

How data science solves health care problems

What do data scientists do for fun – and to sharpen their keen analytical skills? They solve incredible problems. Recently, a team of our data scientists stepped up to the plate to help physicians looking to apply deep brain stimulation (DBS) as a treatment for epilepsy.

Health care is getting into the crowdsourcing game to solve complex problems at an affordable price point. Together with the Mayo Clinic, the Michael J. Fox Foundation challenged teams of data scientists to help with a particular needle-in-a-haystack project focused on the more than 2 million people with epilepsy and the half million who are subject to drug-resistant seizures.

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Physicians using DBS need highly specific information on the data surrounding pre-seizure brain activity. EEG data from both human and canine subjects were provided to approved teams.

The teams had to find a variable to identify an algorithm to predict seizure activity. In other words, predict who will have a seizure and who will not. Two hundred teams took the 60-day challenge. Our company came in second by .0006 of a percentage point – a photon finish, if you will. The benchmark for this project was 65 percent accuracy, and the top two teams hit 95 percent – that's a home run in the data science world.

This kind of problem solving goes directly to what the health care industry is trying to do as it moves to value-based care. The data scientists engaged in predictive analysis, the area of data mining concerned with forecasting probabilities and trends. Knowing what happened in the past is important to addressing issues within the organization, but getting proactive requires a bit of a crystal ball.

So what are the components of predictive analysis? First, there's descriptive and exploratory data analysis, which acts as a baseline with the goal of normalizing the data and identifying the outliers. From there, inferential analysis is used to create incomplete data sets. Not surprisingly, health care data are messy compared to other industries. The condition of health care data is comparatively juvenile and as such requires a level of sophistication to drive actionable insights. Addressing the "missingness" of the data is critical in moving forward. Bridging gaps in understanding is key to finding answers.

To create meaningful change and improvement, predictive analytics must move into something we call the "mechanistic phase." That's the successful implementation of what's been discovered so that when action is taking place, the outcomes are expected. In fact, Dr. Benjamin Brinkmann of the Mayo Systems Electrophysiology Lab asked the data scientists engaged in the Fox Foundation/Mayo Clinic contest to document the algorithm so that their researchers could use it as a basis for innovation.

As health care moves closer to the Holy Grail of value-based care, predictive analytics – and the data scientists wielding this powerful tool – take on an essential role to help health systems and payers make sense of all the data they're collecting.

