



Data Analytics for Healthcare:

Creating understanding from big data

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Data analytics is an essential resource for any profession. This collection of data and information is capable of forecasting the future. From understanding what services customers deem necessary to the cost effectiveness of a recently implemented technology, data analytics is a vital part of any corporation, business or organization.

Analytics plays a more pivotal role for healthcare than it might in financial and business markets. Understanding data points to ever-changing trends, including new research findings, emergency situations and outbreaks of disease. Thus, effective use of analytics in the healthcare industry can improve current care but more importantly can facilitate preventive care.

What is Big Data

The sum of all of the information and data related to patients, healthcare and well-being make up “big data” in the healthcare industry. This includes everything from social media posts and web pages to emergency correspondence, news feeds and articles in medical journals. Understanding and utilizing this vast amount of data has the potential to improve care and save lives, but this potential is lost without a way to create connections and understand patterns and trends. Thus, to take advantage of the explosion in data, data analytics are needed to create understanding and actionable conclusions.

What is Data Analytics?

Data analytics is the examination of data with the intent to draw a conclusion from the information. Data analytics is used in every industry; from the most popular burger during dinnertime at a restaurant to what direction a baseball player is more likely to hit a ball off of a right-handed pitcher. In emergency care, data analytics helps emergency teams efficiently sort through raw data, message traffic and news feeds from the Internet to define the “where” and “when” immediately. In preventative care, data analytics spots outbreaks, trends and prepares healthcare specialists for the challenges they’ll be facing in the future. Medical research also benefits greatly from data analytics. The ability to collate research, filter findings and stay abreast of the latest research-based best practices helps teams collaborate, improving testing methods and successfully

apply for grants based on need and up-to-date information.

Analyzing data is more than just an educated guess or an assumption, but a determination of future events based on current facts and trends. Data analytics can be broken down into two different spectrums: Exploratory data analysis and confirmatory data analysis.

Exploratory data analysis, also known as EDA, is used to determine new trends in a specific marketplace or industry. Business companies and financial forecasters determining the next big trend often use EDA. From determining the next big electronic device based on what’s currently purchased by consumers, to what strain of flu might go around in the next flu season, exploratory data analysis is used to determine this information.

On the other hand, confirmatory data analysis, or CDA, is used to prove or disprove existing hypotheses. In the medical field, CDA is used to determine everything from the origin of a specific disease to what common medication is most beneficial in treating current symptoms. This is generally how new drugs are developed, where over time, researches use a combination of products and medications to test and improve treatments. After years of research and compounding data, researches are capable of performing comprehensive data analysis over all the data, in order to determine if the medical combination is, in fact, capable of treating the illness.

Before Analytics

Before modern science began to take shape in the 19th century, most doctors depended on

independent knowledge, skill and slight luck when diagnosing people. Little knowledge was available on most common sicknesses, let alone what caused it. Doctor's knew the symptoms and possibly the name of the disease, but other than that, most physicians could do little to treat the infection, and often times, the cure appeared far more drastic than the condition itself. Not until healthcare analytics come into play did the medical field begin to comprehend what caused such problems in local citizens.

If healthcare analytics existed in the middle ages, avoiding the black plague may have saved millions of lives. With proper data analysis, individuals in the medical field could have pinpointed one similarity in all cases: the water. In Germany for example, many of the citizens came from different areas of the country, most of which ate different food. However, all drank the same water. Yet, those people seemingly immune to the black

plague were the monks, isolated from the rest of the community in abbeys, drinking not water but beer. Modern healthcare analytics quickly would have pointed to water as the death-causing culprit, while the boiling process eliminated bacteria in the water, keeping monks healthy.

Sadly, many in the medical community remain in the dark ages by not properly using healthcare analytics to determine the needs of patients and their community. This is a limitation in the current medical facility, resulting in poor treatment options for local patients. Data analysis obtained directly from a community is capable of identifying key needs local citizens have, what their most common ailments are, services they require and just about any other variety of information needed. It is essential for a medical provider to tailor its services towards the community and effective use of analytics turns big data into actionable information for local care providers.

Modern Analytics

Before the advent of modern analytics, researchers and analysts were forced to pour over thousands of pages of data, resulting in thousands of hours of labor to make a simple conclusion based on the combined data. Often times, information was missed during this transition period, in which data was analyzed, but not to a great extent, simply because no methodology allowed large spectrums of data to be studied relationally. Sample groups could provide insights as to what the larger, general public might like or enjoy, but outside of these sample groups, looking over the needs for hundreds of thousands of individuals proved costly and far too time consuming.

