Title: Prescriptive analytics

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Abstract - **With the flood of data available to businesses regarding their supply chain these days, companies are turning to analytics solutions to extract meaning from the huge volumes of data to help improve decision making.**

Companies that are attempting to optimize their S&OP efforts need capabilities to analyze historical data, forecast what might happen in the future. The promise of doing it right and becoming a data driven organization is great. Huge ROI's can be enjoyed as evidenced by companies that have optimized their supply chain, lowered operating costs, increased revenues, or improved their customer service and product mix.

Prescriptive analytics market is rapidly growing across the globe, as there is rise in data discovery tools, innovation in data preparation tools, evolution in business oriented social networks and easy access to multi structured data. Many enterprises are adopting this solution to make better decisions and have greater control on business application. Prescriptive analytics finds the best path of action for the given situation for enterprises. It also takes structured and unstructured data, to prescribe how to take advantage of this predicted data for business future outcomes. Prescriptive analytics helps the enterprises in decision making based on past and projected scenarios. In addition to that, prescriptive analytics solutions enable enterprises for efficiency and also reduce overall operational costs.

INTRODUCTION

Prescriptive analytics is the area of business analytics (BA) dedicated to finding the best course of action for a given situation.

Prescriptive analytics is related to both descriptive and predictive analytics. While descriptive analytics aims to provide insight into what has happened and predictive analytics helps model and forecast what might happen, prescriptive analytics seeks to determine the best solution or outcome among various choices, given the known parameters**.**

Looking at all the analytic options can be a daunting task. However, luckily these analytic options can be categorized at a high level into three distinct types. No one type of analytic is better than another, and in fact, they co-exist with, and complement each other. In order for a business have a holistic view of the market and how a company competes efficiently within that market requires a robust analytic environment which includes:

Descriptive Analytics, which use data aggregation and data mining to provide insight into the past and answer: "What has happened?"

Predictive Analytics, which use statistical models and forecasts techniques to understand the future and answer: "What could happen?"

Prescriptive Analytics, which use optimization and simulation algorithms to advice on possible outcomes and answer: "What should we do?"

Descriptive Analytics: Insight into the past

Descriptive analysis or statistics does exactly what the name implies they "Describe", or summarize raw data and make it something that is interpretable by humans. They are analytics that describe the past. The past refers to any point of time that an event has occurred, whether it is one minute ago, or one year ago. Descriptive analytics are useful because they allow us to learn from past behaviors, and understand how they might influence future outcomes.

distortions that can upend descriptive and predictive analytics, including data limitations and unaccounted-for external forces. The effectiveness of predictive analytics also depends on how well the decision model captures the impact of the decisions being analyzed.

Advancements in the speed of computing and the development of complex mathematical algorithms applied to the data sets have made prescriptive analysis possible. Specific techniques used in prescriptive analytics include optimization, simulation, game theory and decision-analysis methods.

A company called Ayata holds the trademark for the (capitalized) term Prescriptive Analytics. Ayata is the Sanskrit word for future

Prescriptive analytics are relatively complex to administer, and most companies are not yet using them in their daily course of business. When implemented correctly, they can have a large impact on how businesses make decisions, and on the company's bottom line. Larger companies are successfully using prescriptive analytics to optimize production, scheduling and inventory in the supply chain to make sure that are delivering the right products at the right time and optimizing the customer experience.

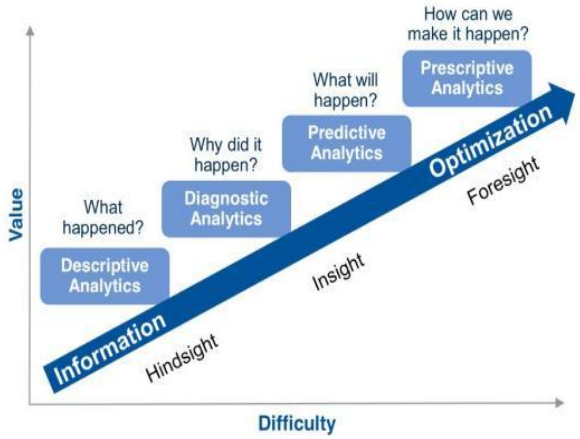
Use Prescriptive Analytics anytime you need to provide users with advice on what action to take.

The Analytics Journey: Descriptive >> Predictive >> Prescriptive

A key management challenge of our time is to advance business analytics beyond descriptive methods, into higher order predictive and prescriptive techniques. This would help in better analysis of the problems and situations in the business world.

Dr Jai Menon of IBM argues that while business analytics includes descriptive and predictive phases, the final phase of the journey is prescriptive.

Firms that are analytically competitive are not only practiced in descriptive and predictive methods, but are also adept at prescriptive techniques that can actuate responses to what happened (descriptive) or what might happen (predictive) in the future. Follow the link below to a related post that discusses what differentiates decriptive, predictive, and prescriptive analytics from each other.



