



Architecture & Sustainable Building Technologies
Prof. Dr. Arno Schlüter

Data-driven Buildings

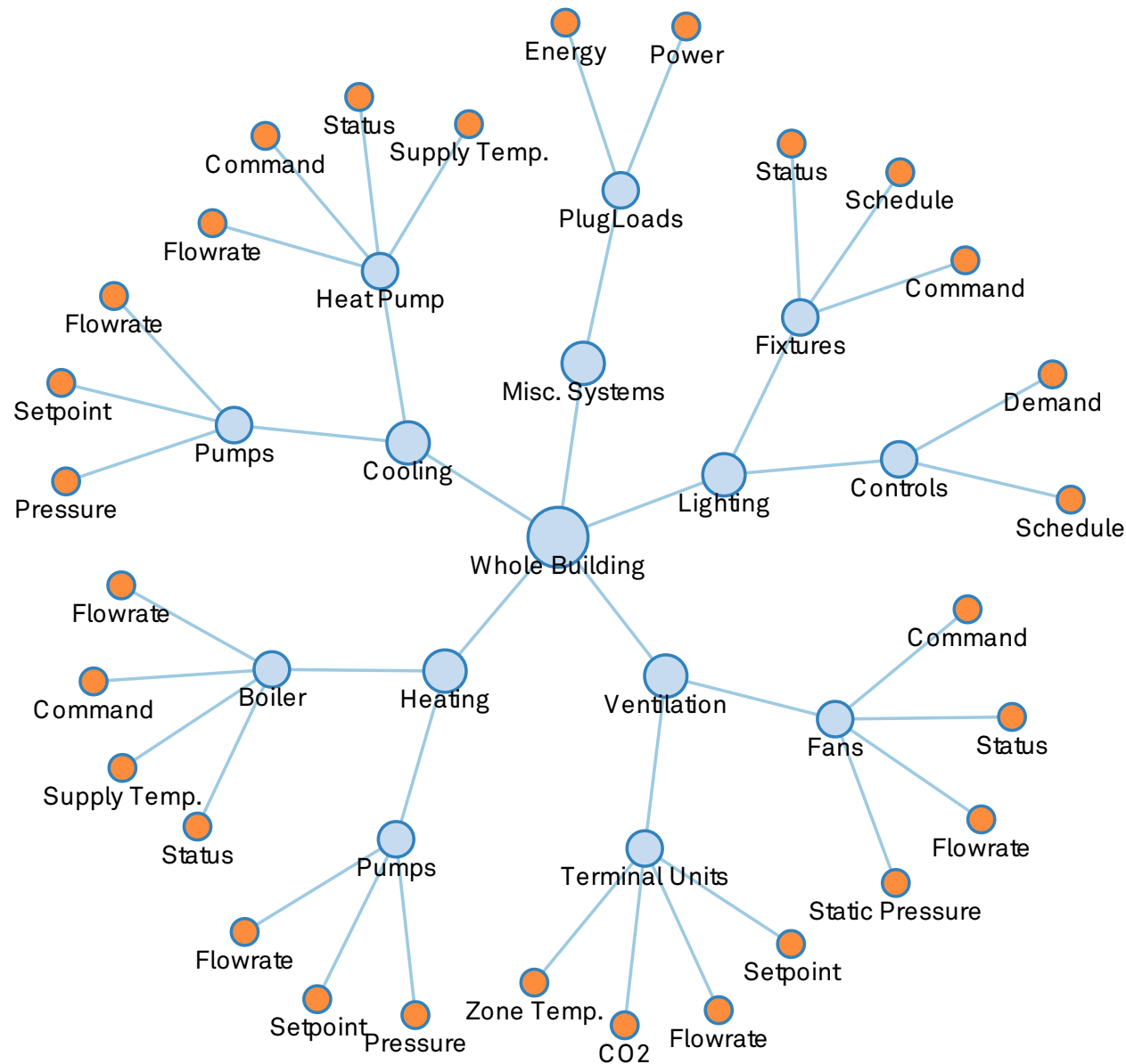
Clayton Miller

/ ITA
Institute of Technology in Architecture
Faculty of Architecture / ETH Zurich



