A New Multiple Change-Point Detection Algorithm
(Smallest Valid Partitioning - SVP)

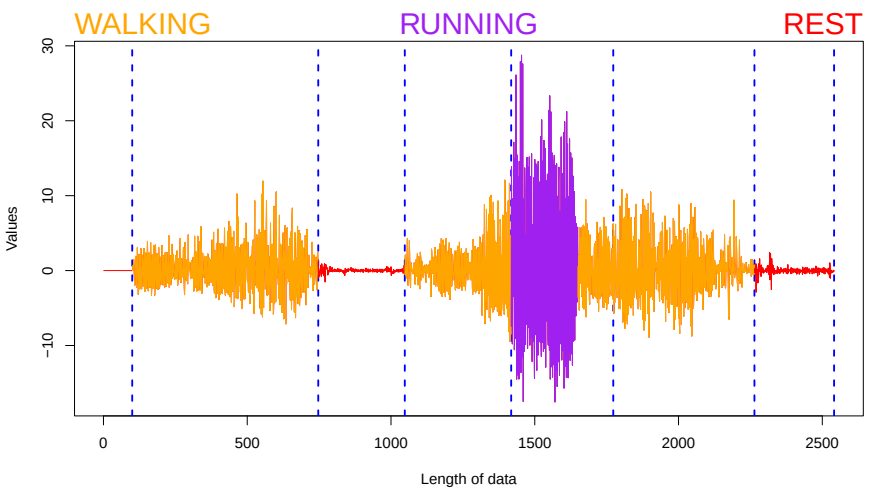
Alexandre Combeau, Vincent Runge, Gaetano Romano, Anica Kostic

Université Évry Paris-Saclay, LSE, Lancaster University

JDSE 2025

Problem & Idea

Goal: Detect structural changes in time series.



Accelerometer data

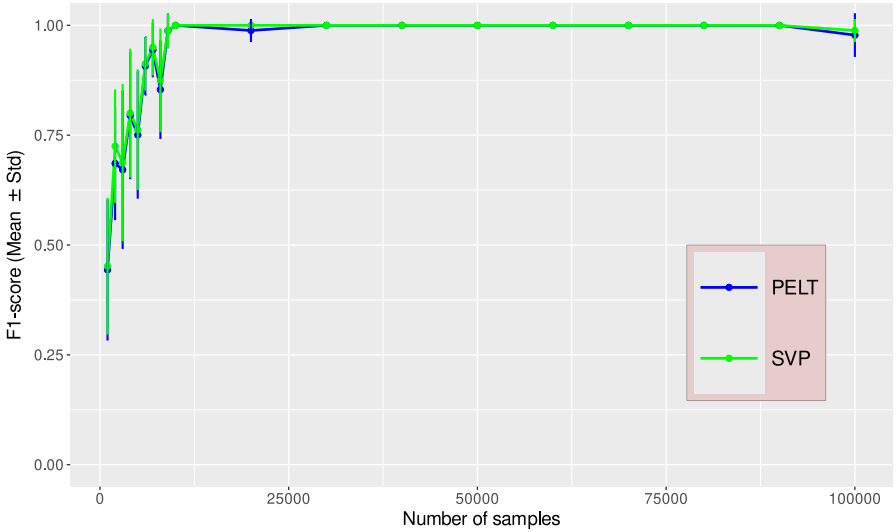
SVP Algorithm

1. Apply local test (**FOCuS**) on each segment
2. Keep only **valid segments** (no change detected)
3. Combine results with **Dynamic Programming**

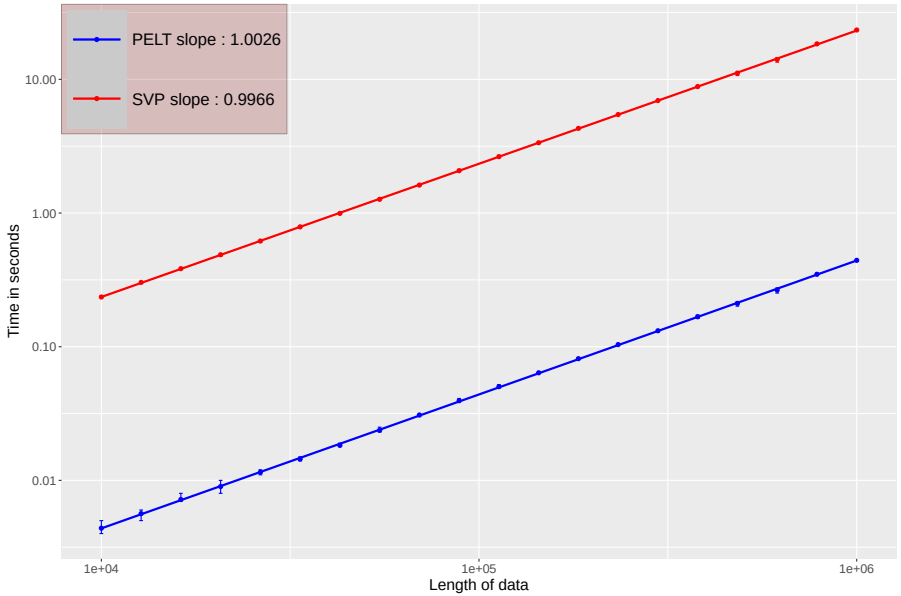
Key novelty

Lexicographic optimization:
→ Minimize #segments first, then cost

Results & Impact



SVP ≈ PELT in accuracy



Linear complexity when many changes

Takeaways

- Adaptive segmentation (no penalty tuning)
- Coherent aggregation of local tests
- Promising results on accelerometer data