PhD research topic proposal
BME, Doctoral School of Mathematics and Computer Science

Name of supervisor:

Balázs Csanád Csáji

Degree:

Ph.D. in Computer Science

Title of the topic:

Statistical Learning

Short description:

Statistical learning theory covers machine learning approaches in which various (typically mild) statistical assumptions are made on the data, in order to provide stochastic guarantees for the obtained models. The filed includes both supervised learning (e.g., classification and regression) and unsupervised learning (e.g., clustering and anomaly detection) approaches. One of the fundamental problems is to provide guarantees for the generalization capabilities of a method, e.g., building on a finite sample of observations, how well can it predict unseen measurements. Kernel methods, including support vector machines, constitute one of the fundamental tools of field. Their foundations are based on the theory of Reproducing Kernel Hilbert Spaces (RKHSs) and the resulting estimation methods often lead to (uncertain) convex optimization problems. A potential research direction is to study recent advances in the theory optimization under uncertainty, as well as bootstrap- and Monte Carlo tests to provide a novel viewpoint on the problem of generalization. Studying how (conditional) distributions embed in RKHSs (kernel mean embedding) can be another possible research direction, which could lead to new results in, e.g., causal inference and change detection.

Requirements:

Solid background in probability and statistics, programming skills (e.g., Matlab, Python)

Contact:

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Place of work:

SZTAKI (Institute for Computer Science and Control, Budapest, Hungary)

Statement: *The conditions of the research above are satisfied, the theme is confirmed by the Head of the Department/Institute*