Insurance in the age of analytics

IBM Watson and the era of information-led transformation
Insurance and analytics: A long tradition

Insurance is a business based on information, analysis and relationships. Its core function of profitable risk management relies on the ability to apply the requisite mathematics against data on exposures, investments and markets. Whether kept in ledgers or filing cabinets, written on magnetic tapes and disks, or pushed up to the ubiquitous cloud, insurers have had to embrace information technology (IT) to manipulate and store critical business information. Recently, the core analytics paradigm (for actuarial and pricing) has been extended to encompass larger and larger data sets of company and customer activities.

For the most part, carriers have succeeded in the move toward a broader use of analytics, even if they sometimes got caught in the backwaters of “lost IT investment” thinking at the expense of enabling newer capabilities. This balance is difficult to orchestrate even in the best of business climates—providing sufficiently flexible infrastructure to maintain strategic plans while allowing for the rise of something like mobile smart devices is not for the faint-hearted. Over the past fifteen years insurers moved beyond simple report generation and into the realms of business intelligence and analytics. The past several years have seen this situation yield to further amplification of capabilities into a new wave of predictive analytics that are in the early stages of transforming many aspects of the insurance business.

Into the midst of this situation comes IBM’s Watson, famous for winning an exhibition on the Jeopardy! television game show against the game’s two greatest champions. On the surface, the ability to answer questions and outplay two human competitors might seem to have limited relationship to the insurance business. However, the technology behind Watson provides a glimpse into the powerful capabilities that are now becoming available to insurers—capabilities that can provide the opportunity to gain new insights for achieving market advantages.
Insurance and analytics: The current state of the art

To appreciate the power of these emerging analytics capabilities, it is helpful to look at how the current state of the art in analytics has evolved. The introduction of business intelligence software began the evolution of computing in insurance from a tactical, transaction focus to a strategic, business planning focus. This did not mean that transaction processing faded from the scene or diminished in importance. Insurers still process billions of transactions every day in the sales, service, and claims arenas via what amounts to basic data processing. No insurer would be competitive without the ability to efficiently handle huge volumes of transactions. However, for insurers, efficiency is only one part of a winning equation.

To compete successfully and profitably, insurers must identify and act on emerging trends, new customer insights, and an improved understanding of natural and man-made hazards. In addition, insurers need the ability to spot operational issues or opportunities in real-time and to then proactively respond. Fortunately, this is possible with the broad class of software known as business intelligence and advanced analytics. The solutions currently in use by insurers include software that is able to create dashboards and scorecards, conduct what-if analyses, leverage scenario planning, employ advanced statistical analyses, harness data/text mining, as well as uncover new opportunities from predictive models. These technologies, combined with human experience and insights, are already giving leading insurers advantages in the marketplace when they are applied. Even so, many additional opportunities exist for insurers to further capitalize on today’s business intelligence and advanced analytics solutions.

Insurance and analytics: A new wave of pervasive analytics

The deep question answering (DeepQA) technology that powered IBM’s Watson to its game show championship provides a visible manifestation of our ability to better understand and harness vast amounts of information in real time. Watson is a confluence of industry solutions, big data and business analytics. It represents a new class of industry specific analytic solutions that leverages deep content analysis and evidence based reasoning to accelerate and improve decisions. Although Watson can potentially change the way businesses look at quickly solving problems, it does have some familiar capabilities that have their roots in proven commercially available technologies. By exploring the three main areas of data, analytics, and text understanding, it is easier to envision what it really can mean for insurance applications and how it can expose the business value of big data for insurers.

Big data

Insurers are fortunate that the fuel for opportunities that can change their prospects both today and tomorrow is readily at hand. Carriers are shepherding enormous and rapidly escalating volumes of data from both structured and unstructured sources. Insurers capture data and information from every customer interaction, including information about customer needs, products, services, and claims. In addition to structured transaction data, insurers are amassing huge storehouses of information from scanned images, pictures, videos, recorded voice conversations, and emails. It is estimated that over 90% of global data was created in just the last two years and more than 80% of that data is unstructured, and therefore not accessible to our traditional IT systems.1
Today, three primary information domains can yield new insurance insights: internal and external risk management systems and providers, social media, and real-time mechanisms that can gather data from embedded or external sensors. As a result, the variety and scope of risk datasets continues to increase. Insurers are now able to acquire risk information from external providers for perils such as hurricane, earthquake, coastal storm surge, wildfire, crime, terrorism, flood, and many other location-based datasets. The wide-open universe of social media provides another domain of information that has the potential to yield rich insights. And although many irrelevant tweets and blog entries are not useful for insurers, many others contain valuable information. Combing through the blogosphere, social networks, and micro-sites has tremendous potential for spotting new customer needs, customer service issues, cross-selling opportunities, and new channel candidates.

