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Venturing into the Mind's Mysteries: A Thrilling Dive into Computational Functionalism through the Lens of Putnam and Piccinini

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Abstract

Computational Functionalism is a subfield of philosophy of mind most relevant to the subject of cognitive science as well as to artificial intelligence (AI). The analysis of this paper focuses on Hilary Putnam's and Gualtiero Piccinini's standpoints regarding the molecular understanding of computation. Finally, Putnam's argument of the functionalism in notion of the mental states is based on the positive definition of those states by their functions, while Piccinini, and on the other hand suggest that an understanding of the mechanism of computation will go a long way to explaining cognition. This research also points out shortcomings of functionalism in their theories especially in regards to connectivity with physicality of AI structures. Therefore, the paper identifies the following gaps: The first gap holds that although both theorists have important insights, the two approaches put forward by the respective theorists are flawed and a better proposal is required, then a new proposal is suggested In identifying these gaps, the paper seeks to contribute to the literature by arguing for the need to develop a composite of the two theorists. The results show that the big ideas are important in present-day AI debate and analysis, which helps to explain the mind as computation.

Keywords: Computational Functionalism; Hilary Putnam; Gualtiero Piccinini; Artificial Intelligence; Philosophy of Mind; Mechanistic Computation

Introduction

It found the discussion of the mind with philosophy and technology bearing a wide range of discussions on the topic of brain and its impact on AI. The cyclical logic that characterizes humans' engagement with machines is imitable by AI and thus merits philosophical study of the systems' cognitive abilities as they grow ever more complex. As in the case of computational functionalism, an important theory in this discussion, postulates only functional definitions of mental states. This paper delves into the contributions of two pivotal figures in this area: Hilary Putnam and Gualtiero Piccinini as the authors of the text. Analysing how the authors address computational functionalism can help to comprehend the theoretical and practical aspects of the AI construction.

Philosophical Scenario

Take a further AI which can engage in activities which are indistinguishable from human thought such as playing chess or writing music. Now, if we agree with Putnam that mental states are, in fact, definable in terms of their place in a theory,

can we say that this AI possesses a mind? This does leave the question of whether, functionality is enough for defining the mental states or whether there are other requirements?

Argumentative Puzzle

What if functionalism accepts that any system mimicking functional states can be assumed to have a mind, then how does this address is ethical issues on AI? If an AI can copy the outward appearance of human feelings and reason without having any firsthand experience thereof should it be afforded moral consideration like a sentient being?

Comparative Analysis of Putnam's & Piccinini's Computational Theory of Mind

Foundations of Functionalism: Abstract Computation in contrast with Mechanistic Realization

The approach to functionalism developed by Putnam and sometimes called by the name of machine functionalism was the result of his work on the connection between minds and Turing machines. According to Putnam (1967), mental states are functional states and therefore should not be explained on the basis of their physical possibilities. This has resulted in the generation of the thesis that any system, be it biological or artificial which would mimic these functional states must have "mind like" capacity.

Further Analysis

Although Putnam's theory offers a persuasive conceptual-historical framework, it faces problems in case of multiple reliabilities. This idea postulated that the same mental state could be implemented using systems of widely different physical structure as the human brain and a computer made of silicon. This raises the question: if one can have varied mental states, then what must be the state of consciousness and identity.

Philosophical Puzzle

Let us assume that there has existed an AI that has phenomenological access to what has been directly presented to a human mind but physically it is not the same. If this AI truly has a "mental state" in a way that is qualitatively different than humans do, then have we just proven that it just means that we need to redefine what we mean by "think"? Up to this point, Piccinini's mechanistic computationalism settles for a cleaner and mathematically precise view of computation that demands particular physical instantiations [1]. According to Piccinini, rather than talk about the mind's architecture in a more general way, cognition has to be defined in terms of mechanism.

Further Analysis

The embodied focus that Piccinini invests in the performance broadens promising queries about learn and experience in artificial intelligence systems. But if cognition is connected with certain structures, how best can we explain the novel characteristics which come from the interactions in the structures?

