



OPTIMAL BANDWIDTH DESIGN FOR LAZY LEARNING VIA PARTICLE SWARM OPTIMIZATION

TIAN HONG PAN^{1,2}, SHAOYUAN LI², NING LI²

*¹School of Electrical and Information Engineering
Jiangsu University
Zhenjiang, 212013, China*

*²Institute of Automation
Shanghai Jiao Tong University
Shanghai, 200240, China*

ABSTRACT—Lazy learning is a memory-based learning techniques, which performs local regression around a point of interest. Because of simplicity and ease in application, it has been successfully used in a large number of complex systems. However, a crucial step in this algorithm is how to design the bandwidth h , which controls the precision of the prediction. Unlike conventional trial and error tricks, the Particle Swarm Optimization (PSO) technique is proposed to design the optimal bandwidth at each prediction. According to this strategy, the optimal neighbors of the query are obtained and the predictive precision is improved. The proposed scheme can enable lazy learning algorithm to be spatial adaptation over the data density and distribution, variation of noise level, and local behavior of underlying function, etc. The effectiveness of the newly proposed strategy is numerically evaluated on two simulation examples compared with some of the state-of-art approaches.

Key Words: Lazy learning, Particle swarm optimization, Bandwidth, Mean square error