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Bayesian Models in Machine Learning: An Introduction

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Abstract

Bayesian models constitute a very important tool in nowadays Machine Learning's landscape. They are specially useful in the context of unsupervised learning. There are many applications of Bayesian Models; to cite some of them: large-scale document analysis, speech recognition and computer vision.

The purpose of this course is to provide a quick inside into some of the methods that are present in Bayesian Models, grasping some of its theory/background, as well as its usage in simple examples. Whenever it is feasible, the mathematical machinery behind each method will be emphasized.

Tentative topics. The topics for this course will be selected from the following list:

- General introduction: Generative Models, Gaussian Mixture Model. Expectation-Maximization.
- Approximate inference in Bayesian models (Monte Carlo method, Variational Inference for a Gaussian Mixture).
- An application: Topic Modeling (Latent Dirichlet Allocation) and its differents variations. Non-parametric Bayesian Models.

References

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