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Applications of Quantum Annealing & Computation in Machine Learning, Neural Networks and Consciousness Modelling

Guest Editor:

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Deadline for manuscript submissions:
closed (31 October 2023)

Message from the Guest Editor

Following developments in our understanding of the stochastic methods of analog quantum computing using quantum annealing, whereby quantum tunneling helps in escaping tall but thin local cost function barriers , major developments in quantum annealers have taken place in the last two decades. While basic quantum physics and technology are still in progress, some major applications of quantum annealing computation have occurred in the last five years or so thanks to the availability of practical quantum annealers on the market (e.g., D-Wave machines). Of particular note is the intense activity in the search for quantum advantages in the application of quantum annealers to machine learning for classification, to deep neural networks, to the robustness of hybrid quantum-classical neural networks, to quantum information models of consciousness, etc. This Special Issue invites mathematicians, physicists, computer scientists, engineers and software specialists to share new research results in these directions, as well as comprehensive reviews, to introduce younger researchers in this exciting field to real-world problems in the application of quantum annealing computation.

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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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