

EE-605

Statistical Sequence Processing

Bourlard Hervé

Cursus	Sem.	Type
Electrical Engineering		Opt.

Language of teaching	English
Credits	4
Session	
Exam	During the semester
Workload	120h
Hours	56
Courses	28
TP	28
Number of positions	20

Frequency

Every 2 years

Remark

CANCELED

Summary

This course discusses advanced methods extensively used for the processing, prediction, and classification of temporal (multi-dimensional and multi-channel) sequences. In this context, it also describes key links between signal processing, linear algebra, statistics and artificial neural networks.

Content

- Introduction: statistical (static and dynamic) pattern recognition, temporal pattern recognition problems
- Basic tools in temporal pattern modeling: Correlation, autocorrelation, linear/nonlinear AR, ARMA and ARCH modeling
- Statistical pattern recognition: Bayes classifiers, artificial neural networks (ANNs), discriminant functions, Expectation-Maximization algorithm, dynamic programming
- Sequence processing: discrete Markov models, hidden Markov models (HMM), autoregressive (AR)-HMM, hybrid HMM/ANN systems, parameter estimation (EM and forward-backward algorithms applied to these models)
- Laboratory exercises: in statistical pattern recognition, autoregressive modeling, Markov models and hidden Markov models

Keywords

Statistical modeling, Markov models, hidden Markov models, artificial neural networks for sequence processing.

Learning Prerequisites**Recommended courses**

Undergraduate level statistics, linear algebra (matrix computations, up to PCA) and minimum knowledge/interest in signal processing and machine learning. Programming in Matlab or similar.

Assessment methods

Multiple.

Resources

Websites

- <http://www.idiap.ch/resource/lectures/statistical-sequence-processing>