Data Analytics and Machine Learning Group
Department of Informatics
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TUM

Uncertainty on Asynchronous Time Event Prediction

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Setting – Discrete events in asynchronous time
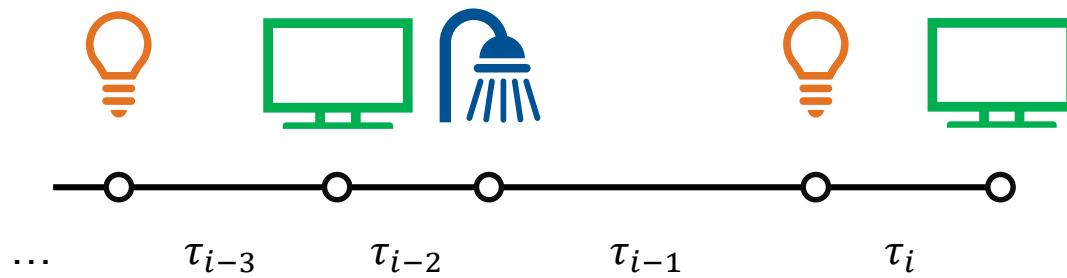
What is the next interaction?

- Smart house
  - Lights
  - TV
  - Shower
- Social networks
- Medical records
- Cars

Setting – Discrete events in asynchronous time

- Two main challenges
   1. Complex evolution
    2. Uncertainty in prediction

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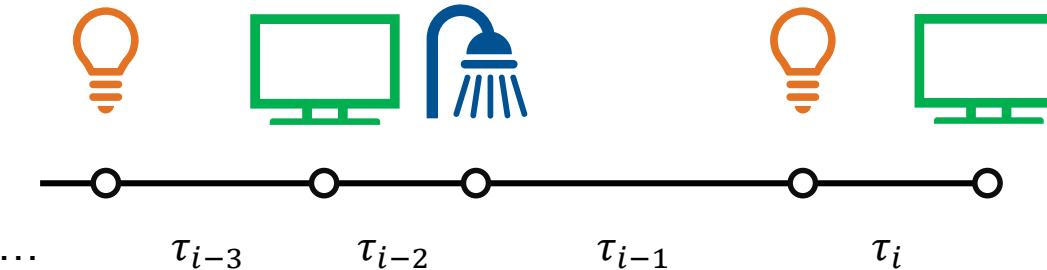
Challenge 1 – Complex evolution of p over (continuous) time

- Evolution of categorical distribution
- Multimodality
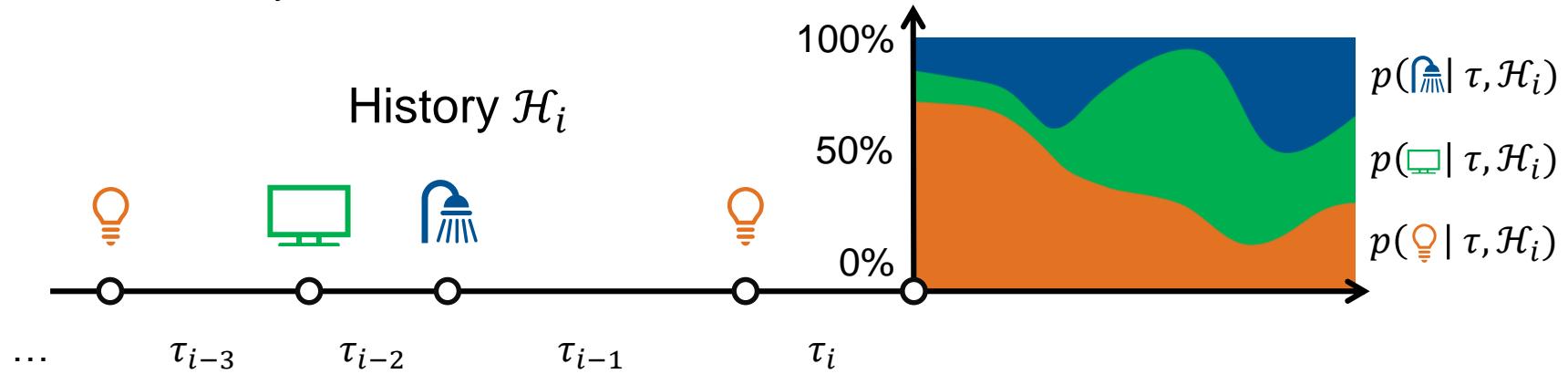
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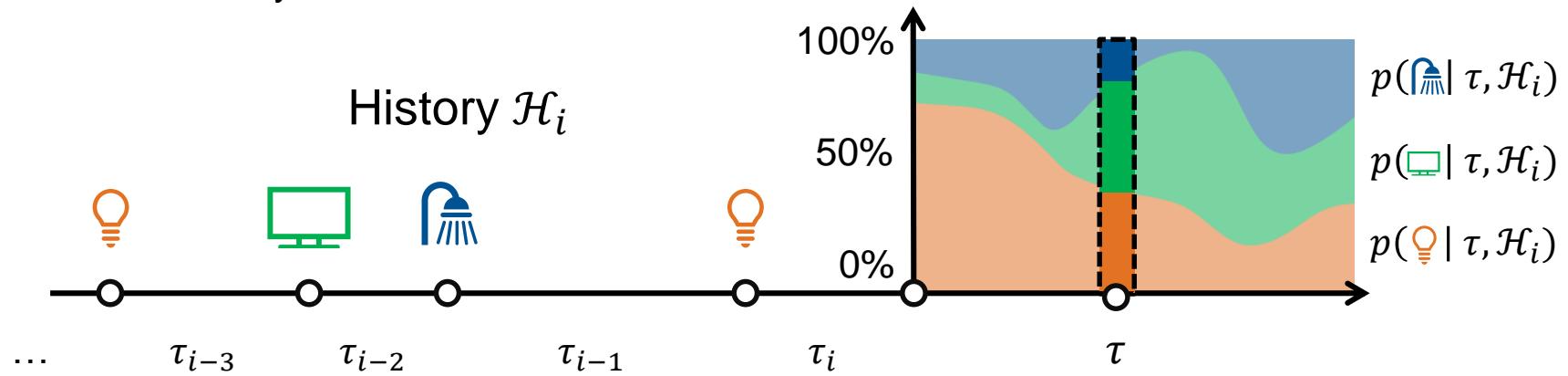
Challenge 2 – Uncertainty in prediction

