This detector applies high-pass filtering via the discrete Fourier transform. The spectrum is computed with the FFT, a cutoff is selected from the power spectrum to suppress low-frequency components, and the inverse FFT reconstructs a high-pass signal. Residual magnitudes are then summarized and thresholded using harutils().

The FFT-based detector applies a high-pass filter in the frequency domain and flags large deviations between the original and filtered signal.

Steps: - Load and visualize a sample anomaly dataset - Configure and run the FFT detector (hanr\_fft) - Inspect detections, evaluate, and plot residuals with thresholds

# Install Harbinger (if needed)  
#install.packages("harbinger")

# Load required packages  
library(daltoolbox)  
library(harbinger)

# Load example anomaly datasets  
data(examples\_anomalies)

# Select a simple anomaly dataset  
dataset <- examples\_anomalies$simple  
head(dataset)

## serie event  
## 1 1.0000000 FALSE  
## 2 0.9689124 FALSE  
## 3 0.8775826 FALSE  
## 4 0.7316889 FALSE  
## 5 0.5403023 FALSE  
## 6 0.3153224 FALSE

# Plot the raw time series  
har\_plot(harbinger(), dataset$serie)



# Configure the FFT-based detector  
model <- hanr\_fft()

# Fit the detector (no training required, tracks parameters)  
model <- fit(model, dataset$serie)

# Run detection to compute residual magnitudes and flags  
detection <- detect(model, dataset$serie)

# Show detected anomaly indices  
print(detection |> dplyr::filter(event == TRUE))

## idx event type  
## 1 50 TRUE anomaly

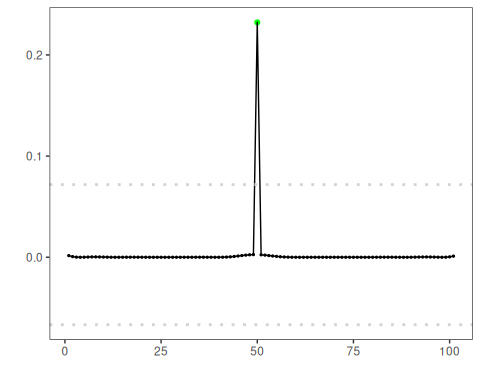
# Evaluate detections against labeled events  
evaluation <- evaluate(model, detection$event, dataset$event)  
print(evaluation$confMatrix)

## event   
## detection TRUE FALSE  
## TRUE 1 0   
## FALSE 0 100

# Plot detections vs. ground truth  
har\_plot(model, dataset$serie, detection, dataset$event)



# Plot residual magnitude and decision thresholds  
har\_plot(model, attr(detection, "res"), detection, dataset$event, yline = attr(detection, "threshold"))



References - Sobrinho, E. P., Souza, J., Lima, J., Giusti, L., Bezerra, E., Coutinho, R., Baroni, L., Pacitti, E., Porto, F., Belloze, K., Ogasawara, E. Fine-Tuning Detection Criteria for Enhancing Anomaly Detection in Time Series. In: Simpósio Brasileiro de Banco de Dados (SBBD). SBC, 29 Sep. 2025. <doi:10.5753/sbbd.2025.247063>