Some limitations and possibilities of data-driven optimization

Abstract:
As we grow highly dependent on data for making predictions, we translate these predictions into models that help us make informed decisions. But how do the guarantees we have on predictions translate to guarantees on decisions? In many cases, we learn models from sampled data and then aim to use these models to make decisions. This intuitive approach turns out to have non-trivial limitations. In some cases, despite having access to large data sets, the current frameworks we have for learnability do not suffice to guarantee desirable outcomes. In other cases, the learning techniques we have introduce estimation errors which can result in poor outcomes and stark impossibility results. In this talk we will formalize some of these ideas using convex and combinatorial optimization and discuss some possibility and impossibility results of this agenda.