PhD Oral Defense

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Thesis Title

Learning Algorithms and Some Neural Network Model Under Imperfect Implementations

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Abstract

Function approximation is an important application of artificial neural networks (ANNs). In areas such as regression problems, image processing, and computer vision, function approximation is a commonly used technique. In function approximation, one problem is the reliability of the estimated model. Besides, in conventional neural network training algorithms, whenever an estimated model is implemented on hardware such as field-programmable gate array (FPGA), the performance of the estimated model embedded in a hardware system is different from the one obtained after learning. Also, in hardware implementation of neural networks faults are unavoidable. The faults can render a well-trained neural network wasteful or valueless. To address the problem, this thesis investigates some neural network models and algorithms under imperfect situations, where well-trained neural networks are affected by faults/noise, such as weight noise, weight fault, and node noise or the combination of these failures. We developed several learning algorithms to handle those imperfect conditions. We explore and investigate single-layer feed-forward neural networks (SLFFNs) and broad layer neural networks under imperfect conditions.