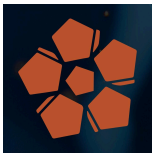


ART ^ NEUROSCIENCES

SEED 16 - Towards General Artificial Intelligence through Natural Intelligence

0. CONTACT DETAILS

0.1 Surname and first name

David Orellana Martín

0.2 Contact e-mail address

dorellana@us.es

0.3 Let us get to know you a little bit through your participation in websites, blogs, social networks, etc.

My personal website is https://www.cs.us.es/~dorellana/. From that web, different research databases can be visited (more info at http://www.gcn.us.es/dorellana/). I do not have an account in the main social networks, while I usually visit them to look for interesting information. Besides, I usually participate in forums (either online or in person).

0.4 What is your background and in which institution do you work?

I am Informatics Engineer, Master in Logic, Computation and Artificial Intelligence and Doctor in Informatics Engineering. Right now I am Assistant Professor at the Department of Computer Science and Artificial Intelligence of the University of Seville.

0.5 Gender: Male

0.6 Age range: 31 – 40 years old

1. ESSENTIAL DIMENSION

1.1 Seed name

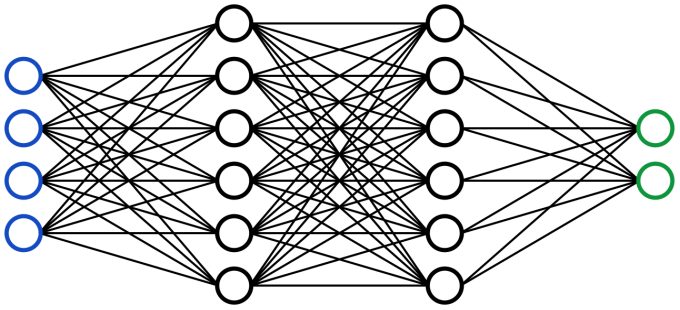
Towards General Artificial Intelligence through Natural Intelligence.

1.2 Seed summary

General or strong artificial intelligence is a type of artificial intelligence capable of performing any cognitive task that a human being can carry out, using abilities exhibited by living beings considered intelligent, such as reasoning, learning, creativity, and adaptation to new contexts. The goal of achieving a model capable of solving such a wide range of problems differs from the classical approach, where different algorithms specialize in solving a particular problem. This model, which may be an artificial neural network, is designed by a natural intelligence that has managed to abstract the necessary information from its knowledge of the brain into a mathematical model capable of solving problems that, in principle, the human being might not have been able to solve previously.

1.3 Metaphor. *Is there any metaphor that helps to explain this seed in a more intuitive way? An imaginative text can inspire as much as a poem.*

While strong artificial intelligence is like a wise person walking down all paths, weak artificial intelligence is an expert in one particular path, knowing all its intricacies, but unable to even step onto other paths without stumbling. The wise person, in reality, has been created by a scholar who cannot walk all paths, but knows themselves well.



1.4 Keywords (separated by commas)

Artificial intelligence, artificial neural networks, bio-inspired computing.

1.5 Scientific field (general)

Computer science.

1.6 Scientific subfield (specific)

Artificial intelligence.

1.7 Resources (File)

1.8 Resources (Links)

The Neural Network Zoo (https://www.asimovinstitute.org/neural-network-zoo/): in this website, some of the many architectures used in the field of artificial neural networks are depicted in a graphical way, using neurons that take inspiration from natural processes observed in living animals' brains.

Hugging Face (https://huggingface.co/): many models solving as many problems are presented. Each network can have a totally different architecture from the rest.

Human Brain Project (https://www.humanbrainproject.eu/en/): a research project devoted to a better understanding of the human brain, that could lead to an artificial intelligence closer to human intelligence.

Survey on artificial general intelligence (https://github.com/bowen-xu/AGI-Survey): repository where some links and references concerning artificial general intelligence can be found.

2. ADDITIONAL DIMENSIONS

2.1 SYNAESTHETIC DIMENSION

This dimension seeks to associate certain sensory characteristics to the seed.

2.1.1 What colours does this seed suggest to you?

Pink, grey and blue.

2.1.2 What sounds or music does this seed inspire you?

Blood flowing, electronic sound.

2.1.3 What aromas would you associate with this seed?

Guts, rust.

2.1.4 What flavours does this seed evoke in you?

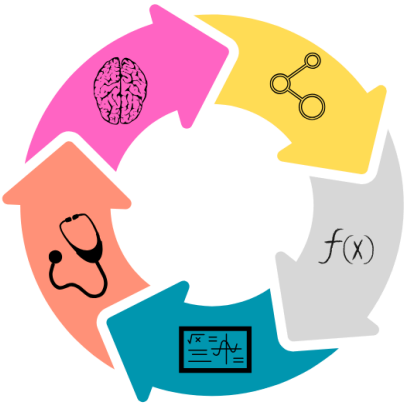
Bitter.

2.2 EMOTIONAL DIMENSION

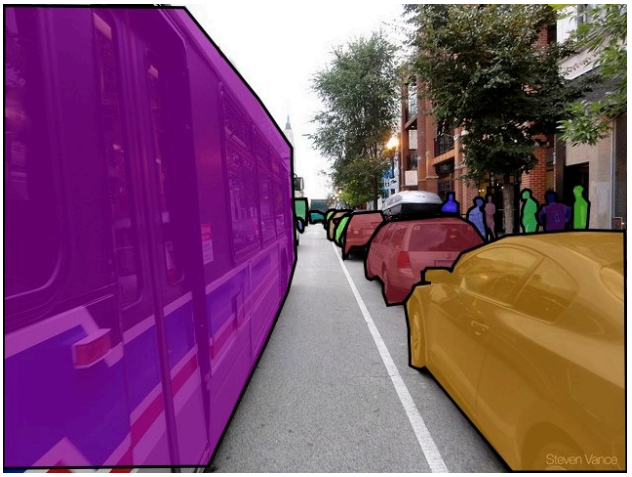
This dimension seeks to explore the personal meaning of the seed.