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Conventional Bottom-up Analysis



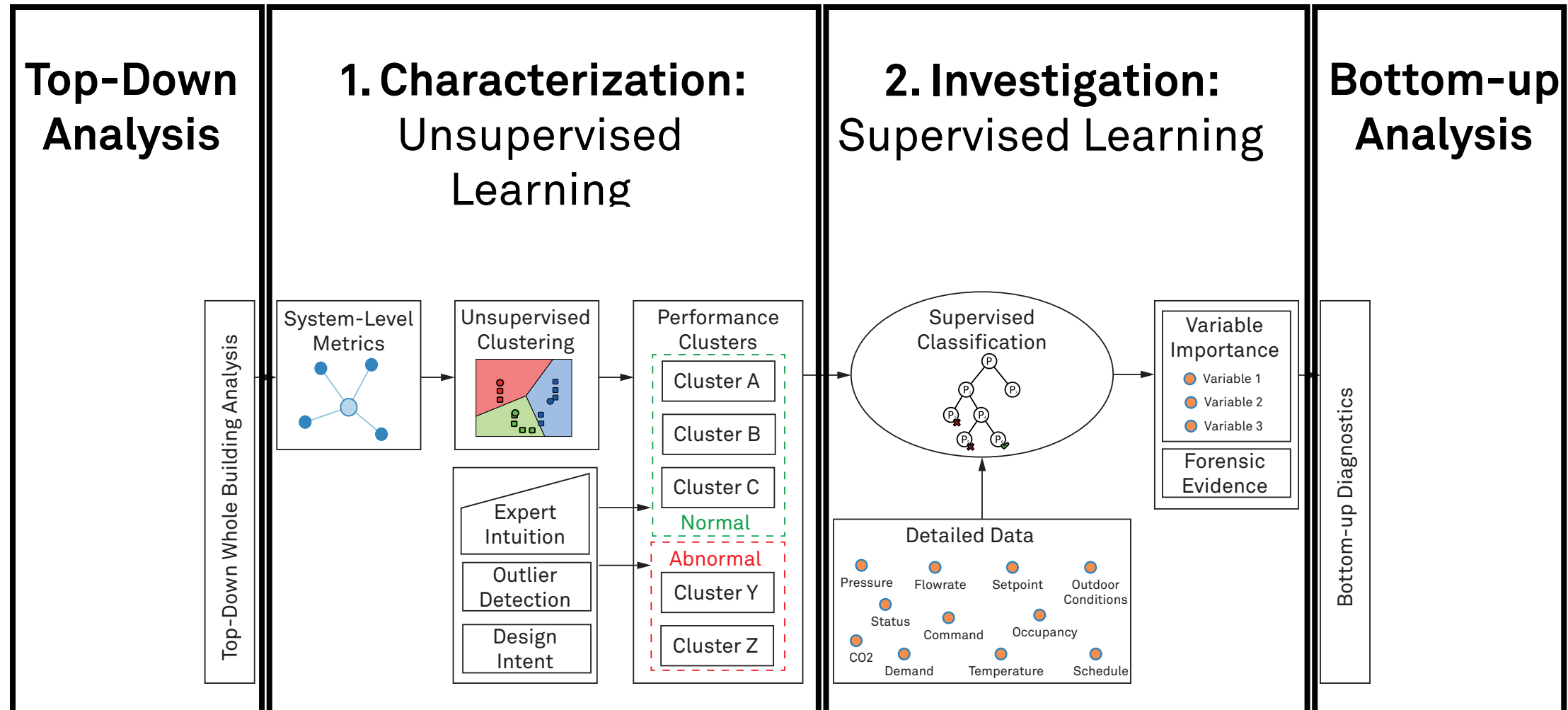
Commissioning techniques
(Milesi-Ferretti & Choiniere 2012; Mills 2009; Bynum et al. 2008)

