Five pillars of prescriptive analytics success

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BY ATANU BASU

As the Big Data Analytics space continues to evolve, one of the breakthrough technologies that businesses will be talking about in the coming years is prescriptive analytics. The promise of prescriptive analytics is certainly alluring: it enables decision-makers to not only look into the future of their mission critical processes and see the opportunities (and issues) that are potentially out there, but it also presents the best course of action to take advantage of that foresight in a timely manner. What should we look for in a prescriptive analytics solution to ensure it will deliver business value today and tomorrow?

Consider the following five pillars to prescriptive analytics success:

1. HYBRID DATA

Most businesses today run on structured data – numbers and categories. According to IBM, underlined[80 percent] of the data currently produced is unstructured – text, image, video and audio. While some businesses may choose to run the same way in the future as they do today, doing so could render them unproductive and noncompetitive. These businesses may not survive as their customers, suppliers and competitors move beyond them by taking
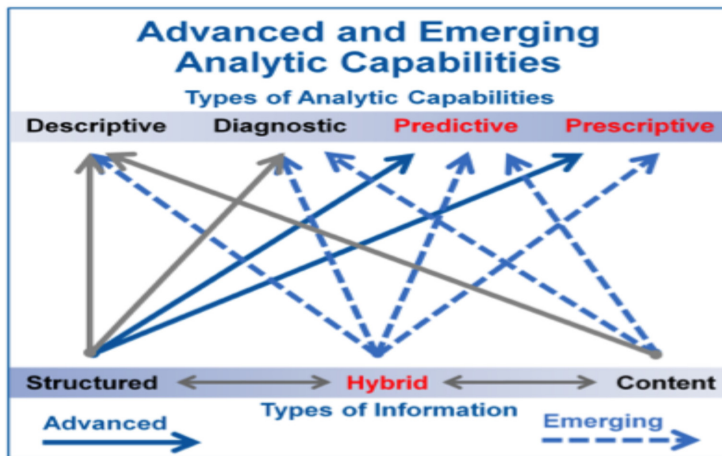
Figure 1: The evolution of analytics according to Gartner.

Source: Gartner Symposium, Orlando, October 2012

full advantage of *hybrid data*, a combination of unstructured and structured data. Hybrid data empowers businesses to use *all* the available data to make the best decisions possible.

For a prescriptive analytics technology to be transformative, it must be able to process hybrid data. Without incorporating hybrid data, decision-makers are making their decisions based on just 20 percent of the available data. Figure 1 is a chart from Gartner Research that showcases the evolution of analytics, culminating in prescriptive analytics with hybrid data.

Processing of hybrid data brings into the mix new technologies that are essential ingredients in prescriptive analytics software, including computer vision, speech recognition, image processing, natural language processing, signal processing and more. While traditional disciplines such as applied statistics remain invaluable, they aren't designed to process image, video, audio and text.

2. INTEGRATED PREDICTIONS & PRESCRIPTIONS

Prescriptive analytics is about seeing and then shaping the future. Common sense tells us that one needs to first see the future *before* one can shape it. The functions – predictions and prescriptions – must work synergistically for prescriptive analytics to deliver on its promise. The symbiotic integration of predictions and prescriptions is the key to widespread adoption and inherent value of prescriptive analytics.

Assume a scenario where predictions and prescriptions are coming from two different systems that have been cobbled together (easier said than done, but let's ignore that for now). Say this software combo produced a prescription that turned out to be faulty. If this is a software issue, is this error due to a bug in the prediction software or the prescription software or both? Imagine the disruption to your business as you investigate the root cause and attempt to preempt similar erroneous prescriptions in future.

3. PRESCRIPTIONS & SIDE EFFECTS

Prescriptions – i.e., recommended, time-dependent actions to improve the future – in prescriptive analytics technology are generated using several methods. A prevalent method of coming up with prescriptions is through a guided framework of business rules. This rule framework can be simple or complex, depending on the business process or the initiative that is being governed by prescriptive analytics. A more scientific and rigorous way to produce prescriptions to improve the future is through operations research (O.R.), the science of data-driven decision-making. O.R. takes into account the objectives, the constraints and the actionable knobs (known as decision variables) to produce the best course of action – a prescription – that doesn't lead to undesirable side effects. Both optimization and simulation technologies, two prominent branches within O.R., can be used to generate effective prescriptions.

For a prescriptive analytics technology to scale, the solution should use *both* business rules and operations research and use them synergistically. Then, and only then, this technology will be able to generate the most effective and timely prescriptions that the available data will allow. For the Internet of Everything (or the Industrial Internet) to reach its true potential, prescriptive analytics – and the resulting decision automation – has to play a pivotal role.

4. ADAPTIVE ALGORITHMS

Image you are driving to work. As you drive, what you see ahead through your windshield keeps changing and what you do based on what you see ahead – and when you see it ahead – also keeps changing. In our daily lives, we find this reality to be an obvious one, and we do the needful without much thought.

Now think about a business process that you are trying to improve through prescriptive analytics technology. As this business process evolves over time, the technology should continually re-predict and re-prescribe so the predictions and prescriptions remain relevant.

In a world of growing data volume, velocity and variety, the prescriptive analytics technology must be able to automatically recalibrate all its built-in algorithms, plus automatically create new algorithms. This total recalibration also needs to be adaptive – dynamic and/or continual – in order to successfully assist the business process being managed in an ongoing fashion.

Recalibration of the algorithms in the prescriptive analytics software can be triggered in several ways – with new data arrival, with data change(s), after a specified time period and more.

Another important factor to keep in mind is the "action-ability" of the prescriptions; it is, of course, different for different business processes. Sometimes, it may not be helpful to automatically generate newer prescriptions if the old ones haven't been acted upon properly.

5. FEEDBACK MECHANISM

How would the prescriptive analytics software know if its prescriptions are being acted upon? Prescriptions are, generally speaking, time-sensitive action plans involving changes to some actionable influencers to preempt one or more predicted issues (or to benefit from one or more predicted opportunities). If a business manager decides to ignore a prescription from the software, this inaction would at some point be reflected in the incoming data that is being collected on the actionable influencers. The consequence of inaction, if any, will then be subsequently reflected in the upcoming predictions and prescriptions. For example, due to lost time, inaction on a valid prescription could lead to additional expenses in preempting an upcoming issue that has been flagged (via prediction) and addressed (via prescription) in the last round.

While this may change in the near future, today, there is a difference between prescriptive analytics software and prescriptive automation. Prescriptive automation (Google Car, for example) has elaborate, built-in process control (software, hardware, firmware and much more) to automatically "action" the prescriptions coming from the software side. Prescriptive analytics software today still requires human assistance to carry out these prescriptions.

While Google can probably outfit a car anyway it wants to, companies with highly sophisticated prescriptive analytics software are dependent on humans to act on the prescriptions coming out of the software. Envision a future where this distinction would disappear and prescriptive analytics software will become a fully integrated and embedded component of the business process it is improving – and not the new thing that it is today. ∎

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