Casting a wider net

A promising new source of data is afforded through the emerging trend of embedding sensors and miniaturized computer chips in living and nonliving things, with the option for gathering that data via wireless communications streams. Insurers are already collecting information from devices in automobiles and trucks as part of usage-based insurance offerings or risk management plans. Embedded devices in packages, livestock, machinery, roadways, and houses are beginning to unleash a torrent of information about their usage and environment. Insurers have the opportunity to use that information for safety and loss control purposes, as well as to design new usage-based insurance offerings. In addition to this somewhat ad-hoc deployment of sensors, a growing number of sensor networks such as weather stations, cell towers, and radars can provide a baseline of information for analytical use.

The aggregation of all these types of information (the insurer’s internal data, external risk data, social media data, and embedded/external/networked sensor data) explains why the average IT department is wrestling with data storage compound growth rates of 60% per year.²

Deep analytics

The amount of data available to insurers is staggering, but the real value is in gaining new insights from it. Widely available business intelligence and advanced analytics tools are valuable for gaining these insights. Typically, these software tools have been applied to large, well-defined databases. However, a new class of analytics goes well beyond the traditional approaches. Deep analytics operates against immense collections of data from multiple sources, both structured and unstructured. In the past, this volume and complexity has required massive parallel processing and coordination of multiple analytical techniques, but modern high-performance computing techniques may ameliorate this situation.

Two broad categories of deep analytics are emerging—macro-analytics and micro-analytics. Macro-analytics are oriented toward the identification of trends and patterns for strategy and planning, and used to detect patterns and insights about opportunities, behaviors, performance, and other dimensions. Micro-analytics focuses on the smallest domain of collected information to gain insights on individual customers or to support individual activities, such as diagnoses, assessments, and advice. Connecting micro insights to macro trends can be a source of real power for users of this innovation.

Understanding language and text

Combining big data with deep analytics is already yielding important insights across many industries and domains, and significantly impacting strategy and planning. To capitalize fully on analytics at almost any level, a new capability is required. While the use of macro-analytics has typically been conducted by specialists in the back office, newer uses of micro-analytics will be initiated and employed by a wide range of customer-facing individuals. In insurance, this means that agents, financial advisors, call center reps, adjusters, and loss control specialists will be directly tapping into big data and deep analytics to provide immediate responses to customer questions and issues. In addition, the potential for deeper understanding of corporate and enterprise information is ever more critical for industry executives.
One of the most critical aspects of moving the insurance industry forward will be the ability to more easily access the potential of the intersection of big data and deep analytics. Current business analytics tools of all stripes can be perceived as being merely adequate for this purpose.

The future of financial services, and the insurance industry in particular, could be made more secure through the use of more conversational or “natural language” front-end mechanisms for accessing knowledge. These systems will enable consumers, policyholders, agents, and executives to ask questions in everyday speech or sentences, not in some arcane computer-speak. Handling spoken or text-based requests is straightforward for a human being, but until recently has been problematic for computers. Automated systems designed to answer specific questions have thus far used a closed-domain approach, restricting the field of knowledge available for query, and the possible answer set. Open-domain question answering systems, of which Watson is a prime and unique example, are much more complex, but can offer significantly greater rewards. To perform optimally, these systems must move beyond the recognition of a word or stock phrase to the understanding of the meaning and context of spoken questions and written queries.

For example, consider the following question a US policyholder might ask an agent, “Will my wife be insured if she drives into Canada next month?” An agent would have no trouble understanding that the customer wants to know if his auto insurance coverage is valid in another country. However, a computer system must understand the concepts of time, gender, family relationships, and geography to interpret this question. Watson does exactly this, understanding for example that Canada is not something that would cause a physical collision, but could cause another sort of problem for the purposes of answering this question.

The natural language processing capabilities that enable Watson’s intuitive interaction with users also enable it to understand almost any unstructured text it can access. Marketing materials, regulations, advertisements, as well as underwriting rules, claims adjuster and contact center agent notes can now be made available for analysis. In natural language, the same question can be asked a number of ways. DeepQA technology can understand these various forms of the same question and then look across a company’s text files as well as external sources such as web pages, newspapers, blogs, and social media sites to find answers. Only the best answers are presented, along with a confidence factor and the ability to audit the reason the answer was selected. Although Watson is not currently being commercialized for Insurance use cases, such capabilities have the potential to make insurance systems based on Watson technology truly revolutionary and to change how insurers operate and the way they communicate with their customers.

