A novel remote sensing recognition method based on DBN ensemble and D-S evidence synthesis. (English) Zbl 1460.68095

Summary: Deep belief network (DBN) is a generative learning strategy which has been proposed very early, similar to the rest deep learning algorithms, the complex network structure and the large size of parameters increase calculation cost greatly, the application is limited greatly. In order to solve this problem, a decision-level identification method named distributed DBN weighted Dempster-Shafer synthesis (DDWDS) is proposed for high-precision classification of remote sensing objects. Firstly, the low-dimensional features and a small number of samples are selected randomly, many distributed, independent and lean DBN network are constructed and trained. Secondly, their classification results are used as a trust allocation function of the evidence focal element, and finally obtain the trust allocation function of each focal element based on weighted synthetic rules. With the multi-source remote sensing data of the light detection and ranging (LIDAR) system, the recognition accuracy of distributed DBNs which are constructed by 4 features and 20% samples is below 0.7, this situation shows great conflict, training cost decreases significantly, but the final classification recognition accuracy is raised to more than 0.9 with the proposed DDWDS. The results show that the method can determine the scale of the network by itself, and achieves better performance.

MSC:
68T10 Pattern recognition, speech recognition
62H30 Classification and discrimination; cluster analysis (statistical aspects)
62M45 Neural nets and related approaches to inference from stochastic processes
68T07 Artificial neural networks and deep learning
68T37 Reasoning under uncertainty in the context of artificial intelligence
86-08 Computational methods for problems pertaining to geophysics

Keywords:
depth belief network; conflict evidence-weighted integration; LIDAR land-cover classification; decision-level identification

Full Text: Link