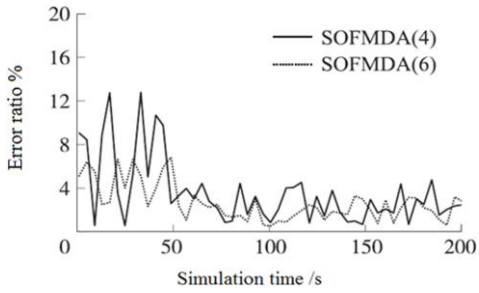

Figure 6. Network error ratios of 4-set and 6-set classifications

Figure 7 compares the LEACH and the SOFMDA in energy consumption. It is clear that the SOFMDA consumed less energy than the LEACH. Moreover, the energy consumption of 4-set classification was lower than that of 6-set classification. This is because 6-set classification has a greater degree of data aggregation than 4-set classification, leading to a smaller feature value and lower energy consumption in communication.

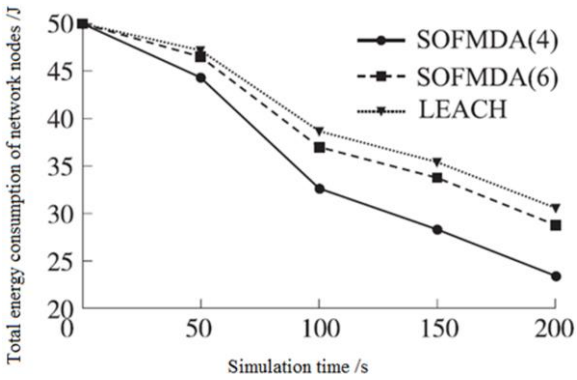

Figure 7. Energy consumptions of LEACH and SOFMDA

In light of the above analysis, the number of classified sets in the SOFMDA should be selected to strike a balance between accuracy and energy consumption. Since the CPU needs much more energy than wireless transmission, it makes sense to ensure the computing power at the sake of transmission volume.

5. CONCLUSIONS

This paper proposes a WSN data aggregation algorithm based on SOFM neural network, and denotes it as the SOFMDA. Considering the location-based clustering routing protocol in the WSN, the intra-cluster nodes were taken as the input layer neurons of the SOFM neural network, while the cluster head nodes, relying on the SOFM neural network, classify the data and extract data features, and then send the feature data to the sink node, thereby reducing the transmission load and energy consumption. Through a simulation experiment, it is proved that the proposed SOFMDA can effectively reduce the transmission volume through the classification of original data and the extraction of similar data features. The research findings shed new light on energy reduction, channel pressure relief, channel utilization improvement and service life extension of WSNs.

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