**IT601- Research Topics**

**Predictive Analytics in healthcare: Promise and potential**

Introduction

Predictive analytics is the use of data, statistical algorithms and machine learning techniques to identify the likelihood of future outcomes based on historical data. The goal is to go beyond knowing what has happened to providing a best assessment of what will happen in the future (SAS, 2017). It makes it possible to harness the power of big data to improve the health of patients and lower the cost of health care (Cohen, Amarasingham, Shah, Xie, & Lo, 2014)

Big data

In healthcare, the term big data typically refers to large quantities of electronic health record, administrative claims, and clinical trial data as well as data collected from smartphone applications, wearable devices, social media, and personal genomics services (Hernandez & Zhang, 2017)

As more electronic health data become available, some health systems have begun to develop predictive models around clinical issues, such as acute intensive care unit decompensation and hospital readmissions (Bates, Saria, Ohno-Machado, Shah, & Escobar, 2014)

It is highlighted that data—especially from mobile phone and social media—can be utilized in fighting hunger, disaster and poverty. This report talks about “data philanthropy” where the companies, whose businesses revolve around data, can collaborate with the UN in predicting imminent humanitarian crises and help take possible steps to avoid situations that can lead to disasters. In the developing countries, the farmers are often less informed about the soil conditions, extreme changes in the weather patterns, plantation, topography and access to markets (CFA, 2015; Kshetri, 2014)

In this emerging era of big data, predictive analytics models can use a variety of current or historical information such as claims, clinical, social, and genomic data to make predictions about the future. The early use of predictive analytics models in medicine has focused on identifying patients at high or low risk for serious complications or adverse clinical events, preventing those adverse events, and optimally allocating scarce clinical resources. The most common example is identifying patients at high risk of hospital readmission (Cohen et al., 2014).

Post discharge Care Hospital readmissions represent an important driver of spending, with all-cause 30-day readmissions costing the US health system more than $41 billion annually, and thus are a major quality indicator for health systems (Hines, Barret, Jiang, & Steiner, 2014).

Other matters growing in importance among the Most Wired hospitals and health networks include using data to make the transition from volume-based to value-based reimbursement; helping to connect hospitals in remote locations with specialists via video or audio; and continuing to work to make electronic health records more useful and shareable among different hospitals and health systems.

Why is predictive analytics important?

Organizations are turning to predictive analytics to help solve difficult problems and uncover new opportunities. Common uses include:

**Detecting fraud.**Combining multiple analytics methods can improve pattern detection and prevent criminal behavior. As cybersecurity becomes a growing concern, high-performance behavioral analytics examines all actions on a network in real time to spot abnormalities that may indicate fraud, zero-day vulnerabilities and advanced persistent threats.

**Optimizing marketing campaigns.** Predictive analytics are used to determine customer responses or purchases, as well as promote cross-sell opportunities. Predictive models help businesses attract, retain and grow their most profitable customers.

**Improving operations.**Many companies use predictive models to forecast inventory and manage resources. Airlines use predictive analytics to set ticket prices. Hotels try to predict the number of guests for any given night to maximize occupancy and increase revenue. Predictive analytics enables organizations to function more efficiently.

**Reducing risk.** Credit scores are used to assess a buyer’s likelihood of default for purchases and are a well-known example of predictive analytics. A credit score is a number generated by a predictive model that incorporates all data relevant to a person’s creditworthiness. Other risk-related uses include insurance claims and collections.

**Concerns**

Some health professionals have raised concerns about the application of predictive analytics, not the least of which is the perceived diminution of the role of the physician in managing clinical uncertainty (Sniderman, D’Agostino, & Pencina, 2015). Other concerns include protection of patient privacy, diminishment of patient preferences, and inadequate medical training ([Amarasingham,](https://www.ncbi.nlm.nih.gov/pubmed/?term=Amarasingham%20R%5BAuthor%5D&cauthor=true&cauthor_uid=25006140) [Patzer,](https://www.ncbi.nlm.nih.gov/pubmed/?term=Patzer%20RE%5BAuthor%5D&cauthor=true&cauthor_uid=25006140) [Huesch,](https://www.ncbi.nlm.nih.gov/pubmed/?term=Huesch%20M%5BAuthor%5D&cauthor=true&cauthor_uid=25006140) [Nguyen,](https://www.ncbi.nlm.nih.gov/pubmed/?term=Nguyen%20NQ%5BAuthor%5D&cauthor=true&cauthor_uid=25006140) & [Xie,](https://www.ncbi.nlm.nih.gov/pubmed/?term=Xie%20B%5BAuthor%5D&cauthor=true&cauthor_uid=25006140) 2014). Health professionals had similar hesitations more than a decade ago when considering implementing EHRs. However, algorithms routinely outperform practitioners’ clinical intuition without decision support. Algorithms also may enhance the quality of interaction between physicians and patients— for example, machine learning algorithms based on retrospective data can provide survival projections that may help inform discussions regarding end-of-life care for patients with advanced cancer. However, physicians will still need to exercise clinical judgment, and with appropriate training can combine new insights learned from predictive analytics alongside patient preferences to make higher-value treatment decisions.

Predictive analytics have been used in a wide variety of settings, including higher education, to manage finances, inventory, operations, assets and resources. Increasingly, higher educational institutions are turning to business intelligence tools and techniques for enrollment management and student recruitment. The next great wave for predictive analytics adoption in higher education is focusing on institutional performance outcomes and individualized student success

Many types of captured data are used to create models and images of the Earth’s structure and layers 5,000-35,000 feet below the surface and to describe activities around the wells themselves, such as machinery performance, oil flow rates and pressures. With approximately one million wells currently producing oil and/or gas in the United States alone, and many more gauges monitoring performance, this dataset is growing daily.

The biggest question: Where is more oil? The next biggest question: How do we get substantially more out of the ground safely, with minimal environmental impact? The less sexy, but possibly more relevant question is: How do we use data that has such potential to unlock these answers?

What is predictive analytics, and why all the talk? Predictive analytics is essentially the process of using any of one or more statistical techniques to analyze real-time or historical data, with the intent of making some sort of prediction about the future. The subject has become more prominent largely because of growing dialogue about a related topic: big data. As business and research entities around the globe produce increasingly complex data sets, tools for not only organizing and storing but also filtering and analyzing the data have become necessary. Predictive analytics is one of the tools that have emerged from this need.

Predictive analytics in the oil and gas industry to improve oil and gas recovery rates, reduce asset maintenance costs, and reduce non-productive time.