

## **PERFORMANCE OF EXTREME LEARNING MACHINES FOR OPTIMIZATION PROBLEMS-A SURVEY**

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### **Abstract**

Artificial Neural network (ANN) is a massively parallel distributed information processing system that has been inspired by the biological nervous system. This paper discusses the concepts of a new single layer feedforward neural network called Extreme Learning Machine (ELM) and its applications. ELM is a simple tuning-free three-step algorithm. The paper also discusses the various enhanced and hybrid types of ELM and their performance for various optimization and classification problems. The survey results show that the learning speed of ELM is extremely fast and it is capable of solving complicated optimization and classification problems. This algorithm tends to provide the good generalization performance at extremely fast learning speed. The experimental results based on a few optimization and classification problems including large complex applications show that the ELM can produce better generalization performance in many cases and can learn thousands of times faster than traditional popular learning algorithms for feedforward neural networks. The ELM performs better than SVM for all type of problems.

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**Keywords :** Backpropagation algorithms, Extreme Learning Machine, Neural networks, Single layer feedforward networks and Optimization problems.