The Intelligent Machine – a Dream Which Is Not Yet Real ...

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Not long ago, one of the greatest dreams of human beings was to fly. For many, many years its seamed to be just a dream … Nowadays, it is no longer. In order to over come all the difficult situations that occur inevitable in each and every person' s life, man always wonted to be supported by a guardian angel such as the good fairy, from the Fairyland, or by „Greuceanu", the Rumanian male symbol off the one able to succeed in everything he put his mind to.
But today, the ideal of man is guarded in a secret place of his mind and soul: the creation of a perfect machine, gifted with a striking degree of resemblance between the two of them able to obey without question.

On his great guest to conquer the Universe in order to gain supremacy, trying to rule the invincible forces of nature, man was able to reach the Moon.
From that moment on he became more and more aware that was seemed to be just an ideal closely related to electronic computer, will soon come to live.
When speaking of computers or any other technical fields, man proved once again that he is the only master. The fact that he is the one who created electronic components in miniature, represents, more than ever before, the living proof that his outstanding achievement will give him one day the opportunity to build a robot that would think and act exactly like a human.
Unfortunately, today we find it very difficult to believe that researchers in artificial intelligence and theory of knowledge are getting more and more pessimistic. We have no choice but to ask ourselves "why?". The answer lies right in front of us. At the beginning of the Informatics Era (1960-1970), there was no doubt that man' s great ideal will come true. At this time, everybody believed that by the year 2000, all the intelligent machines would be able to take, without any problems the Turing test. They wrong! All the results regarding the theory of knowledge, gathered by now, could exceed (surpass), no matter what, the limits of the intelligent machines. The machines proved to be incapable to assimilate the "common sense" knowledge.
During all this years, the results concerning the artificial intelligence and the theory of knowledge convinced researchers to take into account all the aspects regarding them, but in a different manner. They have no choice but they give up for now the global approach of the artificial intelligence. Researchers have in mind more specialized fields, where professional knowledge from the human experts is needed. This is the way experts systems came life, leading to spectacular results in different activities: medical diagnosis, financial exchange, insurance.

Hopes, achievements and failures regarding the building of intelligent machines

Starting from the question: what did man wish for? – the response seems to be simple: to build a machine very much alike him, more performant but which obeys him blindly. This is why the first concerns were focused on artificial intelligence, which studies human thinking processes and way of expressing them with the help of intelligent machines.Since there is no consensus on defining either natural intelligence nor artificial intelligence, without claiming a general accepted definition, we could say:

* *Natural intelligence* is that … complex, yet flexible mental activity, always dealing with new situations and issues, in which we make use of available memory, reason and

knowledge, allowing us to understand and comprehend phenomena and things which not only that help us in solving problems, but permanently raises a lot of questions;

while:

* *Artificial intelligence*[1] is found between various sectors of science and information technology**,** being concern with: symbolic reasons and solving problems with the help of those, having as main objective building of computers which do things that, for the time being, men do better.

Basic disciplines and applications of artificial intelligence are suggestively expressed by artificial intelligence tree[2].

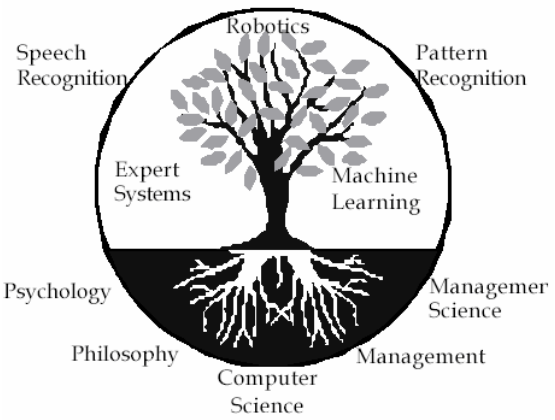


Fig.2. Artificial intelligence tree

We can express in a similar way artificial intelligence fields and tasks[3] allocated to those. Since there is no general accepted definition of intelligence, either natural or artificial, the following question arose: what do the specialists understand by intelligent behavior?

Among the most significant features we can mention:

– learning and understanding from previous practical experiences[4]**;**

– deciphering the meaning of some ambiguous or contradictory messages**;**

– adaptability or ability to rapidly and successfully answer to new circumstances**;**

– using judgements for solving problems**;**

– establishing interfaces in a rational manner**;**

– intensive using of knowledge**;**

– acknowledging the relative significance of different elements which occur in a particular situation**.**

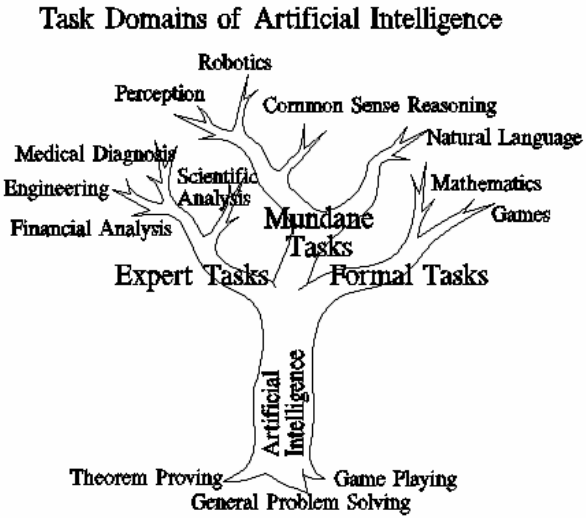


Fig.3. Fields and tasks of artificial intelligence

Alan Turing's challenge**:**

The English mathematician **Alan Turing** is the one who imagined the test that was named after him (1950) and that**,** if it had "passed" a machine**,** it would have proven its „intelligence"**.** Turing started from a very natural idea – if we do not know how to define intelligence in precise terms**,** but we say man is intelligent**,** than we could say the same thing about other „creature"**,** where the last would act like a human being**.** There is still to be determined which aspects of human behaviour are indeed relevant for intelligence**.**