Prescriptive analytics takes analytics maturity model to a new level

Prescriptive analytics provides users with the best options for dealing with given business situations based on the concept of optimizing the process of choosing between the available options. It lies at the high end of Gartner's analytics maturity model, which starts with descriptive analytics and progresses to diagnostic analytics and predictive analytics before finishing at the prescriptive level.

Both predictive and prescriptive analytics support proactive optimization of what is best in the future, based on a variety of scenarios. The problems businesses face are often quite complex and potentially can be addressed by taking multiple courses of action.

The difference between the two approaches is that predictive analytics helps model future events, while prescriptive analysis aims to show users how different actions will affect business performance and point them toward the optimal choice. As data-driven organizations continue to recognize that information can provide strategic competitive advantages, more will strive toward the prescriptive end of the analytics spectrum.

Prescriptive approach throws a lot into the mix

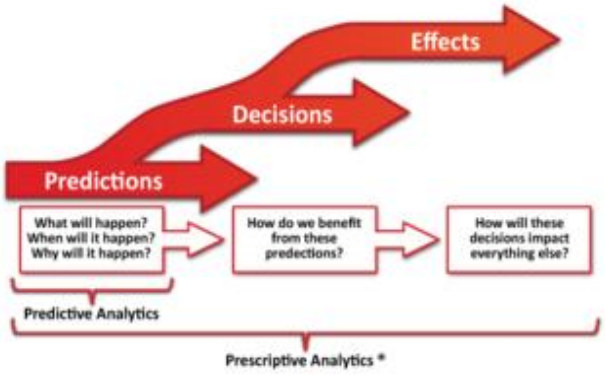
Prescriptive analytics tools formulate optimizations of business outcomes by combining historical data, business rules, mathematical models, variables, constraints and machine-learning algorithms. Prescriptive analytics, much like its predictive cousin, is used in scenarios where there are too many options, variables, constraints and data points for the human mind to efficiently evaluate without assistance from technology. It is also used when experimenting in the real world would be prohibitively expensive or overly risky, or take too much time. Sophisticated analytical models and Monte Carlo simulations are run with known and randomized variables to recommend next steps, display if/then scenarios and gain a better understanding of the range of possible outcomes.

HOW PRESCRIPTIVE ANALYTICS WORKS

Numerous types of data-intensive businesses can benefit from using prescriptive analytics, including financial services, healthcare and government. It is especially valuable in fields like these because of the high cost of human errors. Prescriptive analytics is not foolproof, however. It is only effective if organizations know what questions to ask and how to react to the answers. If the input assumptions are invalid, the output results will not be accurate.

When used effectively, however, prescriptive analytics can help organizations make decisions based on highly analyzed facts rather than jump to under-informed conclusions based on instinct. Prescriptive analytics can simulate the probability of various outcomes and show the probability of each, helping organizations to better understand the level of risk and uncertainty they face than they could be relying on averages. Organizations can gain better understandings of the likelihood of worst-case scenarios and plan accordingly.

Prescriptive analytics relies on artificial intelligence techniques, such as machine learning — the ability of a computer program, without additional human input — to learn from and adapt to new data. Machine learning makes it possible to process the tremendous amount of data available today so that companies can learn from it. As new or additional data becomes available, computer programs adjust automatically to make use of it. This process far exceeds human capabilities because it is much faster and more comprehensive. Prescriptive analytics makes use of machine learning to help businesses decide what the importance of a new development is and how to react to it based on a computer program's predictions.



WHY DO BUSINESSES NEED PRESCRIPTIVE ANALYTICS?

An average business today has a digital footprint, which forces the business owner or operator to collect, ingest, analyze, and present the data to gain competitive intelligence. As business owners or operators are typically very busy folks running their day-to-day business operations, they do not have the time and leisure to pursue data technologies or more specifically, advanced business analytics for increased

profit.

However, they need the profit margins to remain healthy for future sustenance. For most business owners like these, either a Data Center or an advanced Data Analytics team or an out-sourced data service provider has to step in to handle and manage all data technology tasks.

A previous executive survey indicated that most business executives prefer to get ready-made business solutions in times of need. In an emergency situation, the business executives need the data-driven intelligence or data-driven solutions to better run their operations, but they do not have the time or skill to pursue Data Science. This is where Prescriptive Analytics come handy.

While business operators understand their domain well and can assist in providing the needed data for analytics, they want seasoned data professionals to step in and conduct the advanced Prescriptive Analytics to arrive at definite solutions to particular problems. The prescriptive quality of advanced Data Analytics is particularly appealing to already stressed business executives who need immediate solutions to problems.

