

# Opinion: Exploring Watson

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## Introduction

Watson is IBM's digital poster boy for the future of Exploring Watson

Watson is IBM's digital poster boy for the future of computing, named after IBM's first CEO Thomas J. Watson. It entered the limelight by winning the quiz show Jeopardy! in 2011. Since the victory, Watson has been heralded in numerous newspaper articles, books and journal papers for its potential.

IBM is investing heavily in Watson to establish it as a platform for what they call cognitive computation. In the section of IBM's website that is dedicated to Watson, the anchor text urges to "Go beyond artificial intelligence with Watson". The further description of Watson on the page implies something that is akin to John H., aka Dr. Watson who made his mark as Sherlock Holmes's brilliant assistant. In no uncertain terms, Watson is said to be "a cognitive technology that can think like a human", a tall order. In the video of IBM Watson personalisation, Watson speaks in first person and says, among other things, that "I am helping Sesame Street make education unique to every child". Let us take a closer look at what Watson is and how it has evolved over the past ten years.

## Watson the Jeopardy! player

The idea of a Jeopardy! playing computer program was first floated in 2004 when IBM was looking for suitable challenges to push boundaries. The first test were run in 2006 and in 2007 the project was granted a team of 15 people and three to five years to prepare for the competition. The team was tasked to engineer a computer that integrated various existing technologies and principles of natural language processing and machine learning, and to train it appropriately with a big set of data.

Jeopardy! is a quiz show in which the host reads out, in natural language, a general knowledge cue in the form of answer whereas the answer is given as a question. If a contestant is confident of knowing the answer, he or she hits a buzzer. The fastest buzzer answers first, and if the answer is wrong, the turn is given to the second and then to the third fastest. Below

is a question, which Watson answered correctly in the competition.

*Question:*

*An assassin fired 2 shots into William McKinley at the 1901 Pan-American exposition in this city*

*Answer:*

*What is Buffalo?*

IBM contacted the producers of Jeopardy! In 2008 regarding the challenge. During the preparation, several matters had to be dealt with. For example, whereas human contestants received cues as speech, the ninety servers that fed the Watson screen on stage received them as text. Also, IBM researchers insisted to have the questions selected in a way that would not exploit Watson's logical deficiencies while the Jeopardy! producers required that Watson will have to press the physical button like the other contestants did. Such were the tensions that the competition was almost cancelled.

Seven years after the initial idea was floated, in 2011, the highly engineered special purpose computer program that was running on sophisticated hardware, took on the Jeopardy! champions of the day and came out as a winner. While Watson was a one-trick pony, the name Watson reached a household status overnight and secured its place in IBM's product and marketing portfolio. The IBM Journal of Research and Development published an extended special issue in 2012 to describe Watson as it existed at the time of competition.

## Watson as a service provisioning platform

Although IBM was highly successful in creating the Jeopardy! Watson, Watson did not perform well in other tasks. Therefore, IBM decided against a product based strategy in commercialisation. Currently, IBM makes Watson available in a piecemeal manner by providing cloud-based services to process and analyse unstructured data, that is, some aspects of texts and conversation, audio and images. IBM has named the services as Language, Speech and Vision. Application developers can use and combine these services in various ways to design and develop Watson applications that serve a particular purpose.

The services are provisioned through application programming interfaces (APIs). APIs are like service counters: bring a document to a service counter you think is fit for job and ask a specific question regarding the document you brought with you. After that, the document will be taken to the back room for processing and in no time the results are handed back to you. The prices of API queries vary as per the API and volume of use. As an example, a single conversation API query costs \$0.0025 with a standard plan.

Currently, Watson is most skilled in text processing. Eight API service sets are made available to process text. The API set called AlchemyLanguage offers analysis services to extract sentiment, keywords, entities, and high-level concepts from texts among other things. The conversation API provides basic blocks to build a dialog model for a chat bot. The Natural Language Classifier API classifies and categorises short texts (max 1000 words) but its pre-trained classification scheme may need fine-tuning and training with a labelled data set to make it more suitable for a specific use case. Other text APIs include Document Conversion, Language translator, Retrieve and Rank, Tone Analyser and Personality Insights.

The text processing APIs are supported with the audio and image APIs. For audio, there are two APIs: to translate speech to text and text to speech, and to provide audio based input and output for text processing services. For images, there is only one API available and it analyses images and returns keywords to describe the content of images. Similarly to the Natural Language Classifier API, its pre-trained model may need additional training depending on the use case. In addition, there are APIs for the latest news and decision making support, named as AlchemyData News and Tradeoff Analytics.

IBM, after ProgrammableWeb, labels this sort of APIs as PhD APIs, "a class of APIs that packs the power of a team of doctoral students and researchers". Also, a PhD in a relevant field might be needed to understand, interpret and discriminate between the models, services and answers they provide.

Given that Watson APIs are designed and built to process unstructured data in the form of text, supported by APIS that can translate between speech and text and convert images to categories and keywords, IBM provides other sets of tools to process structured data, databases and numbers. These tools can be combined with Watson APIs.

## Watson in purposeful applications

As developing a Watson application is about integrating APIs together, let us have a look at some of the applications developers have created.

In 2015, IBM and TED teamed up to bring APIs and content together to build watson.ted.com (requires login). There, one can type in a question, insert a Twitter handle or give a piece of text (100-2000 words) as an input and then get back a list of TED videos

that appear to answer a person's question or reflect the Twitter profile or a piece of text. Please do give it a try to see if your questions are answered.

Recently, e3, a digital agency, listed the five coolest ways to use Watson. The number one was to light up a dress at Met Gala. The Ted Watson described above held the second place, while talking to children through toys made it to the third. The fourth on the list was Under Armour's fitness app that utilises Watson, whereas the personality analysis based on the Twitter feed was left fifth.

To speed up the exploration on how to monetise Watson and increase the number of much needed Watson developers, IBM has launched innovation competitions. For example, IBM and Innovate UK run the Intelligent Data Insights contest that awarded six teams with £35000. Also, cash rewards are available for skilled and inventive chatbot developers in the first Watson Developer Conference in San Francisco in November 2016. Softbank and IBM have partnered to bring Watson APIs to the Pepper robot platform.

In a forward looking manner, IBM has already set its eyes on the next grand challenge. IBM launched with XPrize a five million dollar and four year competition called IBM Watson AI XPRIZE to develop artificially intelligent applications. The competition milestones are in 2017, 2018 and 2019, while the grand finale takes place at the TED 2020. If the past predicts the future, the awesomeness will be Watson in spirit if not strictly in a subsequent application.

## Watson means Watson

Based on the above, Watson is not a singular entity. The Jeopardy! playing Watson is a quiz game winner, engineered painstakingly over multiple years to win a competition that was played under strict rules and constraints. That was achieved by bringing together various text processing methods in a way that suited playing the game of Jeopardy!. Later on, to monetise the effort, Watson was broken down back to its constitutive elements and made available in the form of Watson APIs. Consequently, developers and users combine and fine-tune the APIs to develop applications that serve particular purposes, since it is extremely difficult to build computerised behaviours that generalise across contexts; if potential buyers want the artificially intelligent behaviour shown on telly but tailored to their needs, they should design and build it themselves while IBM provides tools, building blocks and advice. Moreover, in the future, IBM Watson AI XPRIZE challenge may grab more varied skills and meanings under the Watson umbrella.

To avoid confusion and misunderstandings that may arise when a single word is used to describe many potentially overlapping matters, it would be beneficial to develop and use more fine-grained and descriptive language when discussing the platforms and applications that provide and make use of computational natural language processing in some of its various forms.

## References

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