Do You Know Your Algorithms?

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If you want to drill down to the root cause behind what drives so much value in today's world, then you need to know your algorithms. An algorithm is a set of instructions that processes inputs and provides some output. Companies that master their algorithms unleash incredible value. Take for example Uber which relies on algorithms to locate available drivers for customers, processes locations and times, and then delivers online progress and statistics of the ride. When you couple algorithms with great design, then you have a value proposition that others will want. Therefore, getting your algorithms right has profound implications on your business.

One of the reasons algorithms are so powerful is that they help predict things in advance. This is usually accomplished by running a series of 'if then' statements to discern patterns. For example, algorithms tell Home Depot and Lowes which inventory items to stock and how much according to weather forecasts. When a hurricane is expected to make landfall, algorithms measure the intensity and size of the storm, match the target location in terms of population and other demographics and turn out forecasted inventory requirements so every store can maximize meeting future demand.

One popular type of algorithm is the pricing algorithm. These algorithms alter and change prices according to existing capacity and demand. Airlines use these algorithms to maximize revenues for open seats on planes. This same approach is used by other companies who can only produce so much, but want to place and sell their limited products at the right time and place for maximum revenues.

Every company that operates on the internet is run by algorithms. For example, when you visit Amazon and review a product, other similar type products show up giving you alternative choices. Amazon uses algorithms to display the types of products you are likely to buy, generating more sales. According to i2 Technologies, a company that develops algorithms, their clients will save $ 75 billion through the use of algorithms over the next ten years.

"Algorithms increasingly run our lives. They find books, movies, jobs, and dates for us, manage our investments, and discover new drugs. More and more, these algorithms work by learning from the trails of data we leave in our newly digital world. Like curious children, they observe us, imitate, and experiment. And in the world's top research labs and universities, the race is on to invent the ultimate learning algorithm: one capable of discovering any knowledge from data, and doing anything we want, before we even ask." - The Master Algorithm: How the Quest for the Ultimate Learning Machine Will Remake Our World by Pedro Domingos

Most of us know nothing about algorithms. They operate in the background of our lives, impacting everything. Execution algorithms are used by large brokers (such as Goldman Sachs) to re-allocate money using TWAP (time weighted average pricing) and VWAP (volume weighted average pricing) algorithms. Behavioral algorithms figure out the rules of competing companies and exploit the behavior

in order to realize a profit. Algorithms are critical for sorting, searching, parsing and working through mounds of data for optimal solutions. The world's financial markets, including stock exchanges, pension funds, and banking transactions are largely run by algorithms that access and interpret personal data.

"The single greatest instrument of change in today's business world, and the one that is creating major uncertainties for an ever-growing universe of companies, is the advancement of mathematical algorithms and their related sophisticated software. Never before has so much artificial mental power been available to so many—power to deconstruct and predict patterns and changes in everything from consumer behavior to the maintenance requirements and operating lifetimes of industrial machinery. In combination with other technological factors—including broadband mobility, sensors, and vastly increased data-crunching capacity—algorithms are dramatically changing both the structure of the global economy and the nature of business." - The Algorithmic CEO by Ram Charan, Fortune Magazine

Algorithms are not without issues. Take for example how the European Union has challenged Google that its search engine algorithms are a violation of anti-trust laws. Results from the algorithms allegedly show a bias in favor of products and services provided by Google. And because algorithms are not subject to independent scrutiny, any errors in the logic or data can inflict major errors that no-one detects. Increasingly, everything we do is influenced by algorithms and given the fact that so much of your business is riding on the integrity of your algorithms, it begs a simple question – Do you know your algorithms?

http://www.ted.com/talks/kevin_slavin_how_algorithms_shape_our_world?language=en