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Robust Optimization, Sparse Learning, and Large-Scale Text Analytics

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I will provide an overview of recent research in the area of robust optimization, sparse machine learning and text analytics.

Robust optimization is a relatively recent set of techniques that allow one to handle uncertainty in optimization problems. In its basic form, it requires the modeler to come up with a model of how uncertainty affects the coefficients of (say) a linear program. In particular, the approach offers a principled way to perform data dimensionality reduction, for a wide class of very large-scale optimization problems. I will cover various concepts and applications of robust optimization, with a focus on multi-period decision problems, ranging from cash flow liability management to energy resource management.

In a second part of the talk, I will focus on text analytics. Our approach rests on sparse machine learning algorithms, which offer reliable ways to discover statistical associations between terms in large corpora. I will show how to use these tools to provide understanding of a large corpora of air flight safety reports that are generated by US commercial pilots. I will describe a web site developed at UC Berkeley, statnews, that allows media scholars to perform real-time analyses of large collections of news.

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