A Semantic Network-based Evolutionary Algorithm for Modeling Memetic Evolution and Creativity

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Abstract | We introduce a novel evolutionary algorithm (EA) with a semantic network-based representation. For enabling this, we establish new formulations of EA variation operators, crossover and mutation, that we adapt to work on semantic networks. The algorithm employs commonsense reasoning to ensure all operations preserve the meaningfulness of the networks, using ConceptNet and WordNet knowledge bases. The algorithm can be classified as a novel memetic algorithm (MA), given that (1) individuals represent pieces of information that undergo evolution, as in the original sense of memetics as it was introduced by Dawkins; and (2) this is different from existing MA, where the word “memetic” has been used as a synonym for local refinement after global optimization. For evaluating the approach, we introduce an analogical similarity-based fitness measure that is computed through structure mapping. This setup enables the open-ended generation of networks analogous to a given base network.

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