Fault Detection and Diagnostics
(Samouhos 2010; Katipamula & Brambley 2005)

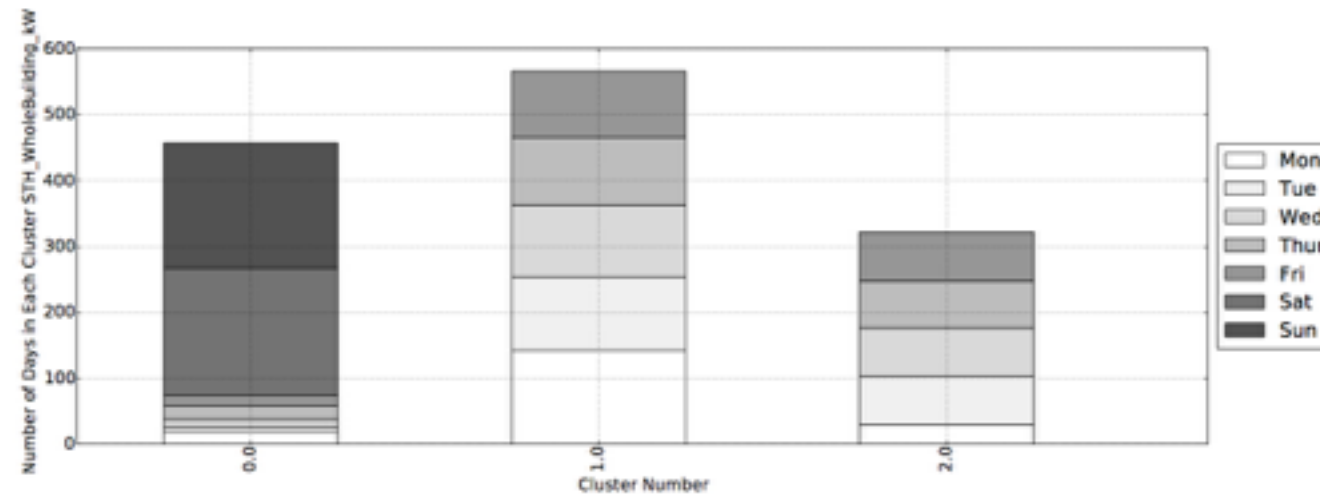
