



# Local Evaluation of Time Series Anomaly Detection Algorithms

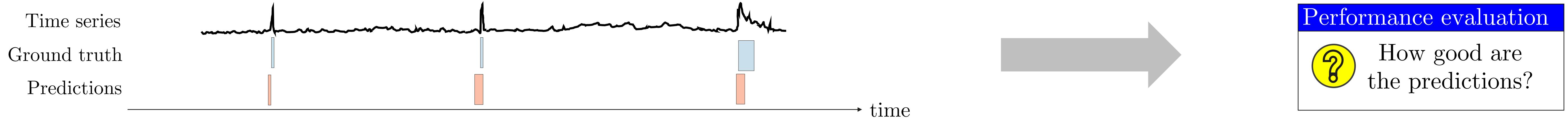
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Presentation  
Thursday, August 18  
1:30 PM-1:50 PM  
Room 5

[Link to article/code](#)  
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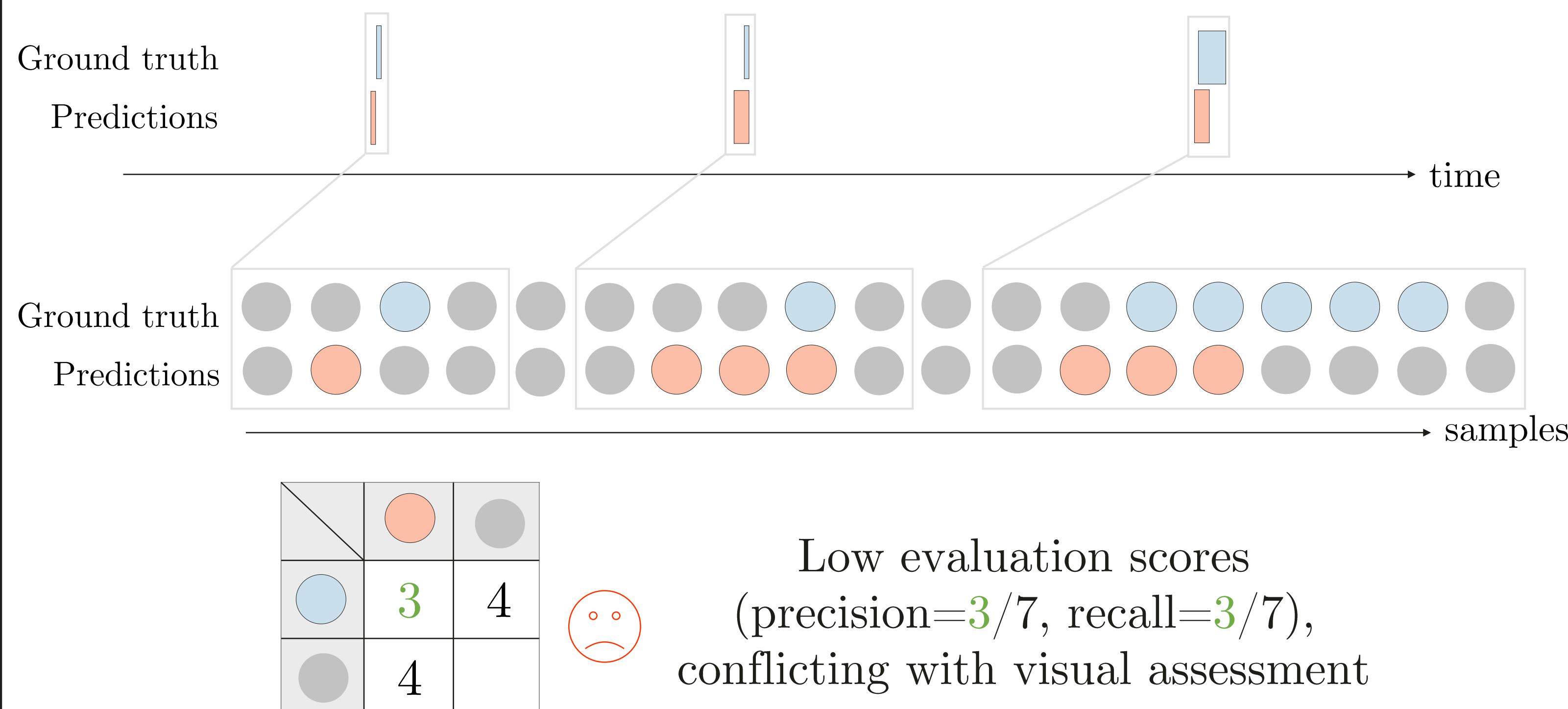
## Goal

We define a new pair of precision/recall metrics for evaluating time series anomaly detection tasks: the *affiliation metrics*.



