

INSIGHT

FEBRUARY 2011

“Shocking, Watson, shocking!”

It's only February, and already 2011 is shaping up as a historic year. Since the New Year we've witnessed some dramatic world events whose full significance will only be known with the passage of time. For example, uprisings in the Middle East have astonished many observers. The speed at which the people of Tunisia and Egypt changed their government regimes is amazing. And inspired by these events, more people are taking to the streets in Algeria, Bahrain, Libya, Iran and Yemen causing us to wonder what the future holds for the region, for better or worse. And while this drama is yet to be played out, there is no doubt that we are witnessing some watershed events of our time with global ramifications.



And while much media attention has rightly been focused on the Middle East, another important event occurred last week to much less fanfare. However, it may be one that will also be recognized as a significant milestone in human history.



A computer called Watson, built by IBM, beat Jeopardy's two most successful human contestants of all time in a two game series.

The event's significance isn't that a computer was able to beat Jeopardy's best players, but according to the *New York Times*, it's that we have "taken a big step toward a world in which intelligent machines will understand and respond to humans, and perhaps inevitably, replace some of them." Certainly, this will sound scary to many. But like any new

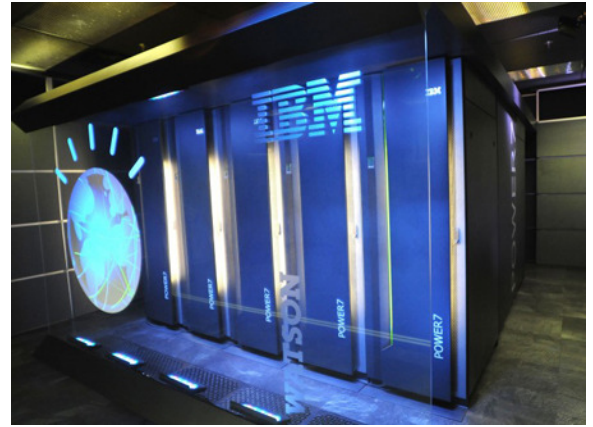
technology, the potential benefits are enormous. And we probably won't have to worry about a future in which computers keep us as pets!

Watson is a powerful computer, but it's really not all that powerful. In fact, it doesn't even rank in the top 500 machines in the world. It is not considered a supercomputer. Rather it is made up of 90 commercially available systems used by many companies today. These systems are lashed together in a way that, according technology futurist and author Ray Kurzweil, are equivalent of about 80% of the processing power of the human brain. He estimates that the human brain can hold about 1.25 terabytes of data, and perform at roughly 100 teraflops (a teraflop is a measure of a computer's speed). In comparison, Watson is an 80-teraflop system with 1 terabyte of memory. In case you are wondering, 1 terabyte is still quite significant; as it can hold 220 million pages of text or 111 DVDs. So Watson, at least in terms of brain power, is closer to being human than it is to a supercomputer!

“The Press, Watson, is a most valuable institution, if you only know how to use it.” Sherlock Holmes

Tony Pearson, master inventor and senior consultant at IBM, explained that Watson only needed about 1 terabyte to process real-time answers to Jeopardy questions. “Yes, we could have handled a lot more information. We could have put more memory in each server, but once we got the answers to three seconds, we didn't need to go further,” Pearson said.

Just how Watson comes up with its answers is unique – it’s not “searching” for them as we typically think of the search process. You can’t do that with many Jeopardy questions due to their indirect nature. After Watson is asked a question, it analyzes the question and topic, and pulls hundreds of possible “candidate” answers from hundreds of sources, and then begins hypothesis generation. Thousands of pieces of “evidence” are sorted to weigh the validity of the candidate answers. These candidate answers are scored and synthesized using deep analysis algorithms to create answer “models” from which the final answer choices – and Watson’s confidence in each – are derived. Watson, of course, goes with the “highest-confidence” response. On Jeopardy, this process took place before the human contestants who knew the answers could hit their buzzers.



The Jeopardy event wasn’t really about computers besting humans. It was about teaching a machine to understand language written for humans, not computers. This is one of the holy grails of artificial-intelligence research, and a technology that could revolutionize industries plagued by computers’ inability to understand what’s known as “natural language.” Watson is a good example of a machine crossing over the divide between human and machine-style thinking.

So what might be Watson’s long lasting contribution? Like Watson in the Sherlock Holmes stories, Watson may become the ultimate assistant. Watson may lead to some of the following:

- A better internet search tool, one that responds with answers to questions rather than just the relevant links to websites (a threat to Google?).
- A tool that could help consumers with product buying decisions and technical support (no more call centers in India?).
- A navigation tool for travelers that incorporates real-time circumstances (e.g. traffic jams, weather, safety concerns, etc).
- A physician’s assistant service where information from thousands of patients’ vital signs and millions of clinical reports and doctors’ notes could be synthesized to provide well reasoned diagnoses and evaluate available treatment options (the all-knowing doctor?).
- A tool to help business leaders make better fact based decisions relying on information previously considered to be just noise or not even available to the decision makers (a super CEO assistant?).
- Computers that we can simply talk to and receive verbal responses to our questions - perhaps the computer will even ask us what we think about things, so that it can provide an answer that considers our preferences (e.g. that you’d prefer a quiet coffee shop over a busy one).
- Computers that can recognize images and incorporate what it is “seeing” into its responses.
- A tool that allows anyone to communicate with and understand anyone else in the world, no matter their language, colloquialisms or accent.

Whether computer tools like Watson could help governments address the concerns of their populace before their boiling point remains to be seen, but we have undoubtedly witnessed some important events this month. The significance of these events we will only know some time later. While advances in computing amaze us, don’t forget that it’s the ingenuity of humans driving it. Don’t count us out yet!

“On the contrary, Watson, you can see everything. You fail, however, to reason from what you see. You are too timid in drawing your inferences.” Sherlock Holmes