With the growth of information, big data is growing every larger, necessitating a system to create understanding from multiple data sets. A

flexible platform is essential to accept multiple data sources and should have these important features:

- The ability to search information by relationships between entities
- Index information from any source type including social media, feeds, databases and file shares
- Ability to customize the environment based on individual needs and data sets
- Tunable search algorithms for significance, relevance, temporal decay and geo-spatial decay
- Simple third party integration using JSON, XML, RSS and/or KML
- Visual interface that is easy to use
- Natural language processing
- Ability to combine structured and unstructured data

Analytic tools, such as **IKANOW's own Infnit.e**, enable organizations to go through different data flows, all of which are completely customizable to gain intelligence into their most pressing questions. Today, healthcare needs to go beyond simple search and instead require a research-driven approach based on unknowns. This approach is often referred to as Agile Intelligence, meaning the ability to create flexible, adaptable and scalable analytics solutions to gather intelligence. Never before in the history of data analysis has something so powerful and customizable been available to the general public, and with the growth of big data, never before has the need been so great.

Modern Healthcare Analytics Data

Financial institutions often go to the extreme when it comes to predictive data analytics. Many credit card companies implement a system known as

real-time analytics, allowing them to track a data flow as it comes into the system. This allows the company to determine when a credit card may be stolen and when unwanted purchases are made. This thus helps prevent identity theft. Medical providers can now do the same, predicting when diseases will appear, what their severity may be and based on the research, which treatments patients will respond to best.

In addition to predictive care, healthcare analytics can also be used as a diagnostic service. Determining what ailment an individual might have in relation to what resources the hospital should have on hand for the medical facility to thrive all go into healthcare analytics. In terms of healthcare, companies need to know and understand what services are best for an individual with a specific need. After understanding the data of all past services and clients, it is possible to determine what course of actions will best help

future patients. Without proper data analysis, treatment is done on an ad hoc basis often based on outdated research. A direct, knowledge base method, which almost always ensures the right treatment is used the first time, reducing the total amount of time a patient may need a doctor, hospital visits or other medical needs.

Collecting Healthcare Analytics Data

The collection of data is incredibly important when it comes to healthcare analytics. This might be data collection from the patient, tapping into the databases of medical journals or monitoring forums of patients or doctors online. Knowing and understanding how to find and use that data is essential in having a complete view of the needs of a patient.

Typically, most medical facilities collect introductory data before ever seeing a patient. This includes standard information such as name, weight, age, past medical conditions and family history. This information is important, as the information can then be compared to other data flows containing similar information to determine if the patient shares like causes and symptoms. However, data collection must not stop there. This is merely the tip of the iceberg, which needs uncovering.

Notations must continue on throughout the entire treatment process, to see how illnesses and symptoms progress and how they compare to the results of other patients in the community. Detailed records compared to historical databases not only help the current patient, but also determine future preventative practices for the same illness. With the ability to collect and use data, it is possible to pinpoint similarities between

patients. This provides a data analysis program the ability to create understanding and help point to other causes and better forms of treatment.

Seemingly unrelated information may uncover correlations or treatments for ailments. Anything from when someone eats breakfast to when they go to bed may prove beneficial towards creating a better lifestyle for the people. The ability to combine medical research with local findings also means providing localized and more effective treatments. It is often impossible to determine what material may prove vital in the healthcare industry, so gathering and understanding big data may help produce a new practice in healthcare.

How to Get Started with Big Data

Big data is already here. Vast amounts of information are available to medical researchers,

practitioners and administrators. Being able to access and understand this data means improved patient outcomes, cost-savings and faster development of treatments and medical breakthroughs. At the end of the data, big data means saving lives.

No one has time to pour over the flood of big data, so a customizable agile intelligence system is needed to translate data into knowledge. With this knowledge, modern healthcare can truly prevent illness and diagnosis with an understanding of the context of each patient.

*Want to learn more about agile intelligence or get started using data analytics? IKANOW's open source data analytics tool Infini.t.e is the perfect place to start. **Request a demo** from IKANOW's team to show how the platform can fit your individual needs.*



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