Watson Background – September 2011
What does Watson mean to the insurance industry?

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With the gradual unveiling of the Watson question answering (QA) system in the latter half of 2010, IBM once again showed that basic research and the pursuit of grand challenges can indeed produce significant results. And, to be sure, Watson represents a leap forward in the maturity of the question answering sub-task within natural language processing (NLP$^1$) and smarter processing in general. IBM’s steady research and the application of scientific principles in the years leading up to its centennial have enabled the development of this amazing system.

Before we dive into the impact that this technological advance could have in the insurance industry, it is important to review various aspects of the Watson computer system.

Overcoming a Reputation: There are those who will hear that Watson is a computer system that can be characterized as being part of the broader category of artificial intelligence (AI) systems. While this is true, and this system will undoubtedly be the source of some humor and even some misplaced fear, it should be pointed out that such visceral reactions are misplaced. The lukewarm, deriding, and downright false portrayal of this branch of computer science is primarily the result of ignorance, lazy journalism, or both$^2$. Average people may have a negative reaction upon hearing that Watson is associated with or uses AI, but those same people likely do not realize that these systems have already become part of our daily lives.

AI, or intelligent systems as they are sometimes called, are embedded in an increasing array of products. They are used for detecting insurance and credit card fraud, spelling and grammar checking programs inside of word processing programs, and increasingly in automobiles. Cars that have electronic ignitions and fuel injection use rule-based systems to operate at peak efficiency. The same is true for anti-lock braking, autonomous cruise control, or electronic stability control systems.

The Domain of Natural Language: Watson was demonstrated and tested doing what it was designed over several years to do – answering questions by understanding natural language as it is structured in the popular television game show “Jeopardy!”.$^3$ Natural language is the formal way of describing the way that people interact and exchange information via hearing/reading, understanding and speaking/writing a common language, in this case, American English. So, in essence, Watson is a question answering system. Watson is built using IBM’s DeepQA technology that has been under development for several years. Depending on what it has “read,” it will be able to answer questions put to it bounded by that knowledge. The concept of a bounded area of knowledge or information is also called a domain.
**Note:** While it is possible to have Watson access information on the Internet and use it to answer “Jeopardy!” questions, it DID NOT do this while it is playing against the 2 top human players. Also, while “Jeopardy!” often has audio/visual clues, for the purposes of the exhibition match, the game was be played with text clues and answers only.

This system represents some of IBM’s deepest research and development effort into natural language processing. It was especially designed to play “Jeopardy!” with all its rules and constraints (like pressing the button to “buzz in” faster than the other contestants, and answering in the form of a question). Even so, the effort to tackle this self-selected grand challenge will have enormous impact on how people interact with information systems. The idea of a grand challenge is to solve not just a straightforward, or everyday type of problem, but to tackle the really big problems in a given area. In natural language processing, the concept of language understanding is one of those big problems.

Most people with even a passing understanding of information technology know that computers can recognize text and spoken words. We love-to-hate automated phone systems that use voice recognition and computer generated voices, but in truth, there are some that work pretty well and the performance of such programs is improving at a steady pace. We are also increasing our expectations of computers and handheld ‘smart’ devices when it comes to spoken commands and searches. We can thank tools such as Google’s voice search option and apps like Dragon Dictate and Dragon Search from Nuance Communications for pushing the envelope in this area.

However, for a computer to have the ability to make the necessary connections between words and their meanings in the context of what is being said or read is truly difficult. This is especially true when the knowledge domain (i.e., its area of ‘expertise’) becomes wider than the needs of an airline reservation system or searching for a restaurant in an unfamiliar location.

**Embedded Intelligence:** One final point to make on the topic of AI before we consider what Watson or a system developed from this effort might do for the insurance industry.

While it is convenient to talk about artificial intelligence as a homogenous technology, it is really an collection of at least half-a-dozen separate areas of R&D within the information sciences. Insurance was one of the first industries to make use of the rule-based systems component of AI when “expert systems” were applied to underwriting. These systems had their domains, or rule-bases, created from the underwriting rules that were typically found in underwriting manuals and in the common sense knowledge of experienced underwriters. Knowledge about underwriting is stored within these systems in the form of conditions to be met and actions to take when the conditions occur. For instance, one way to do this would be to use the familiar IF-THEN-ELSE statements of simple computer programming. For example, IF blood-pressure is GREATER THAN x, AND age IS LESS THAN y THEN mark the case for medical review.
**Insurance Coverage:** What could a question answering system such as Watson do for the insurance industry? Let’s start by considering the points in the insurance value and service chains where questions logically arise. At the same time, we also should look for areas, or domains, where the knowledge required for a high-level of performance is well understood. Although insurance is a mature industry, it is changing all the time to keep up with variations in its target environment: risk protection products and services for individuals and businesses.