## Motivations

### 1. Sample-based precision/recall cannot handle time series well



- A Unaware of temporal adjacency
- B Unaware of the event duration

### 2. Recent range-based metrics [1, 2] are easily gamed by adversary predictions.

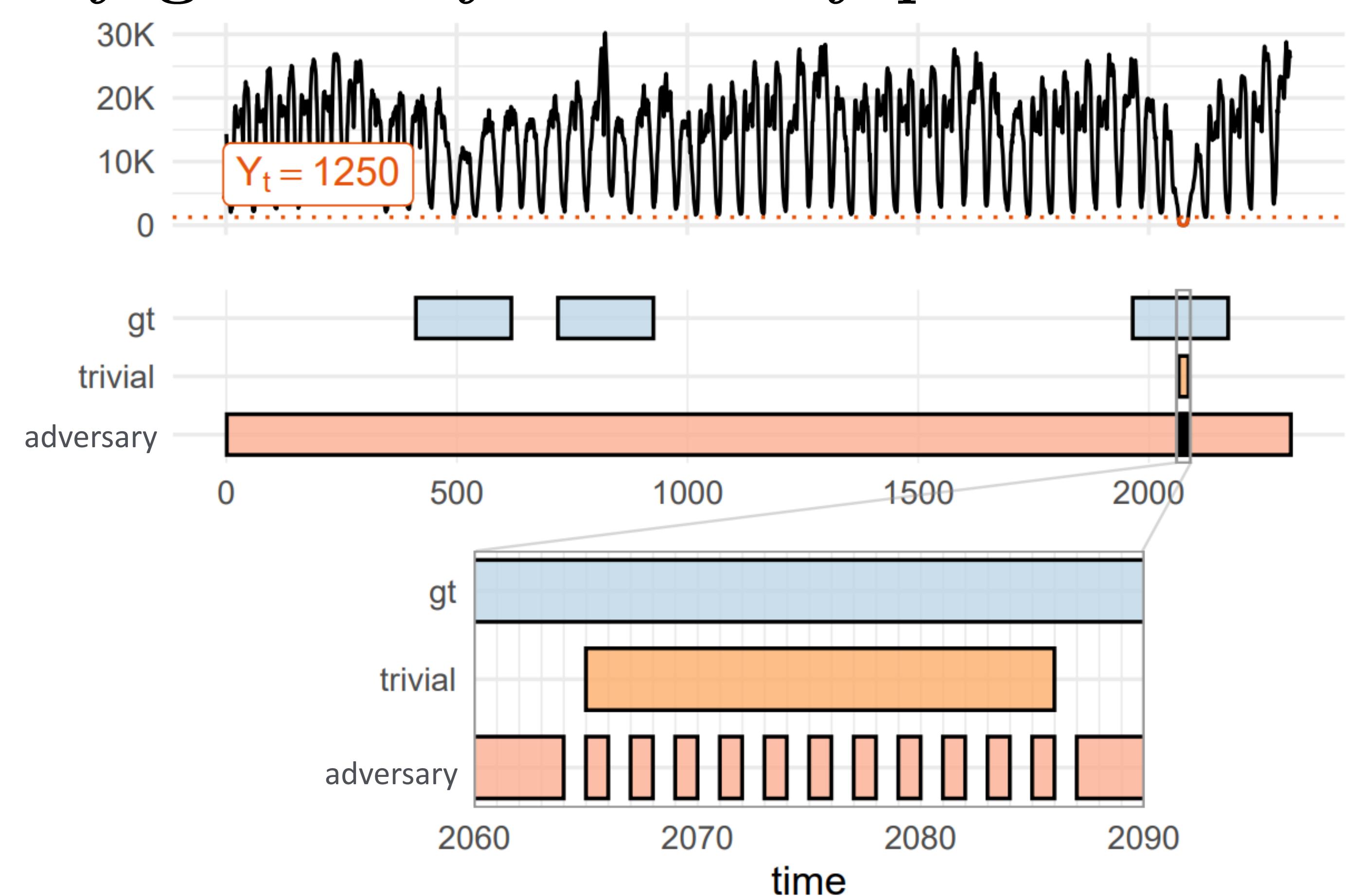
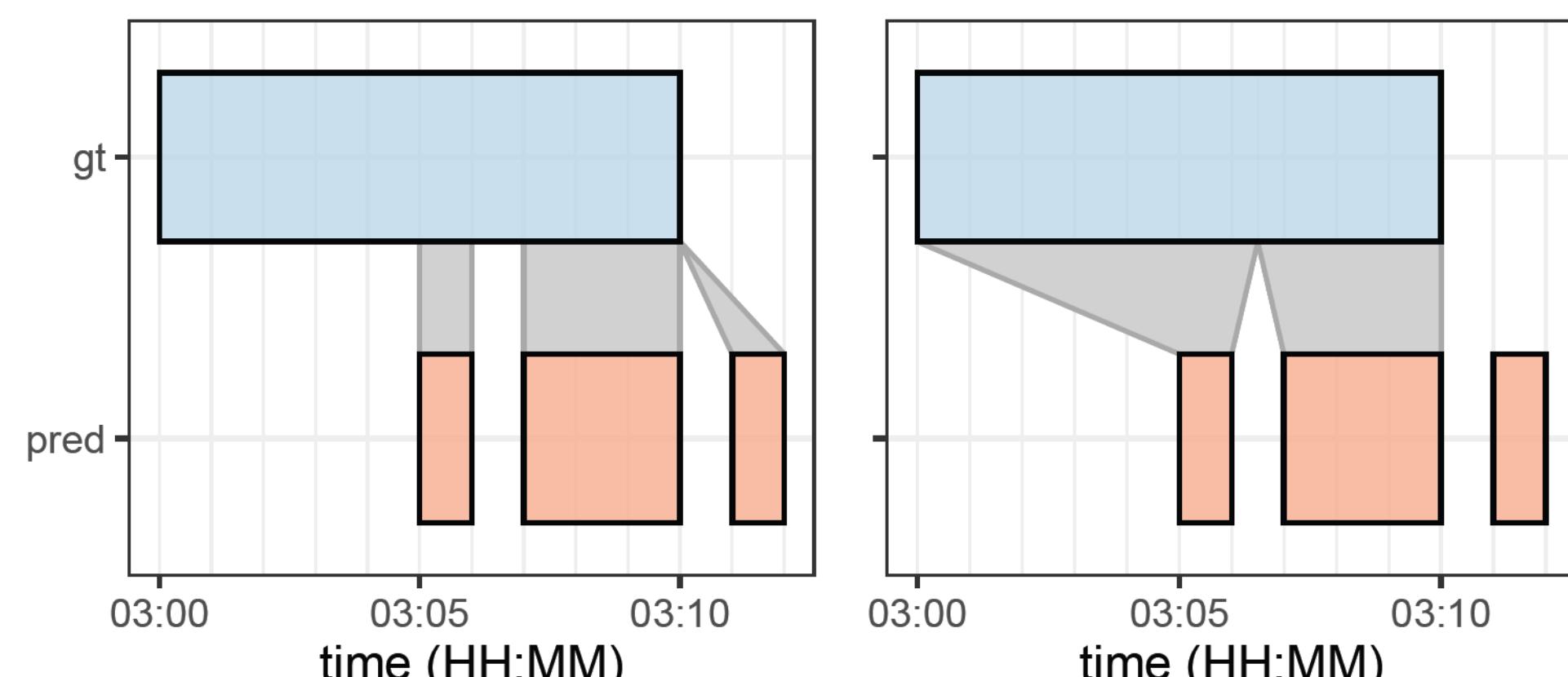


