



**HAL**  
open science

## Habit monitoring over sensor streams

Julie Soulas, Philippe Lenca, Komate Amphawan

► **To cite this version:**

Julie Soulas, Philippe Lenca, Komate Amphawan. Habit monitoring over sensor streams. STATLEARN 2016 : Challenging problems in statistical learning, Apr 2016, Vannes, France. <hal-01417261>

**HAL Id: hal-01417261**

**<https://hal.science/hal-01417261v1>**

Submitted on 15 Dec 2016

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



HAL Authorization

## Author

**Julie Soulas**  
Dpt. LUSSI  
Télécom Bretagne

**Philippe Lenca**  
Dpt. LUSSI  
Télécom Bretagne

**Komate Amphawan**  
Computational Innovation  
Laboratory  
Faculty of Informatics  
Burapha University

## Context

- Use emerging **sensing and monitoring technologies** to improve ageing at home
- **Monitor the activity**, assess autonomy, improve well-being and security

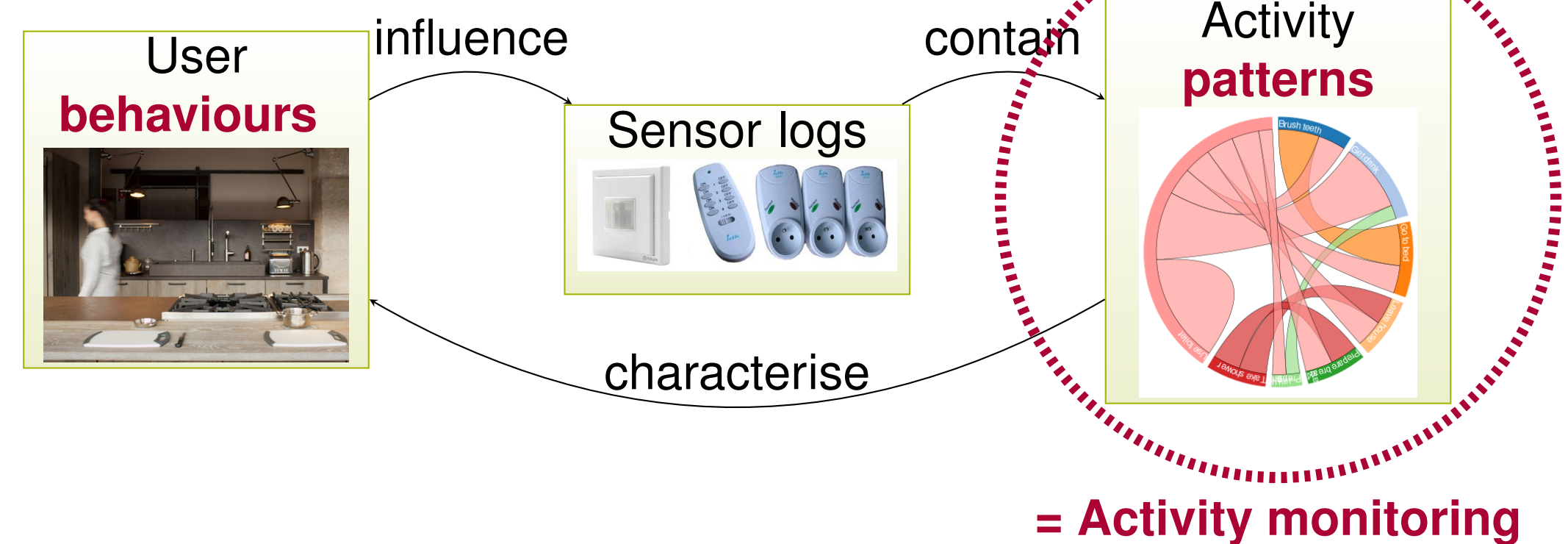


Figure 1: Activity monitoring

## Challenge

Monitor the habits through the **unsupervised** discovery of **relevant patterns** and the analysis of their **evolution**

