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What Is Artificial Intelligence?

By RICHARD POWERS

Urbana, Ill.

IN the category “What Do You Know?”, for $1 million: This four-year-old upstart the size of a small R.V. has digested 200 million pages of data about everything in existence and it means to give a couple of the world’s quickest humans a run for their money at their own game.

The question: What is Watson?

I.B.M.’s groundbreaking question-answering system, running on roughly 2,500 parallel processor cores, each able to perform up to 33 billion operations a second, is playing a pair of “Jeopardy!” matches against the show’s top two living players, to be aired on Feb. 14, 15 and 16. Watson is I.B.M.’s latest self-styled Grand Challenge, a follow-up to the 1997 defeat by its computer Deep Blue of Garry Kasparov, the world’s reigning chess champion. (It’s remarkable how much of the digital revolution has been driven by games and entertainment.) Yes, the match is a grandstanding stunt, baldly calculated to capture the public’s imagination. But barring any humiliating stumble by the machine on national television, it should.

Consider the challenge: Watson will have to be ready to identify anything under the sun, answering all manner of coy, sly, slant, esoteric, ambiguous questions ranging from the “Rh factor” of Scarlett’s favorite Butler or the 19th-century painter whose name means “police officer” to the rhyme-time place where Pelé stores his ball or what you get when you cross a typical day in the life of the Beatles with a crazed zombie classic. And he (forgive me) will have to buzz in fast enough and with sufficient confidence to beat Ken Jennings, the holder of the longest unbroken “Jeopardy!” winning streak, and Brad Rutter, an undefeated champion and the game’s biggest money winner. The machine’s one great edge: Watson has no idea that he should be panicking.

Open-domain question answering has long been one of the great holy grails of artificial intelligence. It is considerably harder to formalize than chess. It goes well beyond what search engines like Google do when they comb data for keywords. Google can give you 300,000 page matches for a search of the terms “greyhound,” “origin” and “African country,” which you can then comb through at your leisure to find what you need.

Asked in what African country the greyhound originated, Watson can tell you in a couple of seconds that the authoritative consensus favors Egypt. But to stand a chance of defeating Mr. Jennings and Mr. Rutter, Watson will have to be able to beat them to the buzzer at least half the time and answer with something like 90 percent accuracy.

When I.B.M.’s David Ferrucci and his team of about 20 core researchers began their “Jeopardy!” quest in 2006, their state-of-the-art question-answering system could solve no more than 15 percent of questions from earlier shows. They fed their machine libraries full of documents — books, encyclopedias, dictionaries, thesauri, databases, taxonomies, and even Bibles, movie scripts, novels and plays.

But the real breakthrough came with the extravagant addition of many multiple “expert” analyzers — more than 100 different techniques running concurrently to analyze natural language, appraise sources, propose hypotheses, merge the results and rank the top guesses. Answers, for Watson, are a statistical thing, a matter of frequency and likelihood. If, after a couple of seconds, the countless possibilities produced by the 100-some algorithms converge on a solution whose chances pass Watson’s threshold of confidence, it buzzes in.

This raises the question of whether Watson is really answering questions at all or is just noticing statistical correlations in vast amounts of data. But the mere act of building the machine has been a powerful exploration of just what we mean when we talk about knowing.

Who knows how Mr. Jennings and Mr. Rutter do it — puns cracked, ambiguities resolved, obscurities retrieved, links formed across every domain in creation, all in a few heartbeats. The feats of engineering involved in answering the smallest query about the world are beyond belief. But I.B.M. is betting a fair chunk of its reputation that 2011 will be the year that machines can play along at the game.

Does Watson stand a chance of winning? I would not stake my “Final Jeopardy!” nest egg on it. Not yet. Words are very rascals, and language may still be too slippery for it. But watching films of the machine in sparring matches against lesser human champions, I felt myself choking up at its heroic effort, the size of the undertaking, the centuries of accumulating groundwork, hope and ingenuity that have gone into this next step in the long human drama. I was most moved when the 100-plus parallel algorithms wiped out and the machine came up with some ridiculous answer, calling it out as if it might just be true, its cheerful synthesized voice sounding as vulnerable as that of any bewildered contestant.

It does not matter who will win this $1 million Valentine’s Day contest. We all know who will be champion, eventually. The real showdown is

between us and our own future. Information is growing many times faster than anyone's ability to manage it, and Watson may prove crucial in helping to turn all that noise into knowledge.

Dr. Ferrucci and company plan to sell the system to businesses in need of fast, expert answers drawn from an overwhelming pool of supporting data. The potential client list is endless. A private Watson will cost millions today and requires a room full of hardware. But if what Ray Kurzweil calls the Law of Accelerating Returns keeps holding, before too long, you'll have an app for that.

Like so many of its precursors, Watson will make us better at some things, worse at others. (Recall Socrates' warnings about the perils of that most destabilizing technology of all — writing.) Already we rely on Google to deliver to the top of the million-hit list just those pages we are most interested in, and we trust its concealed algorithms with a faith that would be difficult to explain to the smartest computer. Even if we might someday be able to ask some future Watson how fast and how badly we are cooking the earth, and even if it replied (based on the sum of all human knowledge) with 90 percent accuracy, would such an answer convert any of the already convinced or produce the political will we'll need to survive the reply?

Still, history is the long process of outsourcing human ability in order to leverage more of it. We will concede this trivia game (after a very long run as champions), and find another in which, aided by our compounding prosthetics, we can excel in more powerful and ever more terrifying ways.

Should Watson win next week, the news will be everywhere. We'll stand in awe of our latest magnificent machine, for a season or two. For a while, we'll have exactly the gadget we need. Then we'll get needy again, looking for a newer, stronger, longer lever, for the next larger world to move.

For "Final Jeopardy!", the category is "Players": This creature's three-pound, 100-trillion-connection machine won't ever stop looking for an answer.

The question: What is a human being?

Richard Powers is the author of the novel "Generosity: An Enhancement."