Simulating the Analytic Value Chain

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Data collection efforts, data mining algorithms, predictive modeling technologies and strategy development methodologies define the analytic value chain of a business operation:

Data → Models → Strategies → Profit

It is intuitively clear that improvements anywhere in the chain can propagate to eventually lead to higher profit. However, the sensitivities of profit with respect to changes in the analytics can be difficult to understand. For example, buying additional data may lead to improvements of a score in an area that is too far away from the operating point to have much of an effect on the decisions made by the score, and therefore profit will remain virtually unchanged. Obviously a business wants to invest only in those analytic improvements that lead to significant profit improvements and provide good ROI.

We present a novel simulation framework (Analytic Value Chain Simulator) for estimating the value of an analytic innovation and its sensitivity to operating conditions. The simulator models the entire value chain, so that data generation, model fitting, and strategy optimization become integral parts of a simulation.
We demonstrate insights gained from simulations on a number of simplified case studies, including the value of improved data sources, the value of improved reject inference techniques, and the value of closing the feedback loop with added experimentation.