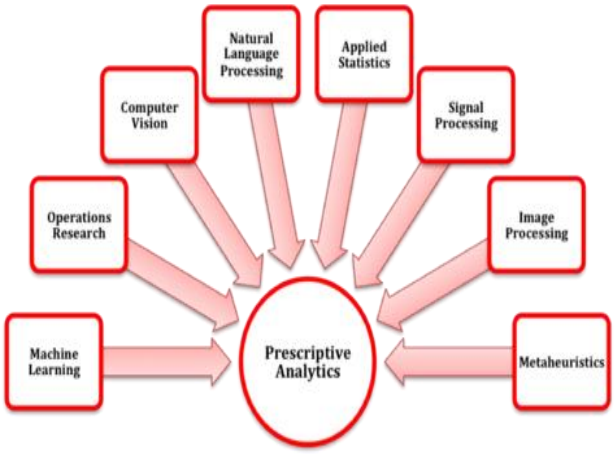
APPLICATIONS

Prescriptive analytics applications have actually been around for quite some time. Business-school operations management courses usually cover one or more prescriptive analytics tools and techniques. The software options available today include Excel and Excel add-ins from vendors such as Frontline Systems as well as products from the likes of SAS, IBM, SAP, Tibco Software, MathWorks, Ayata, River Logic and KXEN (which is being acquired by SAP). In my experience, most prescriptive analytics professionals start with Excel; if the optimization problem that needs to be solved exceeds the base capabilities of Excel and add-in options, more advanced prescriptive analytics tools are sought out.

Some examples of business processes that prescriptive analytics is being applied to include pricing, inventory management, operational resource allocation, production planning, supply chain optimization, transportation and distribution planning, utility management, sales lead assignment, marketing mix optimization and financial planning. For example, airline ticket pricing systems use prescriptive analytics to sort through complex combinations of travel factors, demand levels and purchase timing to present potential passengers with prices designed to optimize profits but also not deter sales. Another highly visible case study example is UPS's application of prescriptive analytics.

Other uses :

- **Health Care**-Predictions alone cannot solve patient care problems. An additional step i.e Prescriptive analysis which provides interpretation of associated data along with predictions, and also probable treatment procedures makes the analysis useful.
- **Sales and marketing** -In the retail Sales and Marketing operations, Prescriptive Analytics is widely used to optimize products and prices, to identify micro markets, to manage the supply chain, and to design targeted campaigns to name a few
- **Risk assessment** -Prescriptive Analytics tools are utilized to manage client risks



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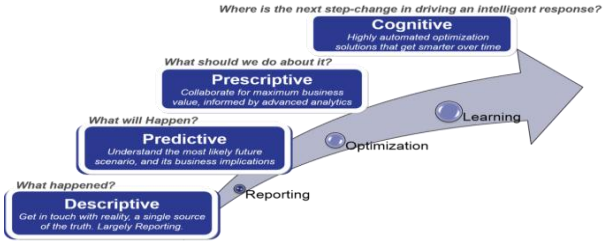
CONCLUSION

Although prescriptive analytics has exceptionally high business-impact potential, it can become overwhelming and complex rather quickly. Partly as a result of that, it remains an untapped opportunity in the vast majority of organizations. According to a recent Gartner report, only 3% of surveyed companies are currently using prescriptive analytics software, compared to 30% that are active users of predictive analytics tools. But with the continued explosion of data combined with vast improvements in technology, prescriptive analytics adoption is expected to grow substantially in the coming years.

In the next generation of advanced Data Analytics, business users can expect transformational systems known as enterprise optimization. These advanced Data Analytics systems comprising Prescriptive Analytics will not just benefit fragmented business functions but the entire enterprise. These systems typically exploit sophisticated features such as visual programming, embedded knowledge, packaged financials, and built-in logic. Also read the Information Week feature article titled 8 Smart Ways to Use Prescriptive Analytics to understand how the hosted, Analytics-as-a-Service platforms of the future will provide Prescriptive Analytics in an eco-friendly way.



REFERENCES

1. Evans,James R. & Lindner, Carl H. (March 2012). "Business Analytics: The Next Frontier for Decision Sciences". Decision Line. 43 (2).
2. http://www.analytics magazine.org/november-ecember-2010/54-the-analytics-journeyLustig,Irv, Dietrich, Brenda, Johnson, Christer, and Dziekan, Christopher (Nov–Dec 2010). "The Analytics Journey". Analytics.
3. Davenport,Tom (November 2012). "The three '..tives' of business analytics; predictive, prescriptive and descriptive". CIO Enterprise Forum
4. Haas, Peter J., Maglio, Paul P., Selinger, Patricia G., and Tan, Wang-Chie (2011). "Data is Dead…Without What-If Models". Proceedings of the VLDB Endowment. 4 (12).
5. Stewart, Thomas. R. & McMillan, Claude, Jr. (1987). "Descriptive and Prescriptive Models for Judgment and Decision Making: Implications for Knowledge Engineering". NATO AS1 Senes, Expert Judgment and Expert Systems. F35: 314–318.
6. Jump up^ Riabacke, Mona, Danielson, Mats, and Ekenber, Love (2012). "State-of-the-Art Prescriptive Criteria Weight Elicitation". Advances in Decision Sciences.