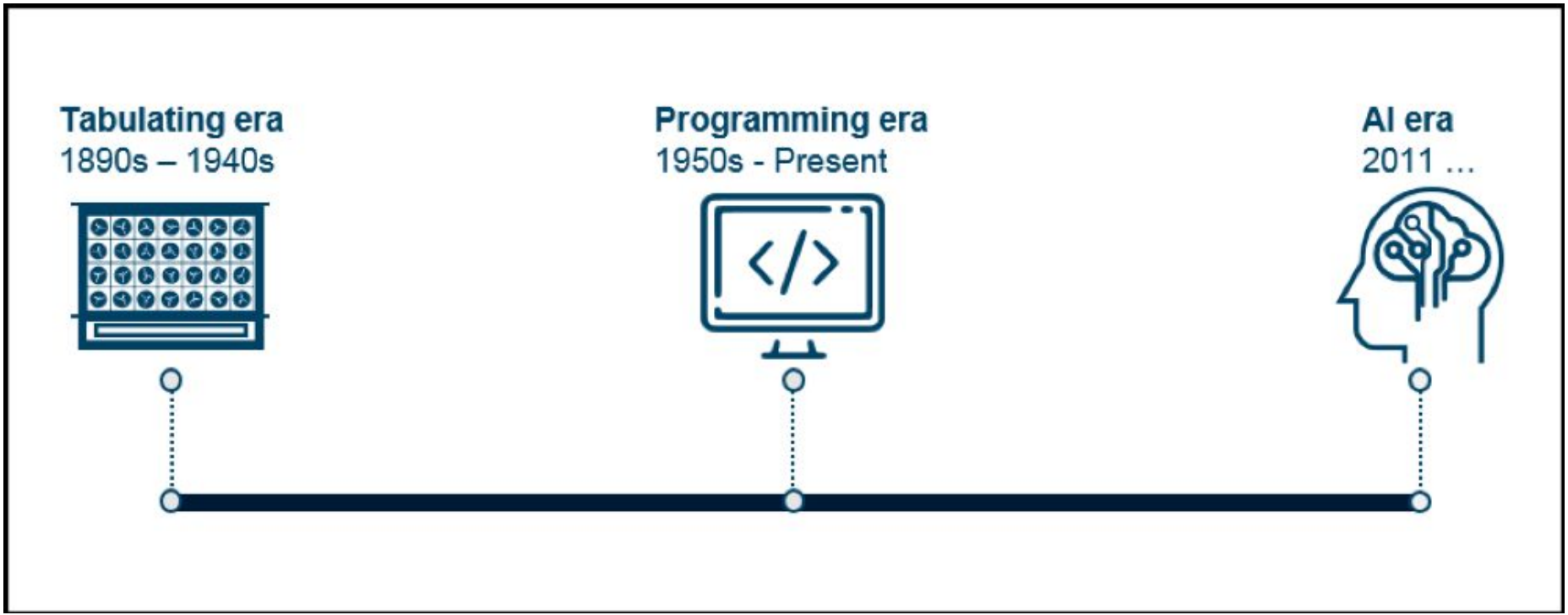
IBM's Watson Analytics for Health Care

Dr.Mayank Aggarwal &
Mr.Mani Madhukar.

Presented by:
Geoffrey Kimani

Introduction



Computer-Based Systems in Health Care

Problem-solving during the first decade of AI research was of a general-purpose search mechanism trying to string together elementary reasoning steps to find complete solutions.

The alternative was to use more powerful, domain-specific knowledge that allows larger reasoning steps and can more easily handle typically occurring cases in narrow areas of expertise.

Problem

According to an expert “75 % of treatment are done on Trial Basis with not exact dosage of medicines and actual number of tests prescribed” such things result in millions of deaths per year in India. If we can have a collection of all records of patient histories countrywide and some way to predict on this basis it would be miracle.

The proposed solution? IBM Watson.

IBM WATSON. What is it?

Watson is a question-answering computer system capable of answering questions posed in natural language.

It has various products ranging from Advertising, Business Operations, HR, Health, Security e.t.c.
(https://www.ibm.com/watson/products-services)

Our focus is the IBM Watson Health Cloud.

IBM Watson Health

Watson was trained over time using many medical materials, notes, textbooks and patient's records.

