Overview and objectives: This notebook demonstrates hard evaluation of event detection results using confusion matrix–based metrics (accuracy, precision, recall, F1). It shows how to compute metrics with har\_eval() from detections and ground truth, and how to visualize results alongside the series.

# 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 a simple MLP regressor-based anomaly detector  
model <- hanr\_ml(ts\_mlp(ts\_norm\_gminmax(), input\_size = 5, size = 3, decay = 0))

# Fit the detector  
model <- fit(model, dataset$serie)

# Run detection  
detection <- detect(model, dataset$serie)

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

## idx event type  
## 1 50 TRUE anomaly

# Evaluate using hard metrics  
evaluation <- evaluate(har\_eval(), detection$event, dataset$event)  
print(evaluation$confMatrix)

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

References

* Salles, R., Lima, J., Reis, M., Coutinho, R., Pacitti, E., Masseglia, F., Akbarinia, R., Chen, C., Garibaldi, J., Porto, F., Ogasawara, E. (2024). SoftED: Metrics for soft evaluation of time series event detection. Computers and Industrial Engineering. <doi:10.1016/j.cie.2024.110728>