

INFINITE FACTORIAL DYNAMICAL MODEL

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MAX-PLANCK-GESELLSCHAFT



CHALMERS

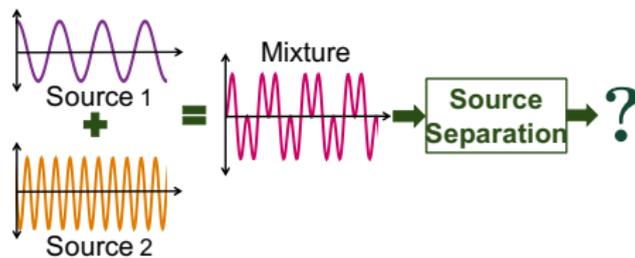
Alcatel-Lucent

Bell Labs

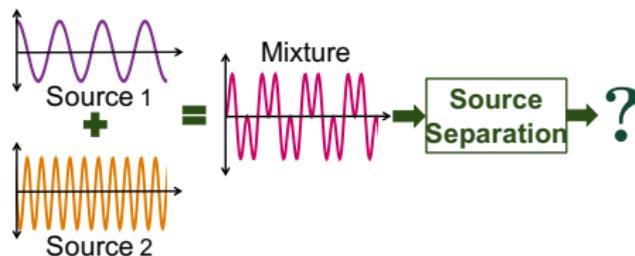


March 4th, 2016

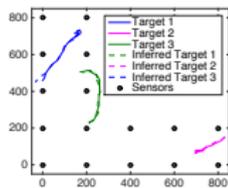
MOTIVATION



MOTIVATION



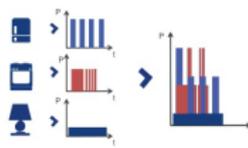
Multi-target tracking



Cocktail party



Power disaggregation



Multi-user detection



Sources with continuous states

Sources with discrete states

MOTIVATION

Internet of Things.

- Discrete signals (messages).
- Transmitters enter & leave the system.
- Receiver needs to infer #sources.



CONTRIBUTIONS

INFINITE FACTORIAL DYNAMICAL MODEL

- ① A general Bayesian non parametric model for source separation.
 - Infers #sources from data.
 - Valid for a wide range of applications.
- ② Efficient inference.
 - Valid for many likelihood and dynamical models.
- ③ Comprehensive set of experiments.

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Multipath propagation

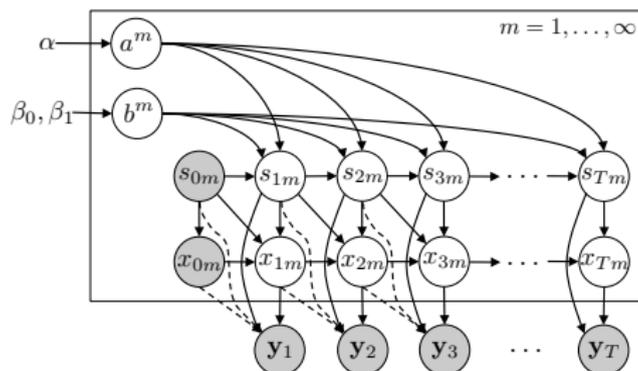
MODEL AND INFERENCE

1 Model

- Infinite #parallel chains (based on Markov IBP).
- Finite number of *active* sources for any finite dataset.

2 Inference

- Infers #active sources, their states, and other parameters.
- Slice sampling & Particle Gibbs with ancestor sampling.



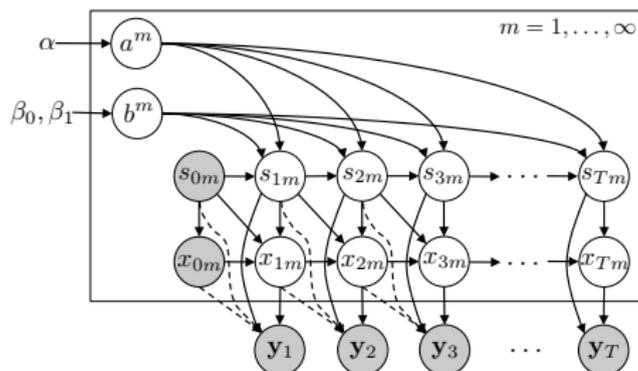
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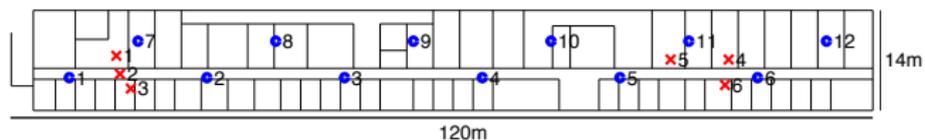
Can accommodate:

- Any transition probabilities $p(x_{tm} | x_{(t-1)m}, s_{(t-1)m}, s_{tm})$.
- Any likelihood $p(\mathbf{y}_t | \{x_{tm}, x_{(t-1)m}, \dots, x_{(t-L+1)m}\}_{m=1}^M)$.

EXPERIMENTS

Experiments on 4 applications:

- Multi-target tracking.
- Cocktail party.
- Power disaggregation.
- Multi-user detection.



Wi-Fi system at Bell Labs Crawford Hill