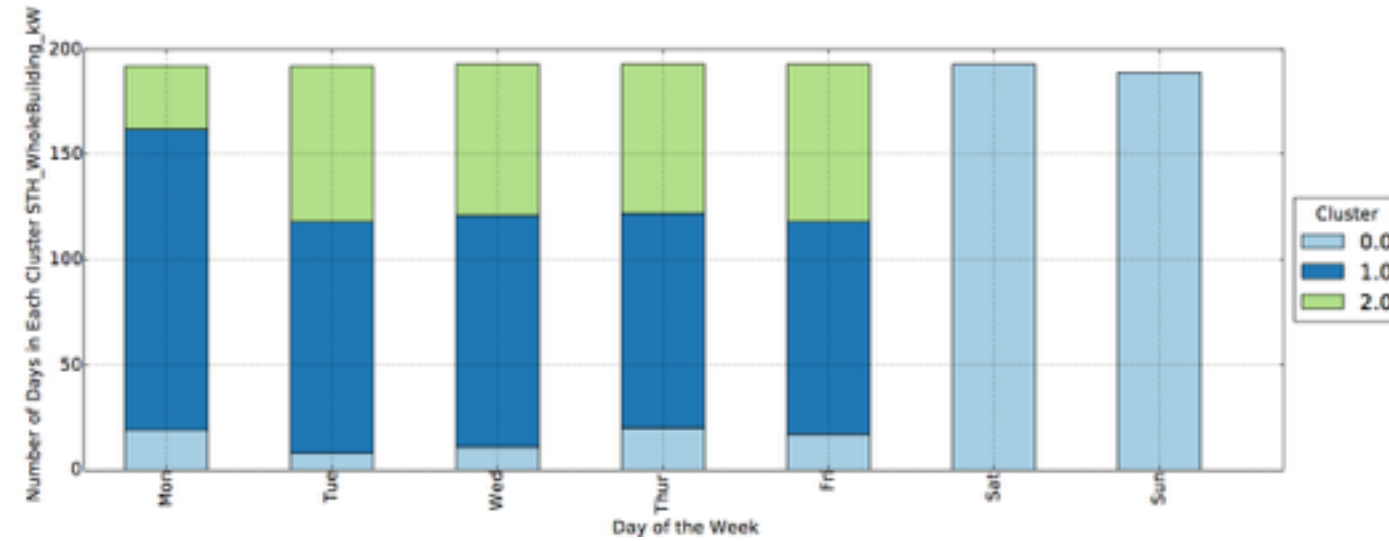
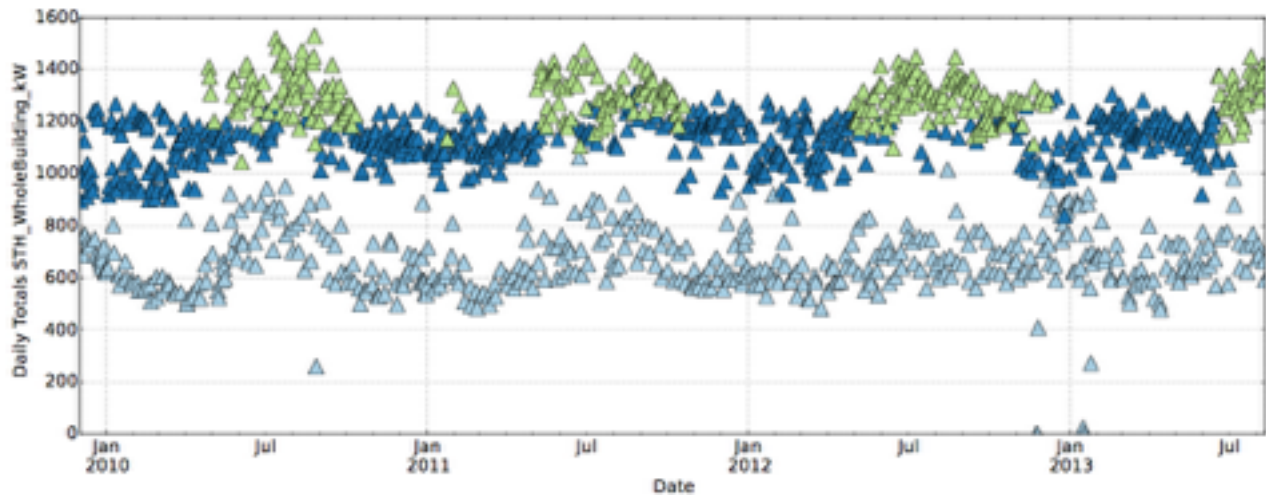
