Comparison of Various Learning Machines in Computational Intelligence for Data Processing and System Modelling

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Abstract:

At the present time, the need in all disciplines for efficient and powerful algorithms for the handling of large and complex datasets is certainly at its highest. Extremely large multi-dimensional datasets are commonplace in image processing, genetics, industrial electronics, financial analysis and forecasting, cyber security, and throughout the social sciences. In addition to the size and high dimensionality of the data, agile real-time systems are needed to process such information for interpolation and extrapolation implementations applied toward control systems, data streaming and filtering, and simulation and modeling.

A small variety of currently prominent learning machine algorithms will be briefly discussed and compared. The list will include: Traditional Artificial Neural Networks (ANN), Takagi-Sugeno-Kang (TSK) Fuzzy Systems, Polynomial-Based Learning Machines (PLM), Support Vector Regression (SVR) and Extreme Learning Machine (ELM) variants. Emphasis will be on major differences and comparative effectiveness as applied to a few problems in real-time industrial applications, and approximation of benchmark "big data" sets.