- In classical approaches uncertainty is ignored

Challenge 2 – Uncertainty in prediction

Equiprobable classes
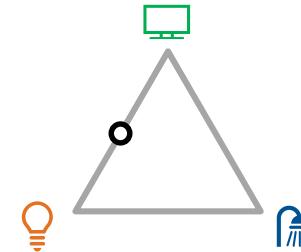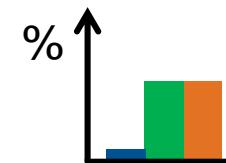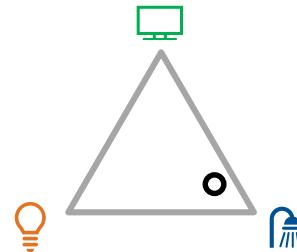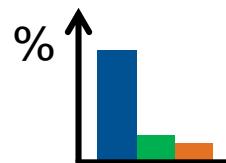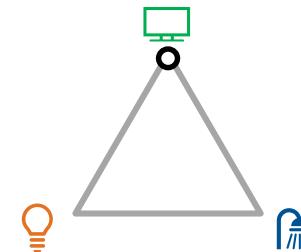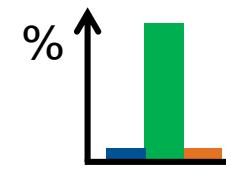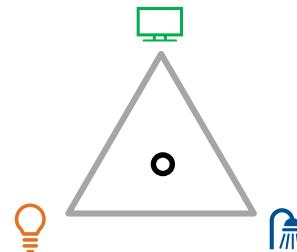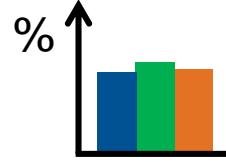
Uncertain prediction

Challenge 2 – Uncertainty in prediction

Equiprobable classes
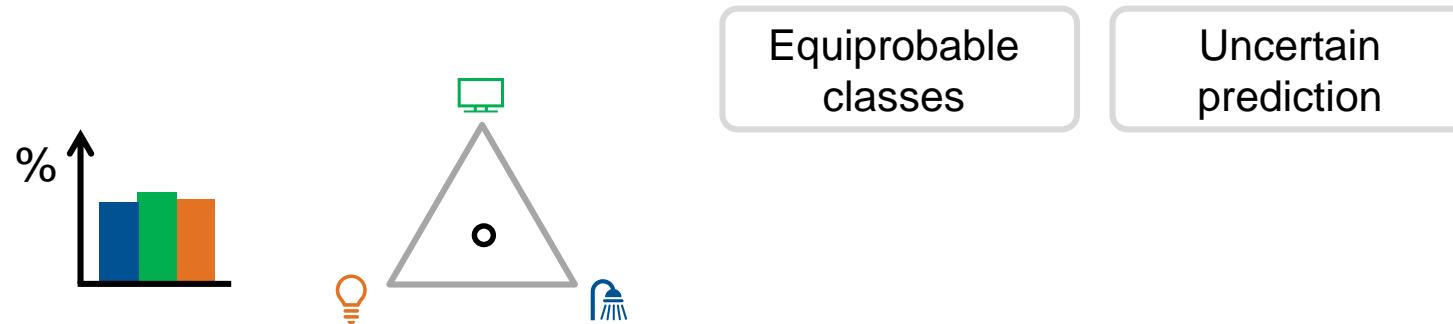
Uncertain prediction
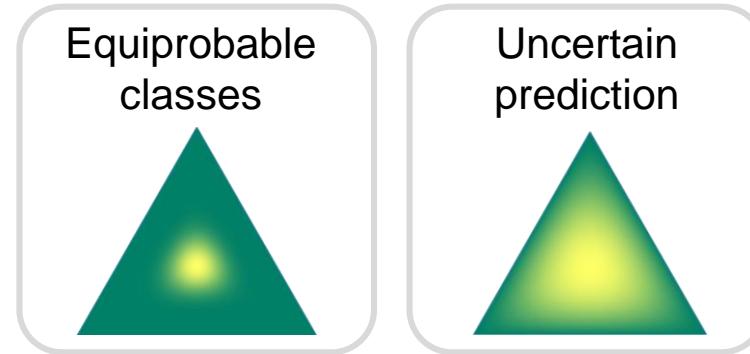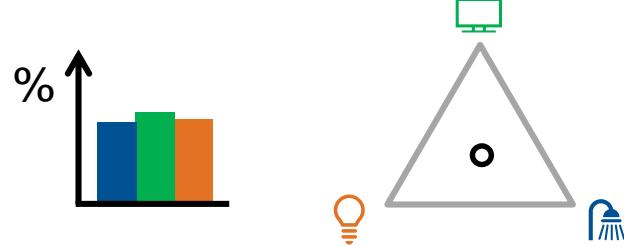
- We distinguish between two scenarios
- Instead of outputting one vector → Distribution over the simplex

