

BRIEF ARTICLE

INGMAR SCHUSTER

1. INTRODUCTION

1.1. Distributional Semantics.

1.2. Approaches to phrase modelling in distributional semantics.

1.3. An approach based on probability theory.

- Advantages of using probability theory (simplicity of model, generative perspective, no ad-hocery)
- Bayesian Inference as straight forward way to fit generative models

1.4. Bayesian Nonparametrics.

- Advantage: model complexity is adjusted to the data

2. A LINEAR APPROACH: PROBABILISTIC MATRIX FACTORIZATION

matrix factorization paper

3. MAYBE: EXTENDING THE LINEAR APPROACH TO A MODEL OF CLASSICAL CONDITIONING

Linear approach can be interpreted as a model of classical conditioning akin to the Rescorla-Wagner model. It can be extended to allow more than one combination of cue and outcome in a similar fashion as the Rescorla-Wagner model.

4. BAYESIAN NONPARAMETRIC CONTINUOUS PRIORS

In the matrix factorization paper it becomes evident that a dimensionality-mixture for continuous latent variables would be desirable. Also, infinite-dimensional nonparametric priors have shortcomings (cf. Jeffs papers/thesis). Thus we develop our own nonparametric continuous prior.

5. SHORTCOMINGS OF INFINITE-DIMENSIONAL PRIORS

6. EXISTING TECHNIQUES TO SAMPLE FROM DIMENSIONALITY-MIXTURE MODELS

Reversible Jump, evidence-based

7. A PRIOR FOR NONPARAMETRIC CONTINUOUS LATENT VARIABLES

8. A NONLINEAR APPROACH TO MATRIX FACTORIZATION USING GAUSSIAN PROCESSES

- Advantages
 - comparison of phrases which differing number of words possible as opposed to linear model - thanks to covariance function and matrix norm
 - nonlinear model means lower dimensionality for latent variables
- Problem: complex implementation

8.1. **Implementation for modelling directed, weighted graphs.** Every edge contains two words (nodes) and is weighted with their cooccurence count (edge weight).

8.2. **Implementation for modelling directed, weighted hypergraphs.** An edge contains an arbitrary number of words (nodes) and is weighted with their cooccurence count (edge weight).