

The Influence of Engineering Theory and Practice on Philosophy of AI

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Abstract. Ever since the early days of Artificial Intelligence (AI), the complexity of its relationship with philosophy has been under observation. Some devoted their efforts to a systematic foundation of philosophy of AI, taking for granted its placement within philosophy of science. Such endeavors were based on the view of AI as a scientific discipline, primarily aimed at answering questions about the nature of intelligence. Thus, it was natural to consider philosophy of AI, like philosophy of physics and of biology, as part of philosophy of science. We believe, however, that this position must be reconsidered today in the light of the issues recently tackled by AI and of the emergence of new fields of analysis: philosophy of technology and philosophy and engineering. In this paper we analyze how the view of AI as engineering influences philosophy of AI. Moreover, we argue that philosophy of AI, under this influence, can contribute to the foundation of the emerging philosophy of engineering.

1 Introduction

This work is aimed at exploring the relations between Artificial Intelligence (AI), philosophy, and engineering. The peculiarity of the relationship between philosophy and AI has been evidenced since the advent of AI [2], [23], [15] and many efforts have been devoted to a systematic foundation of philosophy of AI [4], [7]. We rely on a framework [21] that takes into account both the influence of philosophy on AI and the influence of AI on philosophy. We argue, however, that this framework must be revised today in the light of the emergence of new fields, such as philosophy

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of technology and philosophy *and* engineering. As one can guess by their names the former has already been recognized as an autonomous field, whereas the latter is still under discussion. Departing from the traditional view of philosophy of AI as part of philosophy of science, in this paper we analyze how the view of AI as engineering influences philosophy of AI. Moreover, we argue that philosophy of AI, under this influence, can contribute to the foundation of the emerging philosophy of engineering [1], [24].

In our effort, we take software-agent-based simulation as an example of what lies in a methodological area of overlap between what is traditionally carried out in the sciences (observation) and what most typically characterizes the activity of engineering (construction). Epstein and Axtell consider the former only as a necessary step for the completion of the latter, and wonder whether this alleged primary role of the construction of a model may indeed become a paradigm shift in some research fields: “[Agent-based modeling] may change the way we think about explanation in social sciences. What constitutes an explanation of an observed social phenomenon? Perhaps one day people will interpret the question ‘Can you explain it?’ as asking ‘Can you grow it?’ [8].” We think that this shift in interpretation reflects only a part of what happens when scientific and engineering practices meet in the context of AI: many research endeavors show that the relation between observation and construction is not that straightforward, and that software agents may be built not only to simulate phenomena already observed in the field, but also to explore new interaction patterns that have not occurred yet in the real world. Intelligent agents were indeed first introduced to replace humans in controlled environments, but it became soon clear that they can be exploited in environments with less constraints, as a simulation test-bed to verify what could happen should some possible strategies be implemented in the real world. What has been built as a tool from an engineering perspective can be taken and put into new configurations under different conditions, to observe previously unexplored scenarios, and formulate new relevant hypotheses.

These circumstances call for a methodological rethinking. More specifically, the traditional relation between the scientific perspective that supports the formulation of hypotheses and the engineering methodologies employed to construct the relevant verification instruments must be enriched to take more factors into account. In particular, the object of the researchers’ observation is not only the real world any more, but an artificial environment which models selected aspects of nature and society, and in which the interactions are influenced by how such environment has been implemented by the researchers themselves.

This paper is organized as follows: Section 2 sets the domain of our discourse by illustrating the disciplines involved and the relevant relationships; Section 3 elaborates on an example of agent-based modeling; Section 4 illustrates how such example sheds light on the impact of the engineering aspects of AI on philosophy; Section 5 elaborates further such considerations and shows how they can guide us in the first steps toward the definition of a philosophy of engineering; finally, Section 6 concludes.