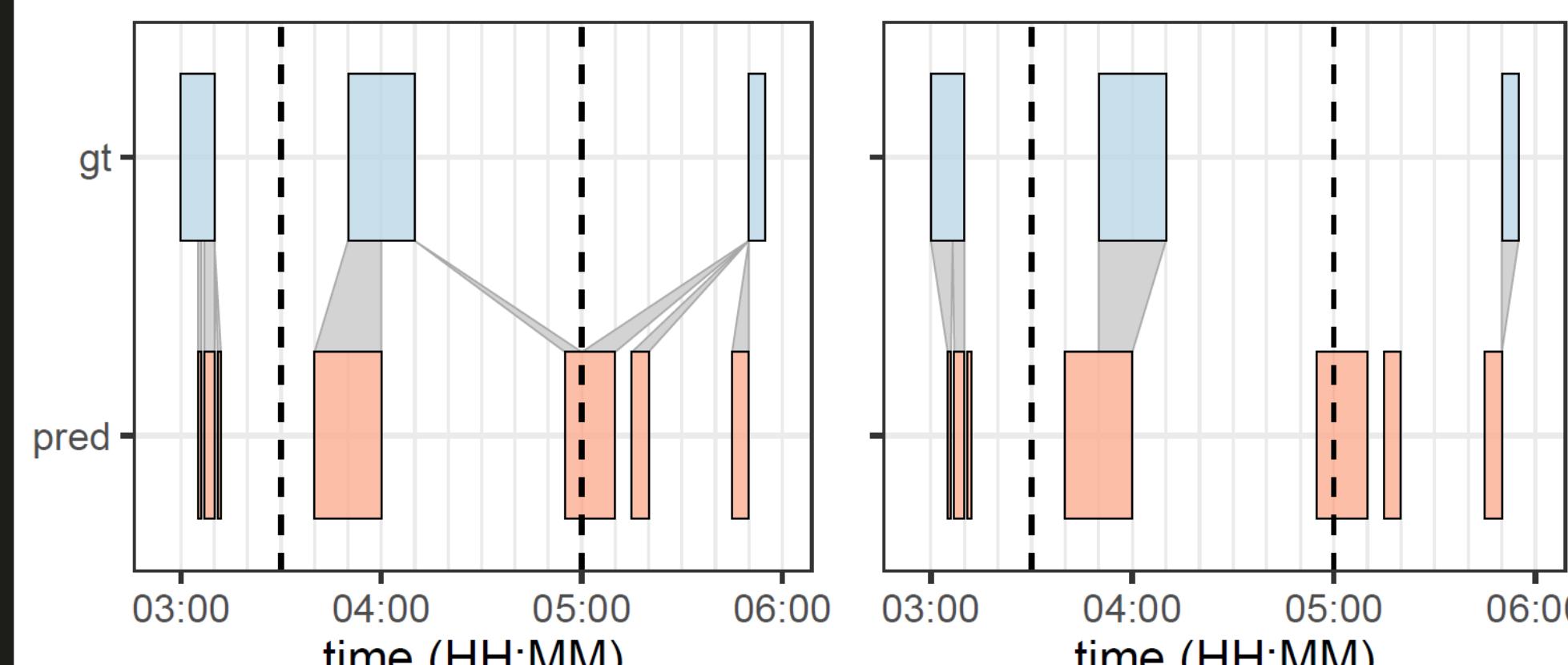
Figure 3: Construction of the adversary predictions