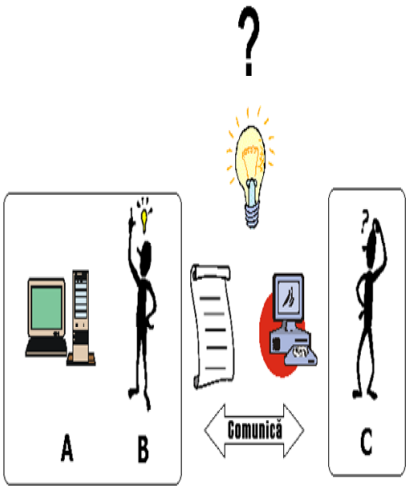
„Turing" Test

[1] John McCarthy (1956), author of artificial intelligence concept, had a great contribution, inferring the perspectives of this field**.**

[2] Figure taken from Turban & Aronson, 2001.

[3] Figure taken from Carol Brown, 1993.

[4] E. Turban and J.E. Aronson – „Decision Support Systems and Intelligent Systems" – 2000.



„Turing" Test – may be considered a „game of imitation" with three players: **a machine (A), a man (B) and a second man (C).** A and B are not in the same room with C. C doesn't know which of the two players is the machine and cannot see or talk to them directly. Communication can be done in written or through a terminal. C has to distinguish the machine from the man, based on the answers to questions asked. **When C is not able to make the difference, can the machine be considered intelligent.**

Disappointment?

Performances achieved by artificial intelligence were not overwhelming for anyone, firstly because no problem truly significant (i.e. *whose solution to have substantially contributed to a human activity*) has been solved. What is important is the **two conclusions** which have imposed and still governed the artificial intelligence:

- most problems may be reduced to a problem of „**search**".
- A problem of search is something like the following case: X wants to get to city A, but finds himself at a crossroad with no sings, no indications whatsoever; in order to get to city A, X takes each of the ways available at the crossroad; if the city found at the end of one road is not A, then X goes back and takes another way.
- search must be guided by certain **knowledge** about the problem, represented by **rules.**
- If we consider the same example, we could say X **knows** none of the ascending roads goes to A. In this case he could avoid from the very beginning the ascending roads starting from that crossroad, restricting his search only to descending roads.

If in early 1950 people estimated that in approximately 50 years time intelligent machines would easily pass Turing Test, the scientists now are a lot more sceptical. Thus, the results of research in theory of knowledge could not overcome the limit of intelligent machines which, for now, are not capable to assimilate knowledge related to common sense.

ϖ However, many elements and knowledge have been accumulated in the fields of **artificial intelligence** and **theory of knowledge.**

„Power lies in knowledge!" – said Feigenbaum in 1977[5]

Given that the creation of intelligent machine, one of mankind's greatest dreams, maybe as constant during the years as man's wish to fly, is very much related to knowledge, I have tried to give an answer to a disputed problem of classic philosophy: **„What is knowledge?",** obviously through a strictly technical approach, focusing mostly on acquisition and representation of knowledge. **In general terms, knowledge may be undoubtedly:**

- complex, intangible, incomplete but, at the same time, constantly evolving;
- certain or uncertain, when we cannot talk about the likelihood of the presence of an element or a fact;
- valid or obsolete;
- contradictory, when we face exceptions.

Knowledge and judgement

Knowledge as process, on one hand, and **judgement,** on the other, represent two strongly correlated fields, taken into account that no judgement is possible without having a basis of elementary knowledge, while by judgement, knowledge gains new dimensions, enriching itself.

[5] Edward Feigenbaum said so in an article presented in 1977, at International Conference on Artificial Intelligence.

How do People Reason?

+People use:

- Inferential reasoning;
- induction reasoning;
- heuristic reasoning;
- analogous reasoning.

How do Computers Reason?

+Computers use:

- frames;
- rules: A ∏ B∏ C;
- existing cases, able to turn to good the preceding results;
- pattern recognition/expectations.

Representation of knowledge

I have identified many methods of representing knowledge. These take into account some criteria, among which we can mention:

ϖ Type of structure and forms of representing the knowledge which are used:

⎧ **if … then** used in **production rules; syllogisms**

⎧ **objects** – **relations** used in **semantic networks**

⎧ **model** used in **frames, scenarios**

⎧ **a sort of …** used in **trees, taxonomies** (*corresponds to the concept of tree structure and specialisation*);

⎧ **analogical** used in **direct representations** (*refers to those models which capture the correspondence with certain physical characteristics of observed reality - homomorphism*)

ϖ The manner in which knowledge is memorised in knowledge basis;

ϖ The actual access to knowledge, and also the time in which this knowledge will be accessed;

ϖ Expertise which will be embedded in the system has to be oriented towards concrete and useful activities or problems;

ϖ Possibility to use also external data or knowledge sources;

ϖ Interface for dialogue with the user.

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