Signal, Speech and Language Processing

Basic information

Sivuaine suomeksi: Signaalin-, puheen- ja kielenkäsittely

Biämne på svenska: Signal-, tal- och språkbehandling

Code: ELEC3034

Extent: 20-25 credits

Language: English

Professor in charge: Mikko Kurimo

Target group: All students with sufficient prerequisite knowledge.

Application procedure: No separate application procedure.

Prerequisites: There are no compulsory prerequisite courses. However, in order to succeed in the minor the student needs good skills in mathematics, especially in linear algebra, calculus, probability theory and statistics, programming skills, basic understanding of linear systems and basic knowledge and skills in analog and digital signal processing. In Aalto University helpful courses include for example MS-A0003 Matrix algebra (ELEC1) and similar courses, MS-A0501 First course in probability and statistics and similar courses, ELEC-A7100 Basic Course in C programming, ELEC-A7200 Signals and Systems, ELEC-C5230 Digital Signal Processing Basics, ELEC-C5340 Applied Digital Signal Processing and ELEC-C5210 Stochastic Processes in Communications.

Content and structure of the minor

The purpose of the minor is to provide the students with a background in either Modern Signal Processing or Speech and Language Processing. Courses in Signal Processing provide a toolbox of knowledge on signals and systems modeling, representation through transforms, and systems optimization and implementation. Some emphasis will be given on the most recent research priorities in the field of signal processing, such as the domains of data analysis, compression and storage, communications and representation of signals. Courses in Speech Processing provide the students with the basics of speech and language processing, as well as the ability to apply those in various fields of science and technology. Speech and Language Processing utilizes signal processing, mathematical modeling and machine learning for statistical language modeling, information retrieval, and speech analysis, synthesis, recognition and coding.

The minor consist of two common compulsory courses (10 cr) and two or three elective courses (10-15 cr).

Code	Name	Credits	Teaching period
Compulsory courses		10	
CS-E3210	Machine Learning: Basic Principles	5	I-II
ELEC-E5410	Signal Processing for Communications	5	I-II
Optional courses		10	
Choose 10 credits.			
CS-E4600	Algorithmic Methods of Data Analysis	5	I-II
ELEC-E5422	Convex Optimization I P	5	I
ELEC-E5423	Convex Optimization II P	5	II

ELEC-E5431	Large Scale Data Analysis P	5	III - IV
ELEC-E5521	Speech and Language Processing Methods P	5	III - IV
CS-E4070	Special Course in Machine Learning and Data Science	3-10	
ELEC-E5500	Speech Processing	5	I-II
ELEC-E5510	Speech Recognition P	5	II
ELEC-E5550	Statistical Natural Language Processing P	5	III - IV
ELEC-E5440	Statistical Signal Processing P	5	I-II