For these reasons, the successful deployment of a Watson-like system would rely on the use of a selected domain. For instance, “personal lines automobile insurance underwriting” would be a reasonable domain for such a system. As mentioned above, we know that insurers already use AI “expert systems” to handle a increasingly broad range of underwriting cases in this domain today. These automated underwriting systems work great and keep costs down while they improve the consistency of underwriting. The reason these automated underwriting systems work so well is that the questions and answers they work with are very specific, i.e., structured: how the questions are asked and answered is critical to their success.

So in terms of our question about what a Watson-type system could do for the domain of personal lines automobile insurance underwriting, we would have to say that current automated underwriting systems have a good handle on the problem. Could Watson do this task, or improve on it? Yes, if it had access to the right customer information as well as the company’s underwriting rules. Would this be a good use of Watson? Maybe not, considering that its forte is answering *unstructured* (as in normal, day-to-day speech, or text that might be found in a newspaper) questions posed in natural language about a set of information that is also relatively unstructured. It can draw on information stored in structured data such as a database, data mart, or warehouse as well.

A more likely or more efficient use of a QA within underwriting would be to have such a system augment the abilities of an underwriter by being available to answer questions about company rules, policy limits, procedures, or government regulations.

**Answering the Question:** Likewise, another use of a question answering system like Watson in the insurance arena might be to answer an agent’s questions about products, or a policyholder’s questions about the coverage that their policy provides. In each of these instances, the body of knowledge required could come from normal, already existing materials *without* having to be translated or coded into a special format required by expert systems or other knowledge-based AI mechanisms.

The source of the answers for the agent’s product questions would come from the text generated when the various policies were developed and deployed. The knowledge domain might also include the text from regulatory filings with various states, or even countries. If the information presented in all the text were accurate and current, then a Watson-type question answering system could “read” it and be able to answer questions posed in everyday language.
For the policyholder’s questions about coverage, the question answering system would have to access the text for that person’s actual policy, the other policies that they might have purchased, and any exclusions, endorsements, and riders. To be complete, the knowledge domain might also contain as much information as was available about a competitor’s products as well, possibly from their regulatory filings.

Both of these examples fall under the category of “self-service, customer service.” Another unstructured customer service application of this type would be claims servicing. The ability to accurately automate the answering of often complex questions that policyholders and third-party claimants have about insurance claims would be a great benefit to carriers and policyholders alike. The information source for this knowledge domain would be contained in the carrier’s claim system for the structured portion such as claim number, dates, and existing actions. The unstructured data could come from the policyholder, claimants, and adjuster statements as well as notes stored in the claim system. Other sources of knowledge to answer questions could come from policy data as mentioned above, as well as weather and police reports, or information from third-party service providers about average completion times for various steps in the repair process.

Each time a question answering system provided an answer, the full conversation could, with permission, be recorded to add to the body of knowledge around the claim. This information could also “blinded” to avoid privacy concerns but still connect it with specific events and data.

Coming to a Conclusion: As question answering systems like Watson mature and are applied to more aspects of business, it is clear that the insurance industry would be well rewarded in making investments that supported this advanced technology. Novel uses will be created, and more people will be better served as a result. This may be especially useful and efficient as more “principles-based” insurance regulations are enacted around the world. Even in the existing regulatory scheme, the ability to pose queries to a question answering system and get answers with a very high confidence level could potentially save insurers millions of dollars.

Ultimately, the people involved in delivering insurance services will be freed from mundane and error prone tasks as more intelligent systems are deployed. They will not be tied up in workaday search and retrieval of information tasks that may not be of the highest quality, and be able to work with the correct information to more quickly complete their tasks.

We also know that in the course of these deployments, people and systems will make mistakes, and that mistaken impressions will be presented and also be the basis for undeserved wariness, negative bias, or even fear. It is our job to replace fear and ignorance with real world examples and use cases where this type of automation serves its proper purpose-allowing people to spend more time working with and providing service to other people.
1 Not to be confused with Neuro-Linguistic Programming, a type of psychotherapy.
2 No small amount of blame can be placed on the popular media which seeks to make a profit by playing off of people’s fears (think of movies like the Terminator series, iRobot, The Matrix and many others). Historically speaking, some of the greatest damage to AI’s image came in the 1980’s when it left academia and R&D labs to make its first forays into the commercial marketplace. In summary, the problem at that time was that the potential of AI was over-hyped via a combination of over-confident practioners and overzealous marketing to the extent that it was impossible to meet expectations thus established. And then, when programs/systems did fall short of the hyperbole, most of the press were quick to publish the failures and shortcomings of programs that were demonstrated or released to the public. And, as a result, the unfortunate impression of AI as an exaggerated piece of technology was set in the minds of business and consumers.