



JOHNS HOPKINS

WHITING SCHOOL
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Algorithms for Data Science

Statistical Algorithms: Introduction

Module Learning Objectives

1. Define the foundational principles of statistical algorithms, including their reliance on probability and statistics for modeling uncertainty.
2. Compare different statistical algorithms, such as Bayes Classifier, Naive Bayes, Gaussian Mixture Models, and Expectation-Maximization, based on their assumptions, strengths, and limitations.
3. Apply statistical algorithms to real-world problems, such as text classification, anomaly detection, and image segmentation, to derive insights from data.
4. Analyze the computational complexity and theoretical correctness of statistical algorithms, including their convergence and sensitivity to initialization.
5. Evaluate the suitability of specific statistical algorithms for various data-driven tasks, considering factors like data dimensionality, independence assumptions, and application requirements.

Statistical Algorithms: Overview

Expectation
Maximization

Bayes Classifier

Naïve Bayes

Gaussian Mixture
Models

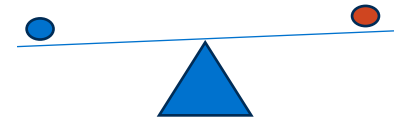
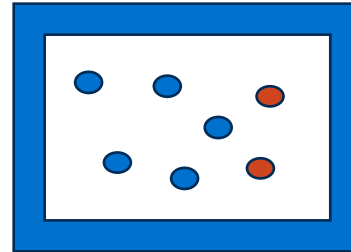


What Are Statistical Algorithms?

Algorithms that leverage probability and statistics to model uncertainty, infer relationships, and make predictions.

Key Characteristics

- Operate under uncertainty and noise.
- Use probability distributions to model data.
- Provide interpretable insights.



Applications

Spam Detection

Segmentation

Density Estimation



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