Special Issue

Uncertainty in Large Neural Systems: Validation, Explanation and Correction of Multidimensional Intelligence in a Multidimensional World

Message from the Guest Editors

Significant progress in data-driven neural Artificial Intelligence (AI) over recent years has brought great benefits to end-users ranging from health, banking, and security areas to advanced manufacturing and space. Modern AI systems are built using massive volumes of data, both curated and raw, with all the uncertainties inherent to these data. One of the major fundamental barriers limiting further advances and use of AI systems of this type is the problem of validation, explanation, and correction of AI's decision-making. This is particularly important for safety-critical and infrastructural applications, but it is also crucial in other use-cases, including financial, career, education, and health services. High-dimensional data and high-dimensional representations of reality are typical features of modern data-driven AI. There is a fundamental trade-off between the "curse of dimensionality" and the "blessing of dimensionality" in high-dimensional data spaces: Some popular low-dimensional methods do not work in high-dimensional data spaces, whereas the blessing of dimensionality makes some simple methods unexpectedly powerful in high dimensionality.

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