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A STUDY ON IMPLICIT LAGRANGIAN TWIN EXTREME LEARNING MACHINES IN PRIMAL FOR PATTERN CLASSIFICATION

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ABSTRACT

The Implicit Lagrangian Twin Extreme Learning Machine (ILTELM) is a novel advancement in machine learning, designed for efficient and accurate pattern classification. Unlike traditional methods, ILTELM operates in the primal space, utilizing the concept of twin hyperplanes to classify data into distinct classes. This approach integrates the strengths of Extreme Learning Machines (ELMs) with implicit Lagrangian formulations, providing a robust framework for solving classification problems. In ILTELM, the primal optimization framework directly handles the input data, eliminating the need for dual formulations. This results in reduced computational complexity and faster processing. The implicit Lagrangian method ensures that optimization constraints are satisfied while minimizing the objective function, enhancing model stability and generalization. The twin hyperplane strategy further divides the input space into two regions, maximizing the margin for improved classification accuracy. Additionally, the ELM architecture, characterized by random feature mapping and minimal parameter tuning, allows ILTELM to handle high-dimensional datasets effectively. Its ability to work with non-linear and complex data patterns makes it suitable for diverse applications, including image recognition, bioinformatics, and text classification. The ILTELM in primal demonstrates superior performance due to its computational efficiency, scalability, and robust classification capabilities, marking a significant contribution to modern pattern recognition techniques.