New analytic systems that take advantage of lessons learned from the Watson experience will be able to make these kinds of interpretations and understand the broad meaning of the question, or ask its own questions to clarify what was really being asked. The answer to a question such as the one posed above can likely be found in several places such as the policy provisions and exclusions, or in marketing materials that discuss the product that defines the policy. A system that used DeepQA technology to understand the question would also be able to refer to those types of unstructured data sources to find the answer. If Watson for Insurance use cases were to be developed, the information could be loaded once (read by Watson) and then be updated when the material changes, or a Watson-enabled application could provide the new information in real time. In addition, Watson is designed to learn and more easily correct mistakes.
Overall, traditional data and analytics elements can remain separate and be accessed normally through a broad range of increasingly powerful systems. If a Watson-enabled application were added to a carrier’s future toolset, insurers would be able to access the large amount of information and knowledge previously locked away in unstructured, text-based data. DeepQA based solutions may also use traditional data query tools to find answers to questions that are located in a data warehouse. Rather than read the data warehouse, this type of hybrid solution might combine Watson capabilities for harnessing the power of unstructured data and traditional technology using something like structured query language (SQL), and then incorporate that result into the overall answer.

**Insurance and analytics: Scenarios for winning insights**

The opportunities provided by this new wave of pervasive analytics span the insurance value chain. A few of the many examples of how big data and deep analytics, combined with language and text understanding might be used in insurance are highlighted below.

**Needs analysis:** Complex life and annuity products often require a dialogue between the prospect and the financial advisor to match the best product to their need. More automated solutions are now possible that could give agents/financial advisors, or even the prospect, the opportunity to ask and answer a series of questions in conversational mode that would lead to product advice. A future Watson-enabled application would incorporate Watson’s capabilities with traditional technology like business rules to manage quickly changing business processes more effectively. Today, this process is sometimes managed as a simple decision tree or through basic algorithms, but the new pervasive analytics allow insurance professionals and consumers to deal with complex financial situations more quickly and with greater confidence.

**Catastrophe planning:** When a major weather event is predicted or in the midst of occurring, insurers want to be as proactive as possible in advising their customers, positioning their claim resources, and preparing for the response to the disaster. A claims manager or even agents might ask questions such as, “How many customers in South Carolina are likely to be affected by a coastal storm surge from this event?” or “How much damage are our policyholders likely to sustain from flooding?” These types of analyses are done today through models at headquarters, but the potential now exists to enable front-line personnel to ask these kinds of questions in real-time. Advanced analytics technology can integrate multiple streams of inquiry and produce consolidated views of near-real-time activity to speed appropriate responses.

**Mobile self-service:** The mobile world began with purely voice communications and has evolved to offer keyboard or touch screen interfaces for almost any transaction. The next wave is moving back to voice—using voice as an interface to the web. To truly capitalize on voice-driven interactions for insurance customers, a more sophisticated capability is needed to interpret customer requests. In the future, a policyholder may use a Smartphone to ask, “What is the renewal date of my policy with XYZ carrier?” They may ask, “How much will my premium increase if I add my daughter onto my policy?” These types of questions require language understanding and a deep understanding of relationships and concepts.
Fraud analysis: Special investigative units (SIUs) typically consist of highly trained professionals with law enforcement, legal and insurance expertise. SIUs increasingly use sophisticated analytical tools, acting on data from a variety of sources, to identify relationships and patterns. Big data and deep analytics capabilities offer new opportunities to incorporate more data from more sources, including adjuster notes, agent comments, and news articles. Conversational front ends that better understand queries provide for more real-time assessments by both SIU professionals and adjusters.

Look to the future
It takes a proven roadmap followed by distinct actions to gain the advantages of advanced analytics in your organization. To get started on the shortest path to value, ensure that your team is focused on the overarching business problems you are trying to solve as well as the strategic plans that guide your company. Analytics can help decipher and use the hidden value within a broad range of activities and data within your company to achieve your goals.

IBM has a track record of creating over 3,000 patents a year for many years. This strong portfolio and the experience used to build it can help you overcome challenges and lead. At IBM, we think it's more important to talk about how to innovate instead of which innovation to choose because that is what leads to sustained excellence for your business.

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