



Cognitive computing

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Glossary


- ▶ Cognition - is the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses.
- ▶ Machine learning - is the study of algorithms and statistical models that computer systems use to progressively improve their performance on a specific task.
- ▶ Processor - a central processing unit contained on a single integrated circuit.
- ▶ NLP - is a subfield of computer science, information engineering, and artificial intelligence concerned with the interactions between computers and human (natural) languages, in particular how to program computers to process and analyze large amounts of natural language data.


Cognitive computing in Brief



Historical background

1. Babbage's differential and analytical machines
2. Hollerith's tabulating machine
3. John von Neumann's model

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- ▶ The term «cognitive» firmly connected with knowledge and special methods of receiving, processing and storing of it peculiar to human. Modern AI technologies are based on such biological methods, which are very effective.

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- ▶ Cognitive computing is a kind of technology that particularly replicate the human brain special features of processing and information analysis. So, It is based on scientific disciplines of artificial intelligence and signal processing.

Methodology of cognitive computing



1. Content processing

- ▶ Machine learning is able to quickly process multiple data sources, identify different patterns and similarities, and stack objects into logical groups.

2. Search

- ▶ Users will be able to ask questions and receive detailed answers in a narrative form. As a result, we have Siri or Cortana, specializing in a special issue area.

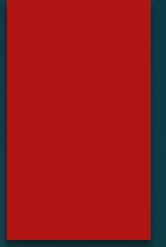
3. Digital companion

- ▶ Cognitive systems, including smart personal assistants, will be able to provide employees with quick access to organizational knowledge wherever they are.

4. Identifying people with needful knowledge

- ▶ Cognitive systems will help to quickly identify users with narrow specialization and experience on almost any issue.

5. Data visualization




- ▶ Cognitive computations help to create a visual representation of data and any knowledge in a short time – diagrams and schemes that reflect large amount of information.

6. Gained conclusions analytics

- ▶ Cognitive systems can analyze databases or extracted conclusions and project logs searching for patterns and trends.

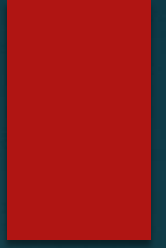
State of Art and Open Issues




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- ▶ Cognitive technologies penetrate into our everyday life more and more. Modern computing algorithms are commonly based on neural networks. AI helps us to find people, to sort huge amounts of information and even to choose clothes in online shops and onwards and upwards.



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- ▶ IBM announced in 2017 that a lot of industry branches will be ready for implementation of cognitive technologies by 2020.





- ▶ One part of the main problem of cognitive computing is that computer architecture was invented when first computers helped people to solve a narrow set of goals.

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- ▶ On the other hand, we still don't know exactly the complete structure of human brain. That's why we can't create a sterling model of it to solve modern issues.

Industry leaders and startups




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- ▶ The most known company engaged in cognitive computing research is IBM. They have a technology named IBM Watson, made to quickly process any kind of information.
 - ▶ Intel made a neuromorphic processor Loihi in 2017. With a help of this processor dealing with AI technologies will become easier.

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- ▶ There were four research projects focused on creation of neuromorphic computers in 2017. Two of them were located in Europe (Germany and UK) and two were in USA. Almost every project aimed to human brain modelling and has its practical realization.



IBM **Watson**

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- ▶ SparkCognition
 - ▶ Microsoft Cognitive Services
 - ▶ IBM Watson
 - ▶ Numenta
 - ▶ Expert System

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- ▶ Cisco Cognitive Threat Analytics
 - ▶ Customer Matrix
 - ▶ HPE Haven OnDemand
 - ▶ CognitiveScale
 - ▶ Deepmind

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