## Concept 1: Proximity



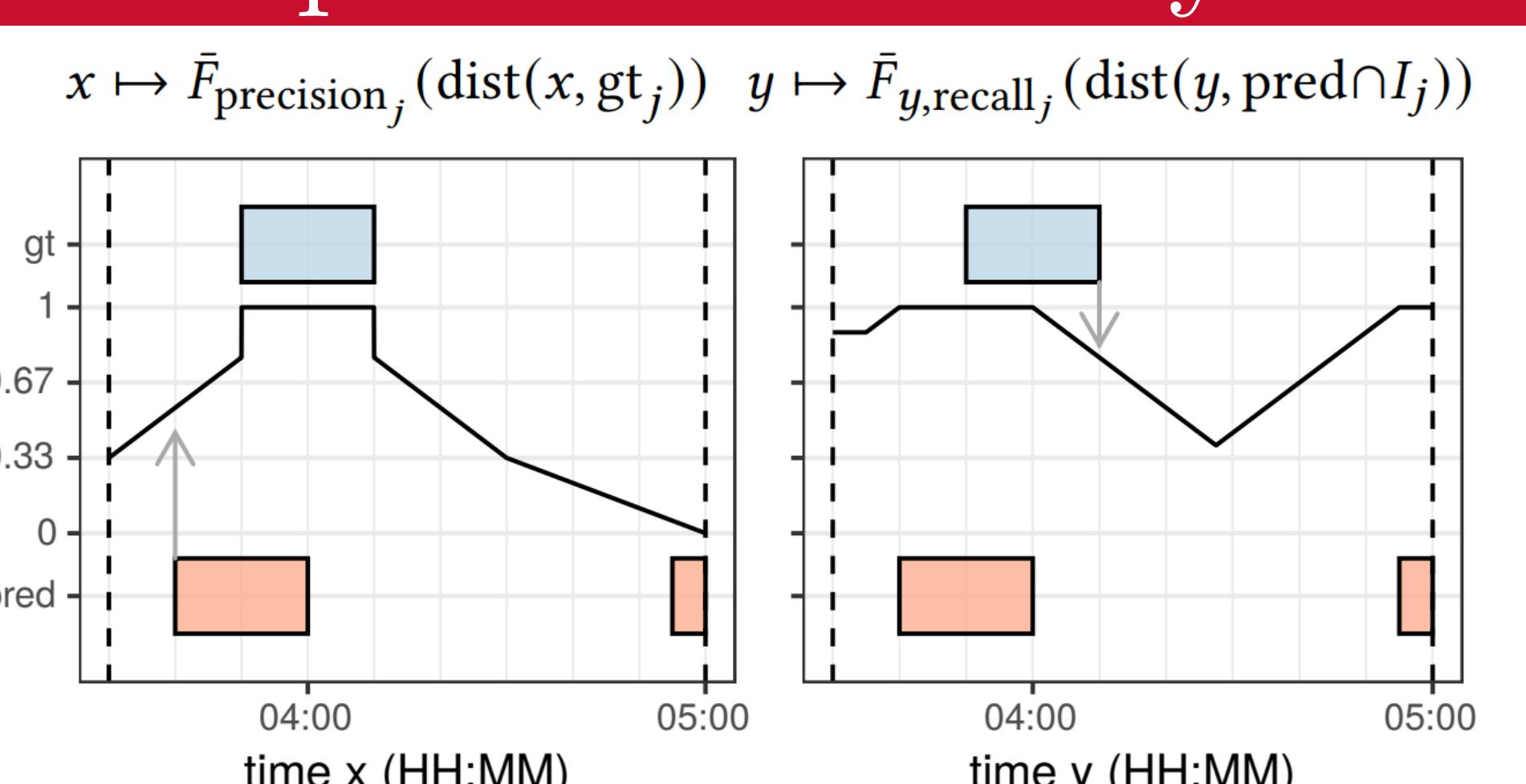
(a) *Average distance between sets:*  
example of the directed distance  
computed from predicted events to  
ground truth (left) and from ground  
truth to predicted events (right).