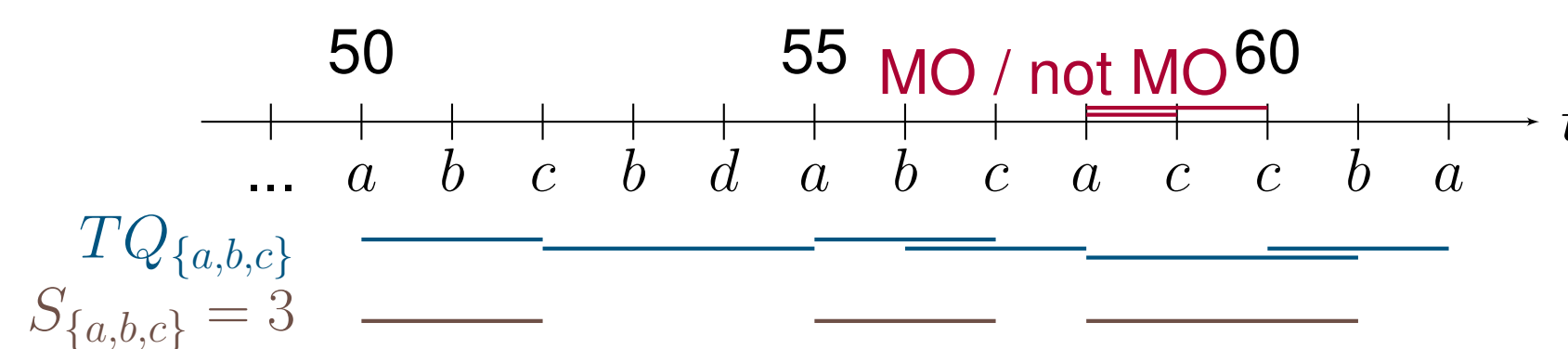


Figure 2: Episode occurrence mining

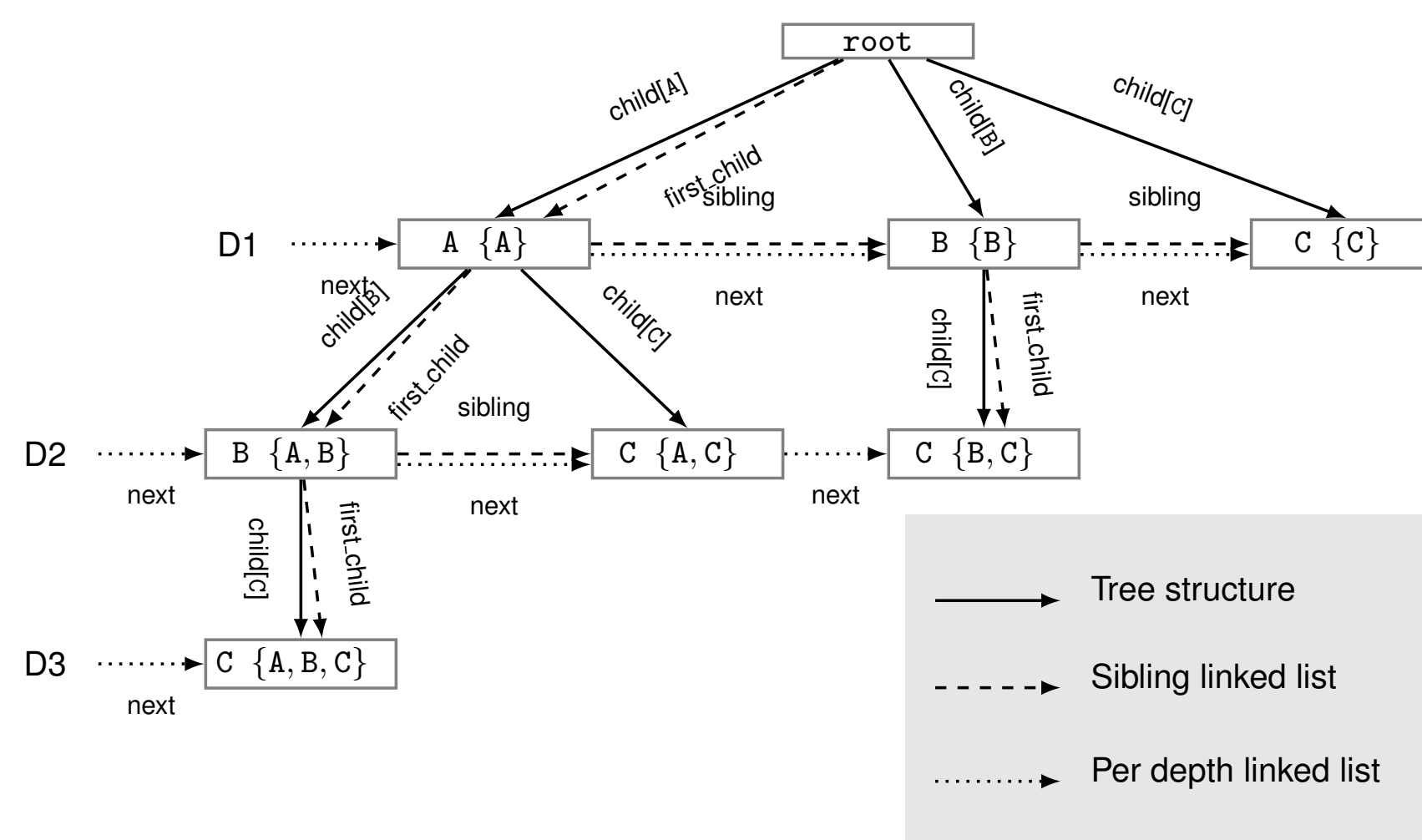


Figure 3:  $k$ -tree

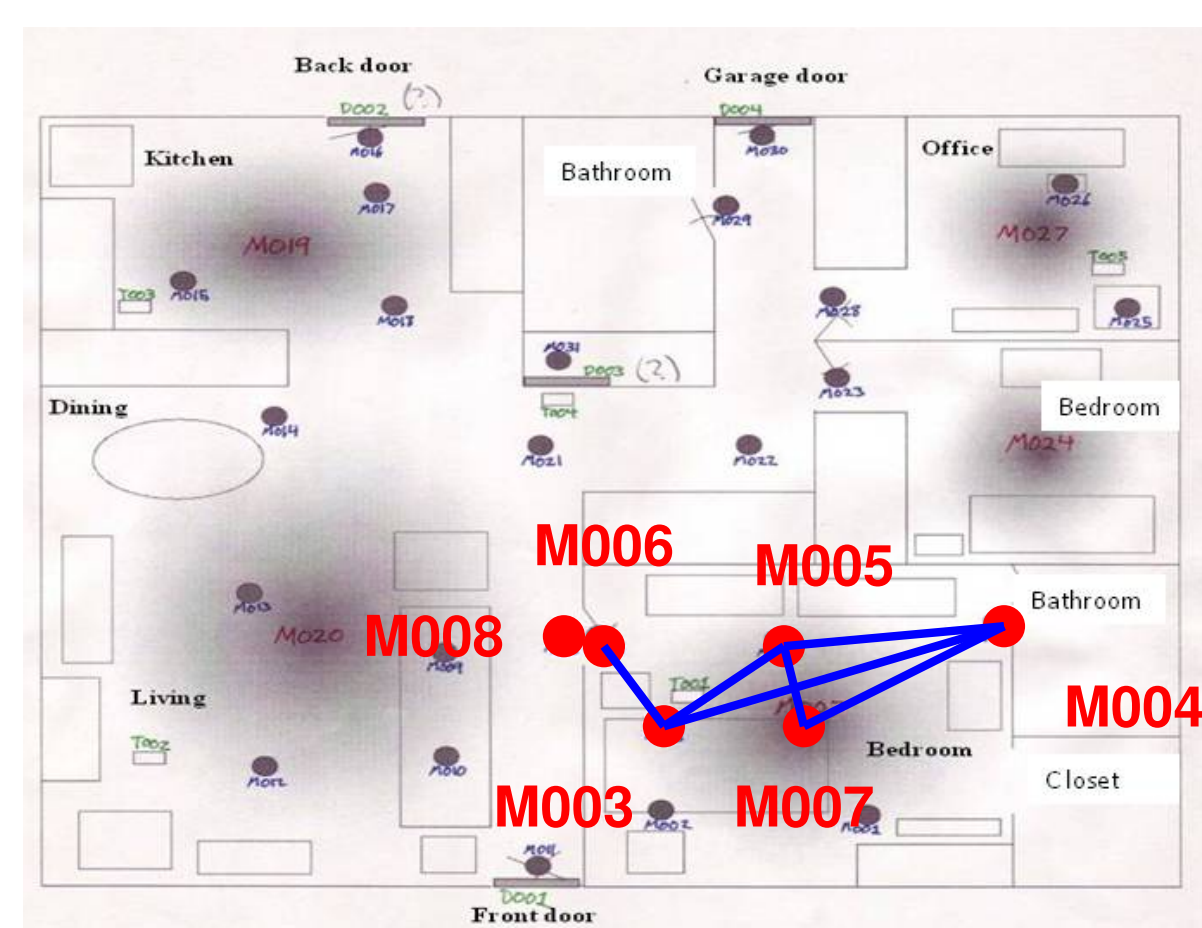


Figure 4: Most regular patterns

## Proposed solution

- General framework, for the **discovery** of the **top- $k$**  most relevant **episodes**
