Aggregating Human Expertise:
An Application for Alternating Projection Algorithms

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Abstract

In the panel aggregation problem, each expert on a panel forecasts the chance of a set of events (about, say, the future state of the stock market). The events in question are logically complex and dependent; since the judges are human, the forecasts are plagued by probabilistic incoherence. Several methods have been proposed to fuse the experts' disparate forecasts into a coherent corpus. For problems of interest, these methods are impractical in theory and practice; applications in risk assessment, marketing, and business demand a new approach. What is an efficient algorithm for aggregating the advice of hundreds of judges who provide forecasts for thousands of events?

In this talk, we discuss ongoing research aimed at addressing this question using alternating projection algorithms (e.g., the von Neumann-Halperin algorithm). In particular, we show how such classical algorithms can be applied to construct fast and scalable algorithms for aggregating forecasts of chance. We validate the algorithms with experiments in market and geopolitical forecasting.

In addition, we discuss how the same methods are useful in other distributed decision making tasks. In particular, we discuss how von Neumann-Halperin can be applied to derive energy and bandwidth efficient training algorithms for distributed kernel regression in wireless sensor networks.

Joint work with Professors Sanjeev Kulkarni (EE), Daniel Osherson (Psych), and Vincent Poor (EE).

Slides for talk