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A Gene Selection Algorithm for Microarray Cancer Classification Using an Improved Particle Swarm Optimization

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Abstract : Gene selection is an essential step for the classification of microarray cancer data. Gene expression cancer data (DNA microarray) facilitates computing the robust and concurrent expression of various genes. Particle swarm optimization (PSO) requires simple operators and less number of parameters for tuning the model in gene selection. The selection of a prognostic gene with small redundancy is a great challenge for the researcher as there are a few complications in PSO based selection method. In this research, a new variant of PSO (Self-inertia weight adaptive PSO) has been proposed. In the proposed algorithm, SIW-APSO-ELM is explored to achieve gene selection prediction accuracies. This new algorithm balances the exploration capabilities of the improved inertia weight adaptive particle swarm optimization and the exploitation. The self-inertia weight adaptive particle swarm optimization (SIW-APSO) is used to search the solution. The SIW-APSO is updated with an evolutionary process in such a way that each particle iteratively improves its velocities and positions. The extreme learning machine (ELM) has been designed for the selection procedure. The proposed method has been to identify a number of genes in the cancer dataset. The classification algorithm contains ELM, K- centroid nearest neighbor (KCNN), and support vector machine (SVM) to attain high forecast accuracy as compared to the start-of-the-art methods on microarray cancer datasets that show the effectiveness of the proposed method.

Keywords : microarray cancer, improved PSO, ELM, SVM, evolutionary algorithms
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