# **Our approach** – Continuously evolving distribution over the simplex
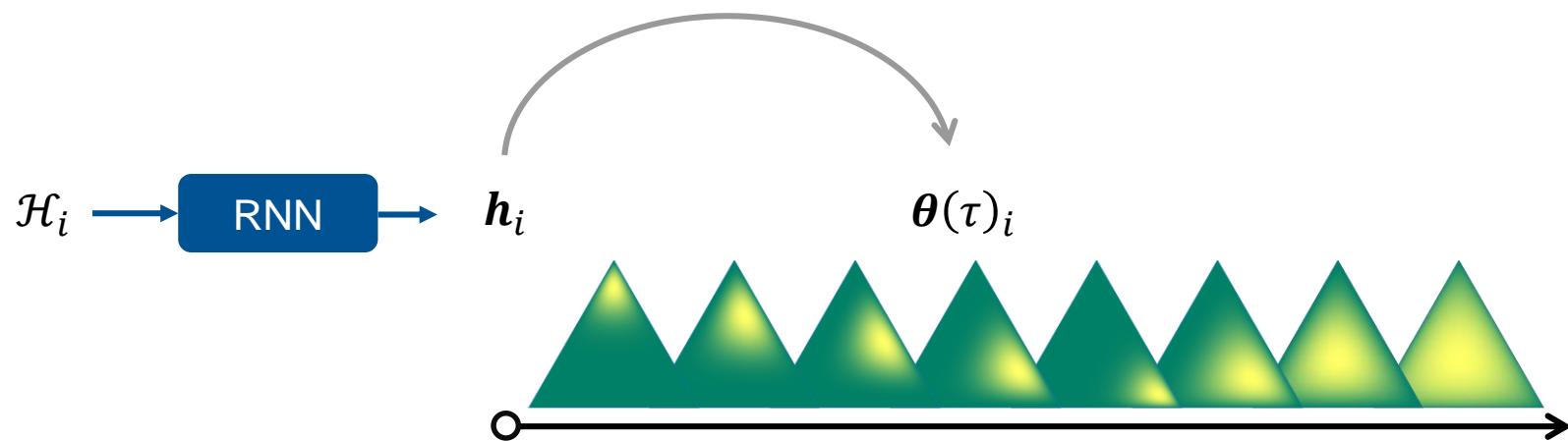
Our approach – Continuously evolving distribution over the simplex

Model 1 – *Dirichlet distribution* parameters evolve with basis function decomposition**

Model 2 – *Logistic-normal* parameters evolve with a weighted Gaussian process**

* Technical details during poster session
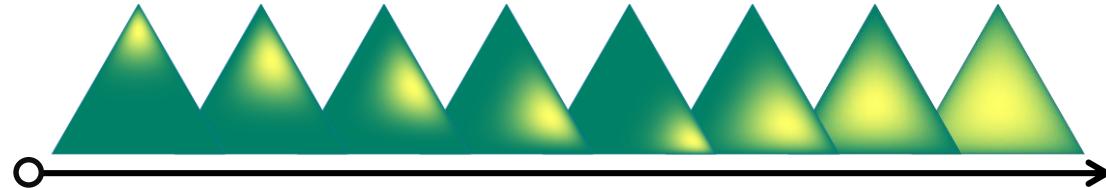
Complex evolution + Uncertainty in prediction

- State-of-the-art results
  - Event prediction
  - Anomaly detection

Poster
Wednesday 10:45 – 12:45
East Exhibition Hall B + C #53

Code & Paper
www.daml.in.tum.de/uncertainty-event-prediction

Smart house anomaly detection