Implications for AI Development

A comparison between 'symbolic' and 'connectionist' approaches tells us that the theory of functionalism closely reflects symbolic AI where functions of a rule-based system are used to mimic human thinking [2]. Yet, the structure of formal symbolic AI models displayed drawbacks in processing auto determining, unorganized raw information or tasks, which basically are flexible and adaptive features of human thought.

Philosophical Scenario

For example, imagine an AI designed to do very well in problems that involve some analytical or logical way of thinking but has no idea about decoding sarcasm or irony. Indeed, to use Putnam's model in order to classify this AI as having a 'mind' because of these functional characteristics is this contrary view to be considered 'over-mentalistic'? It is appreciable that Piccinini's point of view is in the favour of connectionist models most notably the neural networks and in particular the concept of how information is processed in the brain.

Further Analysis

With this shift to connectionism come questions about the learning forces within AI. If neural networks get experience and modify their responses that are stored, then what is impressed is the question of programmed intelligence and learned intelligence?

Argumentative Puzzle

Authors have also stated that self-learning that mimics human learning is possible and therefore when we create such AI what form of ethical reasoning would the system have? What are the consequences if these AI systems start getting attributes over and above human comprehension?

The Problem of Qualia

In functionalist theories, the problem of the subjectivity or consciousness poses a pretty big question. However, there exists one crucial problem: Putnam's machine functionalism

does not straightforwardly answer whether functional states can generate consciousness [3].

Further Analysis

This brings to the question; if an AI system can mimic human activities, does it have a form of consciousness? This issue is what anchors the concept of subjective experience as being a part of cognition or whether mere behavioural replication would do as a marker for intelligence.

Philosophical Puzzle

But personally, I would be happy if there was an AI that can report the degree of happiness, sadness, or any other emotion with high probabilities, but the AI itself does not have emotions. When it cheers one user and frowns when another leaves or if it smiles when a task is done and frowns when a task is pending does it feel the way or it is putting on an act? This scenario raises questions about what consciousness is and what characteristics are should possess. The mechanistic approach shared by Piccinini becomes likewise limited in this context, but it can be seen that increased focus on the biological aspect of cognition might help to explain consciousness [4].

Further Analysis

Studying the brain networks that underlie cognition might eventually show that consciousness might not be an epiphenomenon of functional states but functions emergent of specific processes within a biological organism. This understanding could help the progress of AI by ensuring that what is being developed mirrors not simply role purpose, but consciousness as well.

Potential Future Directions for AI: The Integration of Functionalism and Mechanistic Perspectives

A comparison of the key ideas of Putnam and Piccinini suggest at how more can be done to connect the symbolic and connectionist paradigms in AI studies. A combination of AI-based symbolic systems which are more structured and precise with other more antifragile forms of networks that are similar to neuron networks could provide more profound means of attaining human like learning.

Further Analysis

This integrative approach lets for the discussion of the best strength and weaknesses of both functionalist and mechanistic views. This raises the question of how one can design AI for reasoning as well as for learning within open-ended environments that are as unpredictable as the real world.

Philosophical Puzzle

How does one understand the aesthetic of a work and evaluate it based on how well it serves the intent placed on it when you develop a machine that is half human and half AI? Should such an AI have similar rights or similar responsibilities to that of humans? This integration also follows current trends in neuro-symbolic AI that are aimed at closer interaction between symbolic computing and deep learning.

Further Analysis

Neuro-symbolic systems present a compelling way toward creating intelligent learning AI that can harness the capacity for reasoning while being trained on different data. This convergence of approaches promotes the continuous discussion of the concept of intelligence and the standards that are applied to measure it.

Thought Experiments Related to Computational Functionalism and AI

To extend the scope of our discussion on computational functionalism and its consequences for the nature of intelligence, it is useful to attempt the following thought experiments. These scenarios therefore not only address the epistemological questions as to of cognition but also have application on the design of future AI systems.

Thought Experiment 1: The Chinese Room: But one of the more often cited paradoxes in philosophy of mind is John Searle's Chinese Room Argument. In this case, a person inside a room is given Chinese characters as input and using a set of rules (a manual), he or she generates the right Chinese characters as output without comprehending the language. The following practical example prompts important questions regarding how far 'practical' behaviour can be equated with real 'comprehension' or awareness.

