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Title: Putting Peirce's Theory to the Test: Peircean Evolutionary Algorithms
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Abstract: While Charles Darwin proposed one of the first systematic arguments evidencing evolution, alternatives with a strong empirical grounding exist. These alternatives deserve our attention, if only because some of them claim to correct the oversights in Darwin's theory. Charles Sanders Peirce put forth one such theory. This article devises a novel Peircean Evolutionary Algorithm for finding the solution to a class of optimization problems in the domain of Evolutionary Computation (EC). The results are computed against a benchmark high-dimensional set of mathematical functions and compared with standard Darwinian Evolutionary Algorithms (EAs) and their advanced variants. Although there is further work to be done, this research meets four different but interrelated objectives: 1) To highlight the difference between Darwinian and Peircean understandings of natural evolution, 2) To show how cutting-edge work in molecular biology, symbiogenesis, epigenetics, and systems biology are moving in the direction of Peirce's ideas, 3) To propose a Peircean evolutionary framework that can act as a theoretical foundation for EC, and 4) To meet at least one major challenge facing the Evolutionary Computation community: convergence to local minima due to stagnation.
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