Physical Computation: A Tale of Two Notions

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Abstract:

Under what conditions does a physical system compute? Typical answers to this question pull in opposite directions. On the one hand, computation looks like the kind of thing virtually any physical system can do. After all, physical laws ensure that some states are followed by others in a rule-like manner. On the other hand, computation looks like the kind of thing that only a select few physical systems can do. After all, computing devices only emerged in recent human history. This paper aims to resolve the apparent tension between these answers by putting forth two complementary notions of physical computation.

Keywords: concrete computation; physical computation; computation; computationalism, pancomputationalism.