

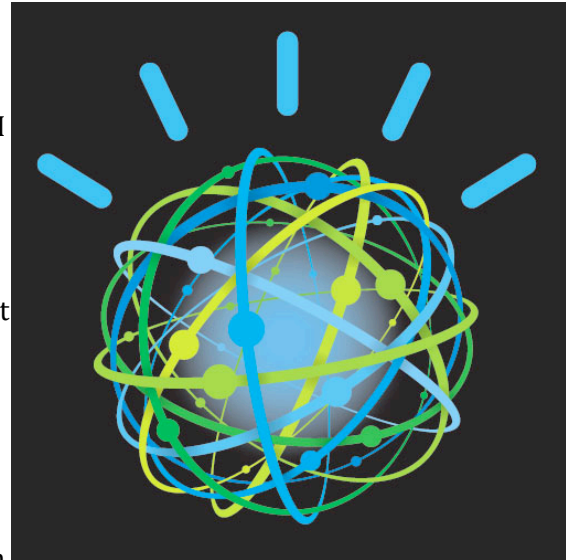
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This Research Made Watson Possible

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In 2007 IBM began a quest to push the boundaries of open-domain question answering and create a computer technology that delivers human-level question answering performance. Four years later IBM introduced Watson, a computer system capable of understanding natural language questions over a broad domain of topics and returning precise answers with meaningful confidence. To demonstrate this technology, IBM pitted Watson against the world's best human players in a two-game match on the popular Jeopardy! quiz show. Watson was victorious in this historic match, which aired on national television in February 2011.



Beating the best human contestants at Jeopardy! represents a major landmark in open-domain question

answering. What IBM has accomplished with Watson is the development of a software architecture and a methodology that builds on, integrates, and advances decades of innovation in the fields of information retrieval, natural language processing, knowledge representation and reasoning, machine learning, and human-computer interaction.

The Federal government's Networking and Information Technology Research and Development (NITRD) Program has played a key role in supporting many of the technologies that laid the foundation for Watson. Investments in fundamental research have produced important advances as well as highly skilled researchers and engineers who can continue to improve and apply these core technologies. Coordinated programs, such as the Text REtrieval Conference (TREC) series sponsored by NIST, have multiplied the impact of independent research groups by creating research communities focused on collaboratively solving important problems. These programs have also defined meaningful metrics and created essential data sets to drive and evaluate solutions.

The programs and research supported by the NITRD over the last two decades have had a direct impact on the Watson research team by enabling the education and training of many team members, creating community awareness and focus around key core technologies, and fueling critical research. With this background of work in related fields, IBM was able to identify open-domain question answering as a grand challenge problem and make a significant investment to drive question answering to new levels of performance.

This accomplishment, however, is just the beginning in this line of research. Artificial Intelligence techniques in language and knowledge processing have a long way to go before computers can reason over natural language content and interact at human levels.



Watson's public performance has opened the door to commercial applications and a future where scientists and businesspeople alike have a deeper appreciation for the potential impact of technologies that promise to tap into the wealth of knowledge buried in text and other unstructured data sources. The full potential of this technology will be realized only with continued investment and focus.