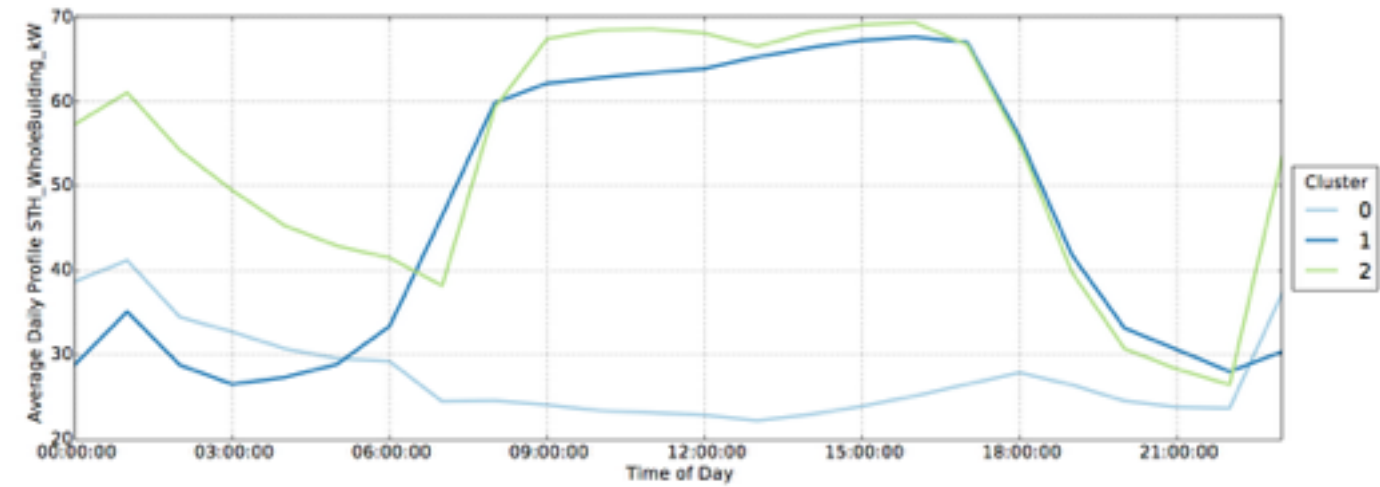
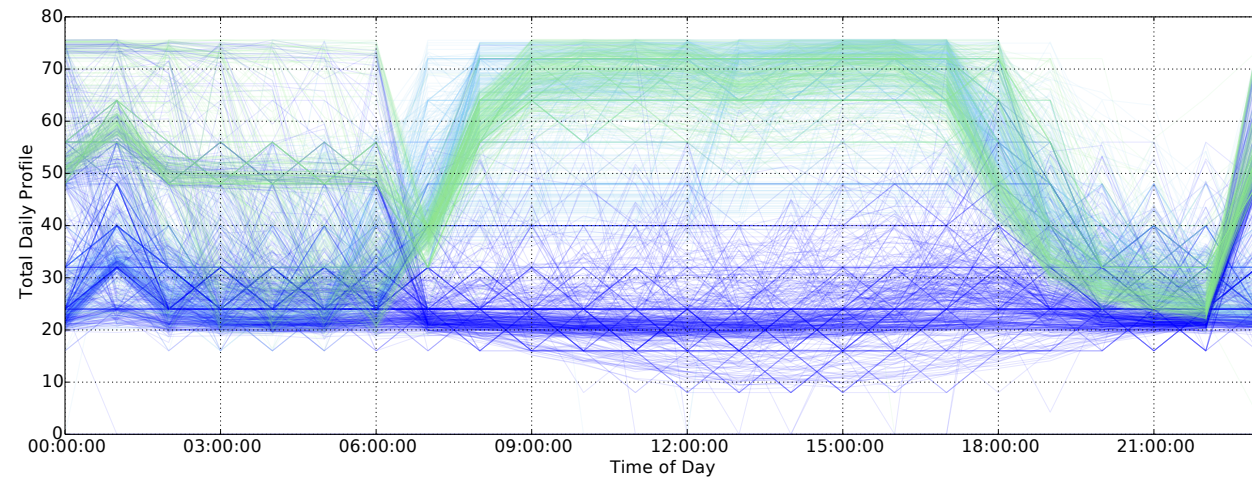
Detailed Model Calibration
(Reddy et al. 2007)