According to Forbes, 2013 **605,000** medical symptoms, **25,000** training cases, **2 million** notes have been analyzed and assistance of **14,700** clinician hours for its accuracy in generating the hypothesis.

IBM Watson Health Cloud for Life Sciences Compliance and IBM Watson Care Manager was launched in 2015. It has mergers with Columbia University, Boston Children's Hospital, ICON plc, Teva Pharmaceuticals and Sage Bionetworks

Institutions Using Watson

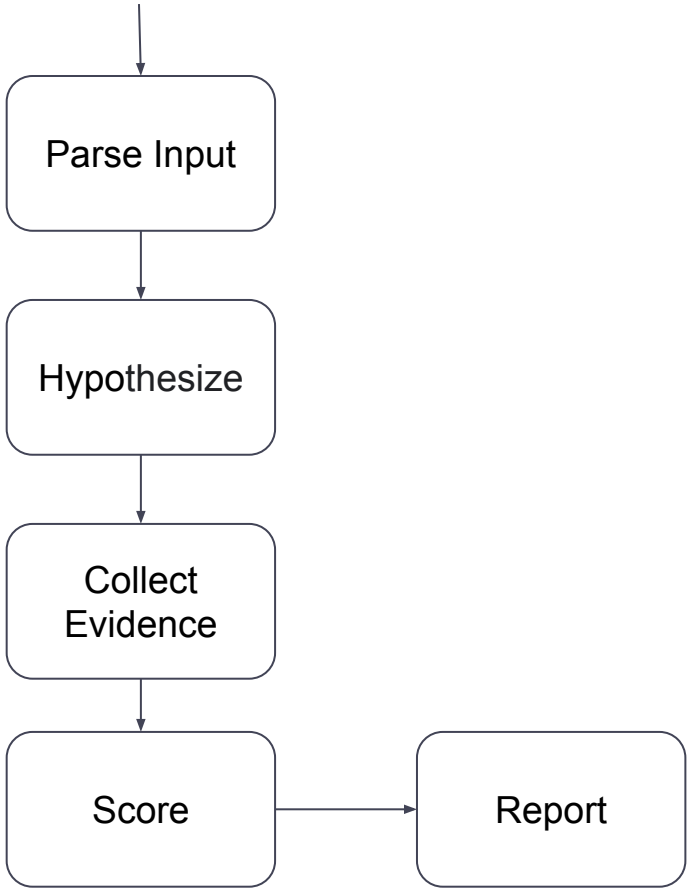
- Mayo Clinic
- Memorial Sloan Kettering Cancer Center
- Cleveland Clinic
- New York Genome Center
- The University of Texas MD Anderson Cancer Center
- Manipal Hospital

Working of Watson

Watson is given the symptoms of the patience and any other metadata pertaining to the patient including; family history, current treatments, duration of illness, lab tests etc.

Using this information along with the findings from tests, different types of treatment guidelines, digital record of medical cases and prescriptions of physicians, as well as peer-reviewed research and clinical studies then, Watson can gives different options for treatment and its confidence rating for each option.

Working of Watson



- ★ The medical practitioner inputs a natural language question, giving details of patient's symptoms and other metadata.
- ★ The system then parses the input searching for related information through it inbuilt search engine. The output of this process is a set of hypothesis.
- ★ In support of a hypothesis, evidence to support the hypothesis is searched for.
- ★ The evidences in the former step are again parsed and strength of each evidence is calculated.
- ★ Based on the strength of the evidence all the hypotheses are given a score

Technical Review

Open source softwares used;

Apache UIMA - Creates a chain-linked structure for different components.

Apache Lucene - Used for indexing and searching of the unstructured documents.

Large amounts of storage is required because of the volume and veracity of data. Processing for this system is a bit easy since the time required for responses is not as prompt.

Ubiquity of Watson

This is enabled by Application Program Interface (APIs) and the Bluemix Platform as a Service(PaaS).

As such developers can use these APIs when creating health-based mobile applications, IoT devices like wearable bands and watches e.t.c

Using such services in devices that users interact with everyday can help contextualize help to specific users who sign up for the service eg. offering customized recommendations about one's health.

Conclusion

Watson's way of reasoning is to generate hypotheses (that is, candidate answers) from a large body of documents, as opposed to from preconceived theories as humans typically do. In fact, a major trend in scientific research is to “mine” discoveries from data. While Watson is trying to emulate human intelligence, humans seem to think more like Watson too!