EE-605 **Statistical Sequence Processing**

Bourlard Hervé

Cursus	Sem.	Type
Electrical Engineering		Obl.

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

Next time: Spring 2020.

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 (matric 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