Requires intimate knowledge of detailed data

Process of Analysis



Clustering Example - Whole Building Electricity - 3 Clusters



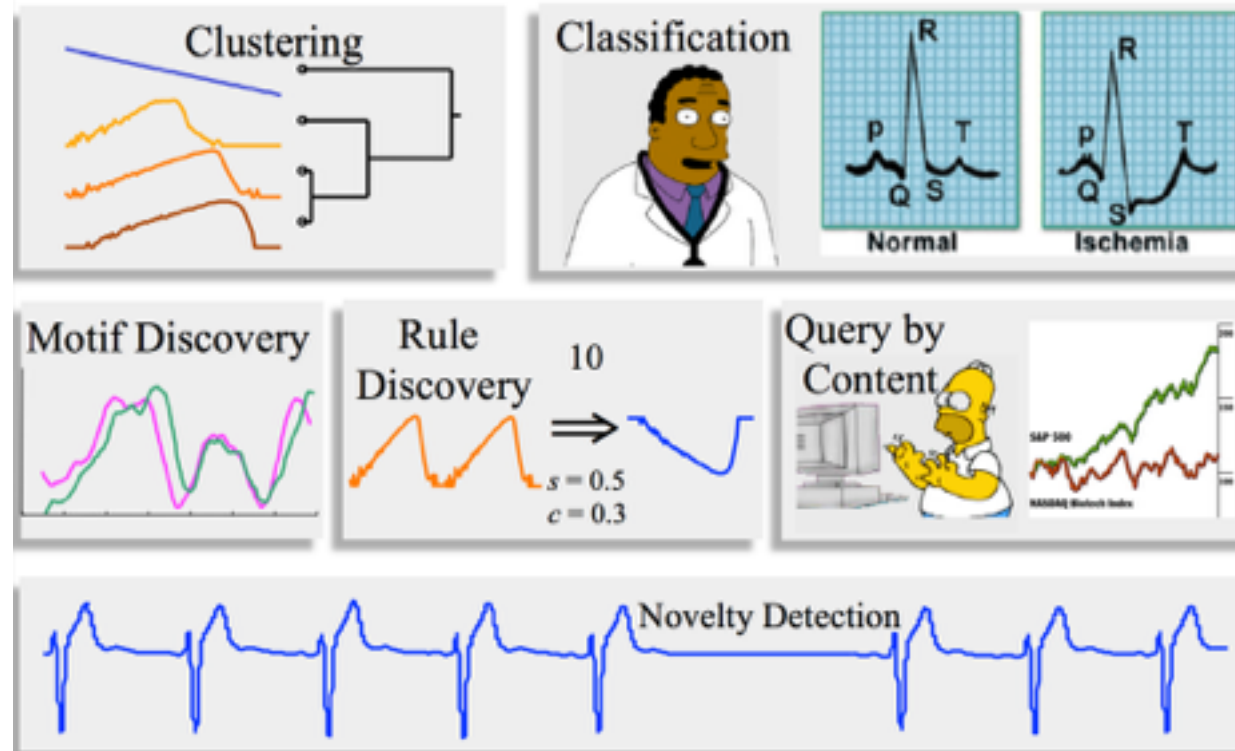
Symbolic Time Series Representation

SAX! **A Symbolic Representations of Time Series**

