Future Generation Memetic Algorithms

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The two last decades hat witnessed the emergence of memetic algorithms (MAs) as one of the weapons-of-choice for dealing with hard optimization problems. The pragmatic philosophy of MAs, open to synergistic combinations with other search techniques and any other way of incorporating problem-knowledge to the optimization process, has led to more and more complex algorithmic models. Indeed, while early implementations of MAs were mostly based on incorporating some classical local-search strategy (such as hill climbing or simulated annealing) to an otherwise standard genetic algorithm –incidentally paving the way to a reductionist characterization of MAs as evolutionary algorithms endowed with some local-search technique– much more sophisticated models have been devised in the last years, featuring architectures and approaches that were hinted in the 80s yet unattainable until recently.

We survey these current advances in MAs, such as self-adaptation, discovery of local-search strategies, and interaction with complete techniques among other salient features, and take a look at some of the capabilities the future can bring to these techniques, focusing in particular on search completeness, and exploitation of distributed knowledge. Some important challenges stand in our way to these future generation MAs, and these will be briefly discussed as well.