## Concept 2: Locality



(b) *Local affiliation to the closest  
ground truth event:* example resulting  
in zones delimited by the dashed lines.  
The zones are similar for both  
directions: precision (left), and recall  
(right).

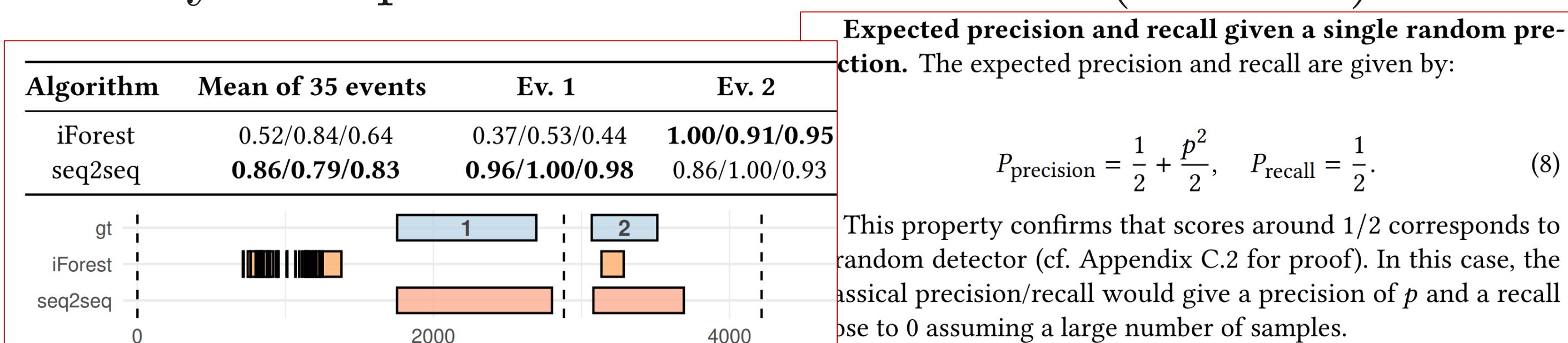
## Concept 3: Probability



(c) *Comparison against random  
sampling:* example for converting  
each predicted sample to a precision  
score (left) and each ground truth  
sample to a recall score (right).

## And more...

Locally interpretable and visualizable (Sec. 4.3)...



...Theoretical bounds on the score (Sec. 4.4)

## Summary

- Parameter-free,
- Retain a physical meaning as linked to a time,
- Locally interpretable and visualizable (Sec. 4.3),
- Robust against adversary predictions (Sec. 4.2),
- Existence of statistical bounds of the score (Sec. 4.4),
- Aware of temporal adjacency (A) and of event duration (B).

## References

- [1] N. Tatbul et al. 2018. Precision and recall for time series. NeurIPS.
- [2] W. Hwang et al. 2019. Time-series aware precision and recall for anomaly detection. In ACM CIKM