ber of Level (NL) were set as 2 and 6, respectively. GA develops the binary structure by optimally selecting the nodes and leaves, and then RSL further refines the binary connections. The parameters used in this experiment are the same as in [4].

To get the reasonable results, 10 independent simulations with different training and testing dataset have been performed. The average classification rates over 10 time independent simulations are described in Table 1. As can be seen, tree structures of fuzzy neural networks can be successfully applied to big data classification problems.

4 Conclusions

This paper applied tree structures of fuzzy neural networks, one of the deep learning methods, to big data classification problem. Tree structures of fuzzy neural networks can reduce the size of rules by optimally placing fuzzy neurons as nodes and selecting relevant input sub-spaces as leaves. In the optimization stage, we considered two-step optimization. GA optimized the binary structure of the networks by selecting the nodes and leaves as binary, and followed by RSL further refined the optimized binary connections in the unit interval. To verify the effectiveness of the proposed method, Adult Census data set obtained from the UCI Machine Learning Repository Database was used. As is shown in the simulation results, tree structures of fuzzy neural networks can be applied to big data classification problems with reasonable accuracy.

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