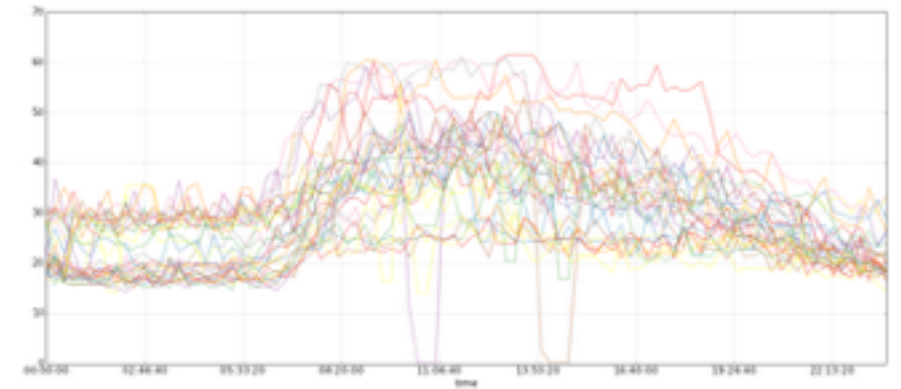
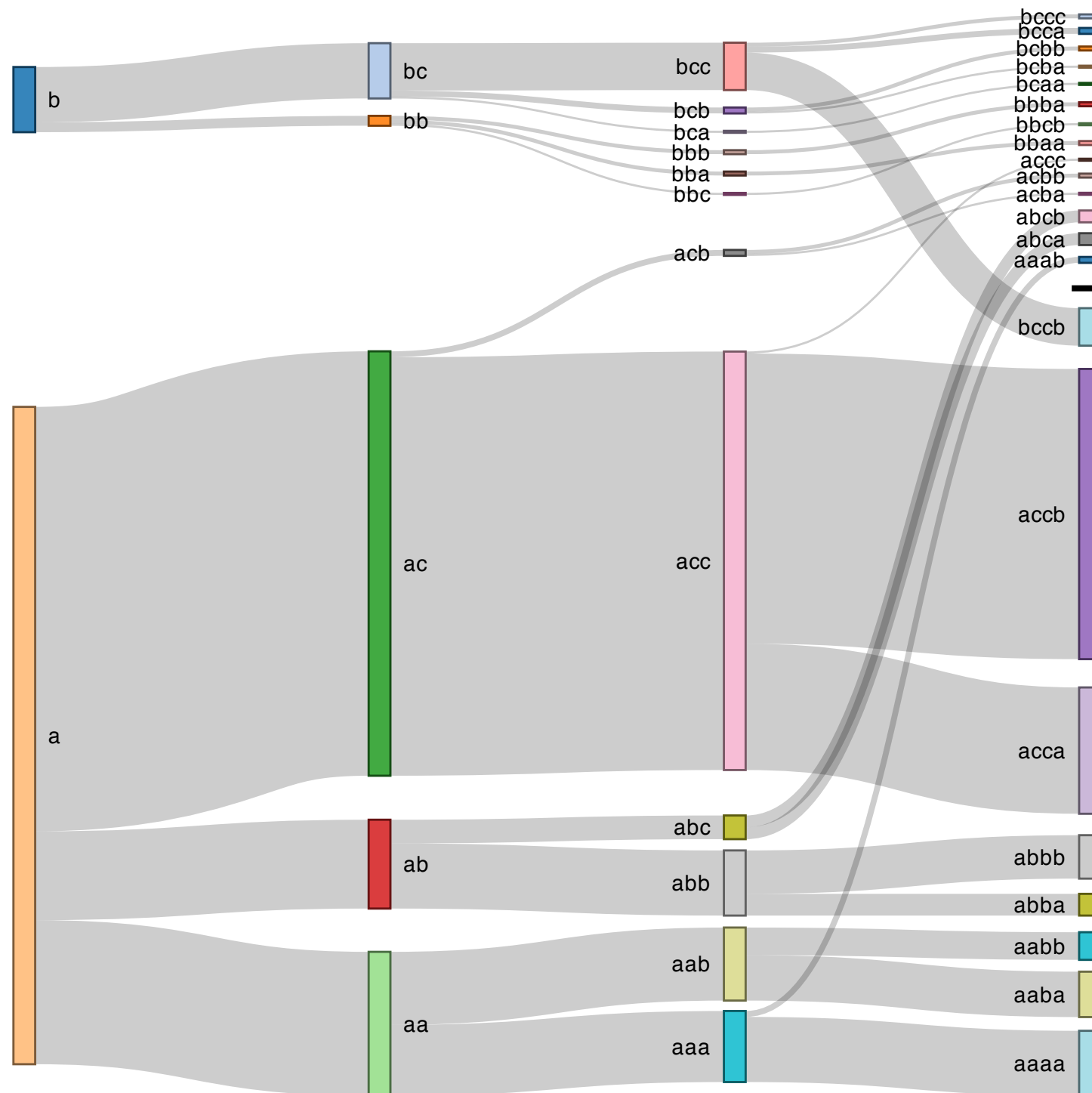
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All these problems require **similarity** matching



Berlin Hospital Dataset - Daily kW Average 2012



“Tagged” for Investigation

“Normal” - High Frequency