2.2.1 What was your motivation to dedicate yourself to this field of research? What personal reasons lead you to suggest this seed?

The pursuit of knowledge for the sake of knowledge itself, beyond its potential applications, is essential for the advancement of society. Having assistants that can interpret reality as a human would can facilitate the search for pathways to solve problems that, otherwise, might take much longer.

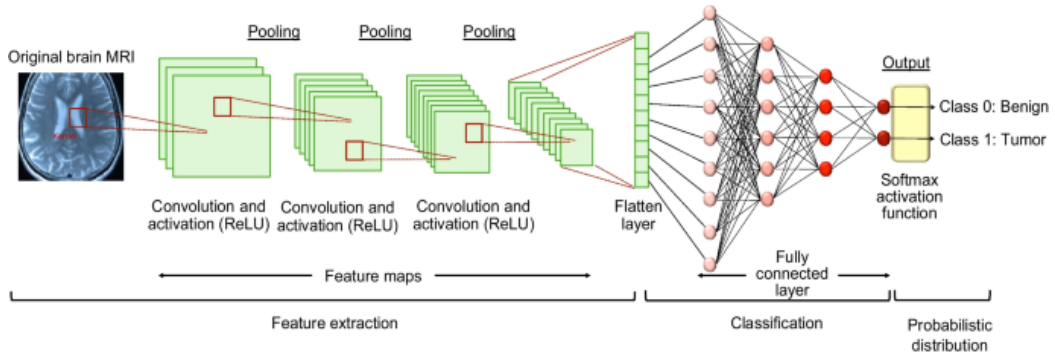


The
inspiration behind artificial neural network models in human neurons, using principles from areas such as algebra and calculus that can help solve mathematical problems potentially applicable to real-life issues like human diseases, seems like a virtuous circle where delving into one of the nodes leads to improving knowledge about the others.



2.2.2 What metaphysical reflections does this seed provoke in you?

Would a strong artificial intelligence be capable of developing methods to create natural individuals from natural elements? Would that individual, in fact, be a creation of such artificial intelligence, or of the human being for having been the original creator of the strong artificial intelligence? The knowledge and simulation of real neurons through mathematical concepts that can be replicated in artificial neurons, although it may seem like something out of science fiction movies, is entirely feasible due to technological advances in diverse fields such as machine learning and neuroscience.



What is also interesting is that, while neurons play a key role in information processing, the intricate web of synapses between them seems to play an even more crucial role, as they are responsible for transmitting these signals and, ultimately, integrating and modulating the information. Furthermore, their plasticity allows them to adapt their strength and efficiency based on experience, making it essential to understand the composition of these elements in detail for their proper comprehension and subsequent simulation.

2.2.3 What ethical reflection or challenges would you associate with this seed?

The issue of general artificial intelligence often sparks a debate about the boundaries between the natural and the artificial, due to the possibility of developing artificial individuals capable of acting, reasoning, learning, and interpreting reality like another human being. Raising the level of abstraction in this regard could change society's perspective on these artificial beings, and they could come to be seen as part of society beyond the business/research sphere.

2.2.4 What aesthetic dimensions does this seed suggest to you?

The beauty of fundamental knowledge, combined with the essence of the human being as a sentient entity, and its fundamental instrument, the brain, form a magnificent collaboration in which human and machine work together to achieve a sublime creation.

2.3 PROCEDURAL DIMENSION

This dimension seeks to explore the scientific processes that are usually followed when investigating this topic.

2.3.1 Description of the research process

Typically, when a problem is posed to be solved using an artificial intelligence model, the debate revolves around which type of model would be best suited to tackle it. Once decided, a continuous process of refining the model is carried out, including components that can address certain aspects of the problem more effectively. Then, the relevant techniques related to the chosen model (e.g., learning algorithms in neural networks) are developed to ensure, at the final stage of the process, that the model can act in accordance with the study's requirements. While this process is followed for weak artificial intelligences, for a strong artificial intelligence, the research process would be far more complex due to the level of knowledge, learning, and reasoning required from such a model. To achieve this, tests would have to be conducted to demonstrate that the behavior of this specimen resembles that of a human being in similar situations.

2.3.2 Research process diagram

2.3.3 Link to the descriptive video of the process

2.3.4 What tools are typically used in this field of research? Whether instruments, technologies, hardware or software.

Cutting-edge software tools are used, such as frameworks where predefined models can be fine-tuned according to the researchers' needs, as well as business tools that can be used to solve a particular problem. Due to the high computational cost of training and/or inference of these models, high-performance platforms such as graphics cards (GPUs) or programmable cards (FPGAs) are often used to execute these processes.

3. PERSONAL SUGGESTIONS

The comparison between weak artificial intelligence models and strong artificial intelligence, along with their relationship to their creator (a natural intelligence), could be the core threads of the work. Furthermore, incorporating aesthetic elements that support the parallel between natural and artificial neurons could make the work a unique piece that captures the attention of creators and scientists, potentially inspiring other research.