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Hybrid Neural Network Architecture for On-Line Learning

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ABSTRACT

Approaches to machine intelligence based on brain models use neural networks for generalization but they do so as signal processing black boxes. In reality, the brain consists of many modules that operate in parallel at different levels. In this paper we propose a more realistic biologically inspired hybrid neural network architecture that uses two kinds of neural networks simultaneously to consider short-term and long-term characteristics of the signal. The first of these networks quickly adapts to new modes of operation whereas the second one provides more accurate learning within a specific mode. We call these networks the surfacing and deep learning agents and show that this hybrid architecture performs complementary functions that improve the overall learning. The performance of the hybrid architecture has been compared with that of back-propagation perceptrons and the CC and FC networks for chaotic time-series prediction, the CATS benchmark test, and smooth function approximation. It is shown that the proposed architecture provides a superior performance based on the RMS error criterion.

KEYWORDS

Neural Networks, Instantaneously Trained Networks, Back-Propagation, On-Line Learning

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