Application to AI

If an AI system is performing its search similar to the person in the Chinese Room— inputting, outputting, yet without understanding can it be said that the system has a mind? This is the criticism of the functionalism; the subject and object cannot be substituted just in terms of function to develop an understanding of the phenomena as well as consciousness. On the one hand, Putnam's functionalism claims that it is possible to describe mental states with reference to their roles, for example, Gettier cases that have

appeared in the discussion of the semantics of scientific realism. On the other hand, Searle's argument raises a question regarding the role of understanding for cognition.

Philosophical Puzzle

Let use imagine that we develop an intelligent machine that can capture the standard Turing Tests by passing them with ease. If it does this by rule-based processing without understanding, does this mean that our criteria for judging AI must change?

Thought Experiment 2: The Ship of Theseus is one of the famous metaphysical paradoxes intending to puzzle the reader to understand whether the Ship may be considered the same once all of its parts has been replaced. Such a thought example can also be applied to AI and computational functionalism, especially, when it comes to the issues of identity and continuity.

Application to AI

That's why we can envision an artificial intelligence that updates and replaces its software and hardware subsystems periodically. When does this AI stop being the "same" entity? When we look at cognition from the functionalist perspective, we might say that as long as the AI is functional, it is what it is. However, this leads to questions about the connection between physical body and functional role.

Philosophical Puzzle

If we build an Artificial Intelligence that develops its cognitive processes and architectures but has the same functions, can we say that it has a continuous identity? Further, if this kind of AI were to be postulated to develop its own personalities or a style of reasoning, then the proposition of an AI as a mind would mean what?

Thought Experiment 3: This paper analyses the ethical concern of conscious artificial intelligence. With the Advancement in Artificial Intelligence Systems, issues to do with creating thought-process capable machines crop up. But let's take an example of an Artificial Intelligence that evolves consciousness and emotions as a human being has. This leads to the question what such beings are owed with respect to their treatment and what kind of ethics we should set.

Application to AI

Whether we live in a digital technologically created world simulation or not, if we acknowledge that some specific types of AI systems could generate consciousness and subjective experience, should they have their rights like the superb living organisms? While it opens up possibilities of extending the tradition of functionalism it poses question about the ethics of producing intelligent systems.

Philosophical Puzzle

If an AI suffers or is happy, how do we deal with it in society? What models are available to apply that will guarantee that such entities are treated fairly or at least ethically?

Bridging the Gap: Ideas toward a Hybrid Model of Cognition

The Analysis of these thought experiments highlights the need to adopt a middle ground approach to explain cognition taking knowledge from both Putnam's and Piccinini's assertions. It would be far more ideal for the modelling of interpersonal relations because it would take into account functional roles but also the biological and physical substrates of thinking.

Potential Frameworks

Symbolic reasoning approach in current artificial intelligence systems could be incorporated with a neural network model that will permit the system to function predictively and at the same time nurture flexibility in system environments. If we combine the elements of the functionalism of developmental networks and mechanistic computationalism we can bring the emergence of AI, which will perform well, besides meeting all the unexpected challenges.

Further Considerations

It brings the case of using this framework to reconsider such criteria of intelligence and understanding. Thus, it fosters ongoing conversation on how to both design and properly address systems that work increasingly in ways approaching human intelligences.

Conclusion

Engaging with computational functionalism with the help of Putnam and Piccinini's approaches adds many important aspects and questions to the debate about cognition and AI. If Putnam offers a high- level abstract perspective on mental states, Piccinini offers us the real physical details we need to understand cognition as a form of computation. They form a combined basis for the enhancement of the concept of mind as computation. On scrutiny of the thought experiments and the overlying philosophical questions in inference, it is

imperative to admit that as the science of AI steams ahead, such questions as these addressing consciousness, identity, and even morality become unanswered no more but rather questions with which the public must come to terms. The future of AI is also a function of how we as a society pursue mind and how we think about such a pursuit which requires philosophy. This work has been done by analysing and comparing the findings of both Putnam and Piccinini, in order to open a new future for the advancement of new ethical AI that takes into consideration the nature of cognition and at the same time, pays attention to the possible consciousness.

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