Speaker: George Barmpalias

Title: From algorithmic learning of languages to learning probability distributions (and back)

Abstract: Algorithmic learning theory traditionally studies the learnability of grammars given sufficiently long texts, while recent work by (Vitanyi and Chater 2017) and (Bienvenu et al. 2014) has adapted this framework to the study of learnability of probability distributions from random data. In this study, one is given a sufficiently long stream of random data and the task is to guess a probability distribution with respect to which the data is algorithmically random. We show certain equivalences between algorithmic learning of languages and probability distributions, that allow to transfer much of the classic theory to the study of algorithmic learning of probability distributions. In particular, we prove that for certain families of probability measures that are parametrized by reals (texts), learnability of a subclass of probability measures is equivalent to learnability of the class of the corresponding real parameters. Based on these equivalences, we present a number of applications, providing many new results regarding explanatory and behaviorally correct learnability of classes of measures, thus drawing parallels between the two learning theories.

This is joint work with Nan Fang and Frank Stephan.