Special Issue

Symmetry in Solving NP-Hard Problems

Message from the Guest Editors

The P=NP question is one of the most intriguing open problems in computer science. If the answer to the question is negative, as most researchers believe, then it makes sense to talk about NP-complete problems and NP-hard problems. These complexity classes include a wide range of problems from diverse areas, such as combinatorial optimization (e.g., integer programming), graph theory, automata and language theory, logic, and games and puzzles. Unless P=NP, NP-hard problems cannot be solved by polynomial-time algorithms. However, for some problems, a clever use of symmetry may give rise to an algorithm that is, in general, still exponential, but may be feasible for many real-world inputs. In this Special Issue of *Symmetry*, we solicit papers that make use of symmetry (or asymmetry) to tackle NP-hard problems. Problems may be solved exactly (using strategies such as complete search, branch-and-bound, and dynamic programming) or approximately (using a variety of approaches, including, but not limited to, simulated annealing, evolutionary algorithms, and particle swarm optimization) and may come from a broad spectrum of domains.

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About the Journal

Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

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