Foreword

The beginning of the computer era was accompanied by a couple of exciting interdisciplinary concepts. Norbert Wiener established the discipline cybernetics, which emphasizes (self)-regulation as a principle in natural and artificial systems. McCulloch's and Pitts' artificial neuron, Rosenblatt's perceptron, and Steinbuch's 'Lernmatrix' as means for pattern recognition and classification raised hopes for brain-like machines. Not much later, Jack Steele coined the term bionics (later also called biomimetics) for all kinds of efforts to learn from living systems in order to create technical devices or processes for solving tasks in innovative ways. Three (at least) groups of people, at the same time but at different locations (San Diego and Ann Arbor in the US and Berlin in Germany) began to mimic mutation, recombination, and natural selection as search principles for many kinds of amelioration, if not approximate optimization, tasks that sometimes resist traditional approaches.

Since the mid-1990s, several of these interdisciplinary endeavors have come together under the umbrella "Computational Intelligence," including artificial neural nets, fuzzy systems, and evolutionary computation, and/or under the umbrella "Natural Computing," including ever more approaches gleaned from nature. There are, for example, DNA and quantum computing, and a couple of successors to evolutionary algorithms like artificial immune systems and simulated particle swarms.

One of these new problem-solving aids uses the bee hive as metaphor to create a novel routing strategy in telecommunication networks. As always with bio-inspired computing procedures, it is important to choose an appropriate level of abstraction. If this level is too low, rigorous analysis becomes impossible; if it is too high, the algorithm may lose its efficacy. The author of this unique and innovative work has found an admirable route between Scylla and Charybdis.

Be curious!

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