



## Discovery Corps, Inc. Corporate Healthcare Résumé

### ***Risk Screening - Premature Births***

For a prestigious university hospital, we developed a predictive, risk-screening model for premature births. Observational data on 1600 factors had been collected for more than 15,000 patients over a period of almost 20 years. Our team created sophisticated algorithms to select the most useful risk factors from the total set. We also produced interactive, decision-support software for visualizing and analyzing the interaction among risk factors and their impact on the outcome.

### ***Risk Screening - Total Patient Universe***

We segmented and profiled the complete universe of patients enrolled in a large managed-care program. For the patients fitting a given profile, we produced estimates of their future cost of care. These estimates provided the managed care organization (MCO) with a baseline of risk exposure for the next year. It also helped the MCO identify candidates who would benefit significantly from disease management programs (e.g., for smoking cessation, asthma management, diabetes management, etc.)

### ***Economic Outcomes Analysis - Drug Efficacy***

Using health care claims as a source database, we analyzed the economic effectiveness of drug treatments for various patient segments, such as allergy/asthma and headache patients. Our findings indicated that particular patient groups showed significant cost benefits when they followed certain drug regimens. To discover these key patient groups, the team developed a custom rule induction algorithm combining robust statistics with a novel search algorithm.

### ***Association Analysis - Prescribing Patterns & Drug Design***

Working with disease management groups at large pharmaceutical companies, we profiled the prescribing patterns of physicians. Our association analysis identified both well-known and novel combinations of medications that are prescribed together. The clients used this novel information as a starting point for new drug design, combining the therapeutic benefits of multiple medications into a single drug.

### ***Capitation Contracting - Medical Supplies***

In a joint project with an MCO and a large medical supply company, we modeled supply utilization at a set of diverse, distributed facilities in a sizable metropolitan area. The supply utilization model enables both the MCO and the medical supplier to accurately estimate the savings resulting from a risk-sharing supply contract. We also developed a population index to adjust for changes in the patient population.

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### ***Fraud Management - Medical Care***

Working with fraud and abuse experts at a major insurance carrier, our team employed neural network clustering to profile several physician specialties (e.g., podiatry, chiropractic, etc.) and to identify fraudulent providers within these specialties. The database application developed for this project has been commercialized for sale to insurance carriers and managed-care companies.

### ***Fraud Management - Pharmacy***

We segmented pharmacies based on their aggregate customer profiles and store category. Clustering the pharmacies within these segments, we first identified key factors associated with unusual or fraudulent activity. We then ranked the pharmacies by an overall suspicion index. This ranking was used to order the pharmacies for audits and the recovery of excess payments.

### ***Campaign Management - Pharmaceutical Sales and Marketing***

For major pharmaceutical companies, we linked sales promotion data with physician prescribing behavior. We built models to understand and predict physician churn (switching from one product to another), acquisition (beginning to write prescriptions for a new or existing product), and retention (continuing to write prescriptions for a product). Based on these models, the client designed new marketing campaigns and evaluated the effectiveness of both previous and current campaigns.

### ***Image Analysis - Breast Cancer Classification***

An ultrasound equipment manufacturer engaged us to collaborate on a breast cancer examination system. We developed a neural network classifier with very high sensitivity and specificity. The system functions as a physician aid for interpreting biopsy results. In the course of the development, we patented a novel technique for explaining the classification produced by the neural network.

### ***Computational Chemistry - Finding Bioactive Compounds***

For a biotech company, our group modeled the combined effects of base compounds, reagents, and solvents on the bioactivity of the resulting product compounds. Our work improved the “hit rate” for finding bioactive compounds by a factor of 50 to 1. The model reduces significantly the need for expensive synthesis of compounds that are unlikely to be useful pharmaceuticals. In the course of the project, we developed a new neural network that outperformed several conventional algorithms (backpropagation and radial basis function neural networks) in predicting the bioactivity of the resultant compounds.