

# Artificial intelligence: Elementary

**Watson, IBM's attempt to crack the market for artificial intelligence, is starting to be tested in the real world**

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IT IS a nice coincidence that IBM's greatest boss and Sherlock Holmes's sidekick shared a surname. But whether it was Thomas J. or Dr John H. who inspired the name of the firm's latest venture into artificial intelligence (AI), the association of that name with a touch of genius makes "Watson" a clever choice. This sense of cleverness was reinforced in 2011, when Watson won a specially staged version of an American TV quiz show called "Jeopardy!" The system's capacity to parse questions posed to it in the show's convoluted, pun-ridden English, to search huge natural-language databases for clues, to synthesise those clues into answers and to frame those answers in a conversational way was able to beat to the draw the finest minds of American quizdom.

Winning game-show prizes, though, is not a good enough business model to justify the investment it takes to build such a system. Watson has undertaken a successful test-run of a real-world application, by encoding the expertise of the doctors and nurses at Memorial Sloan Kettering Cancer Centre, in New York, for use by other medics, but it has yet to make real money. A year ago, in the hope of doing so, IBM made Watson available for general business use, letting firms create and market their own Watson-based apps. Some 350 have now signed up to do so, and their number is set to grow with IBM's announcement, on September 24th, of a new set of tools that will help outsiders develop commercial applications for Watson. The next year or so should thus see whether Watson is as clever at making money as it is at answering questions.

The computational nitty-gritty of Watson's *modus operandi* remains IBM's trade secret. Watson lives in the cloud—the computing industry's name for application software and data stored and run on company-controlled machines remote from the user, rather than on the user's own machine—so it is unavailable to those who might wish to reverse-engineer it. But the principle behind it, called "cognitive computing" by IBM, is well known, the crucial point being that the software involved can modify itself, and thus learn as it goes along.

The process starts with Watson comparing a question it has been asked with a database of potential answers, and generating a long list of possible responses from these. It then scores the elements of this list against the contents of its numerous other databases, be those encyclopedias, medical files, audio clips or images. Fact-checking algorithms moderate the process, according to the perceived reliability of the sources, and a most-probably-correct result (or, often, a set of them) pops out. The final step is for human experts to rate and fine-tune the results, improving them (and thus teaching the software what to do) in an iterative process until the system has been trained well enough to be released to the world. To this end, IBM itself employs teams of linguists, psychologists and sociologists, as well as coders. But it also encourages others to do likewise.

Rob High, chief technology officer for the Watson project, says the tools just announced will extend the range of things developers can do with Watson. They will, for instance, permit the coding of apps that can understand questions in languages other than English; that can carry on an apparently intelligent conversation (a particular desideratum of AI engineers, since it was set as a benchmark of success by Alan Turing, an early computer scientist); that can help people reach decisions about things like what sort of car to buy (Mr High says IBM used Watson to select the location within San Francisco of its new cognitive-computing headquarters); and even that can assess the emotional state or personality traits of their interlocutor.

One early adopter of Watson, @Point of Care, a firm in New Jersey, provides doctors with iPad apps that summarise the latest peer-reviewed research on specific diseases. Earlier this year, @Point of Care's staff trained Watson to answer, based on the most up-to-date information, thousands of questions that doctors and nurses might ask about the symptoms and treatment of multiple sclerosis, lung cancer and diabetes. Sandeep Pulim, the company's chief medical-information officer, says the training process for a particular condition takes about 12 weeks. After that, the app can incorporate new research automatically, as it is published.

Ross Intelligence, in Toronto, is doing something similar for lawyers. They can pose to its Watson app obscure questions on bankruptcy, and receive answers complete with citations and useful readings from legislation or case law. And services for less-specialised customers than doctors and lawyers are also starting up. Wine4me, an iPhone app developed by VineSleuth, in Houston, Texas, recommends bottles based on taste, budget and accompanying food. Go Moment, in Santa Monica, California, uses Watson to power a virtual assistant called Ivy to help hotels automate their customer service. UnitesUs, an online employment agency based in Irvine, California, asks Watson to analyse candidates' writing style, such as their social-media updates and tweets, to gain insight into their personalities. It sounds like seaside palmistry, but the firm claims candidates get more interviews as a result.

IBM itself makes money from this by the simple expedient of charging firms for access to Watson, according to a standard menu of fees. Transcribing a minute of speech costs 2 cents. Help with a decision (such as choosing a bottle of wine) costs 3 cents. A personality analysis is 60 cents. A session training Watson with a large quantity of data will set a developer back \$3.

Other AI systems are available. IBM's rivals, though, usually limit their ambitions to one area of expertise. Clarifai, in New York, tags pictures with keywords. Metamind, in Palo Alto, California, analyses tweets for brand names and positive or negative emotions. Even Microsoft, which launched a set of AI development tools earlier this year, concentrates on detecting and identifying faces. Watson, however, seems truly multipurpose. IBM is even experimenting with using it to add cadence and intonation, accompanied by appropriate non-verbal gestures, to the speech of a humanoid robot. If it can pull that off, a truly disturbing possibility looms: that the next TV show featuring Watson might be "America's Got Talent".