

Bill's Building Blocks

Informed Supply Chain Decisions from Vast Amounts of Data

The past year, it seems, every time I get a supply chain related news feed the buzz words big data, artificial intelligence, or machine learning are somewhere in the title. I have been struggling to understand the relationships among these words. I recently met and talked with an adjunct professor from our industrial engineering department who holds a Ph.D. in mathematics. Why would a Ph.D. in math be employed by the industrial engineering department? Machine learning was his answer to my question.

My most important takeaway was that cloud computing, big data, data mining, machine learning, and predictive analytics have a hierarchical relationship, in that order.

Cloud Computing are shared pools of computer resources that can be reconfigured, i.e. scaled up or down, with minimal management oversight. Examples include server farms owned by Amazon and Google built from massive quantities of computer servers requiring massive amounts of electrical power and cooling.

Big Data is the concept that the volume, variety, and velocity of data collection are so large that they exceed the capability of simple data capture and manipulation. For example, big data is too big to be processed efficiently with Excel. Big data could not exist without the scalability of cloud computing.

Data Mining is the extraction of specific ranges of data from the big data. Data mining includes data cleansing and the identification of outliers in the preparation of data for machine learning. Data mining is an interface layer.

Machine Learning is the development of algorithms to be applied to the mined data. For example, a hospital supply chain uses machine learning on tumor outcomes based on past patient's big data stored in the cloud. The algorithm differentiates a malignant tumor from a benign tumor. When a new patient needs tumor analysis, the machine learning algorithm compares their tumor against known malignant and benign models.

Predictive Analytics, the next layer above machine learning, is a form of **Artificial Intelligence**. Machine learned algorithms are combined without human intervention to forecast future events. Predictive analytics is built upon all of the above technologies.

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