- **Relevancy** as a **combination of measures**, based on user preference
  - Frequency
  - Regularity
  - Length
  - Periodicity

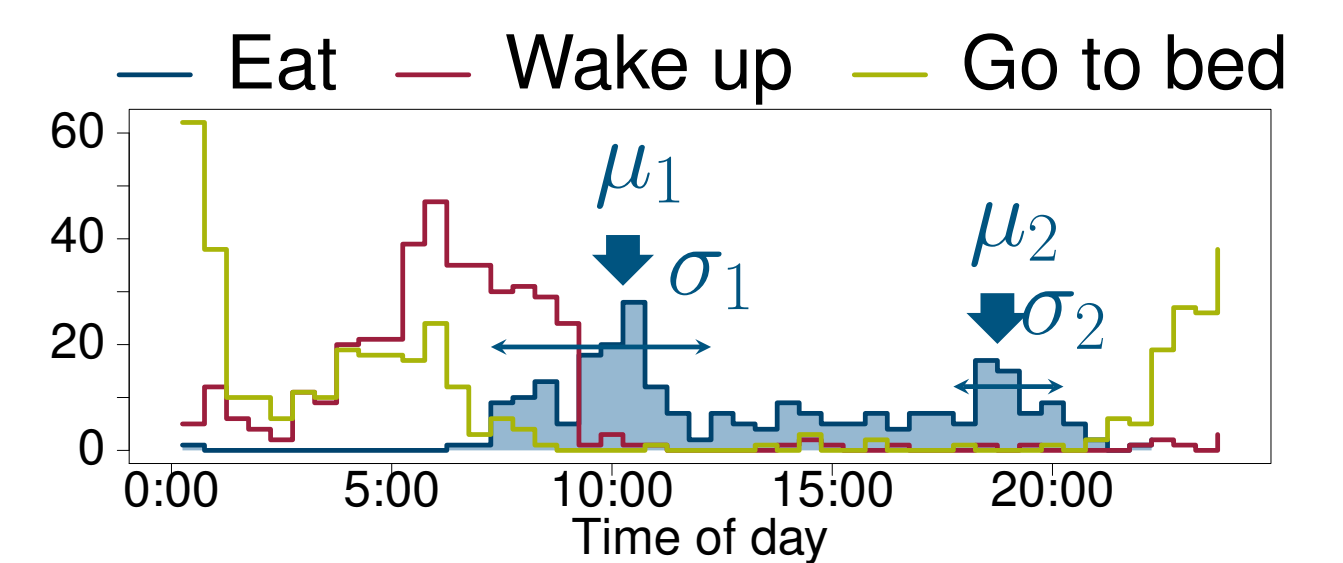


Figure 5: Periodicity modeling

- Handling of **data stream: real-time** discovery and update of the habits over the latest window

## Perspectives

- Integration of the different measures
- Parameter setting
- Trend analysis, anomaly detection

## Keywords

Data mining,  
Ageing at home,  
Sensor networks,  
Pattern discovery,  
Activity monitoring,  
Periodicity monitoring,  
Regularity,  
Top- $k$