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Abstract
This thesis discusses about how to use the Back-Propagation Neural Networks to recognize the capital English characters and the Arabic numbers. Before recognizing these character images, first, transform these character images into the standard sizes, and then find the character boundaries. Then, the thin-plate spline characters can be achieved through skeletonization algorithms. In addition, the center of gravity approach is employed to obtain the distances of the thin line characters before arranging decreasingly the distance parameters into 20 parts. After that, the average value of each part is then regularly normalized between 0 and 1. These characteristic values, obtained from arctan operation, are treated as the 19 input signals of neural networks system. The total characteristic information of 36 English characters and Arabic numbers is divided into four groups, and each group character consists of nine different rotating degrees. Therefore, four neural networks systems are established in this thesis.
In order to compare the effectiveness of the different algorithms applied to neural networks system, three approaches, the Variable Learning Rate, the Conjugate Gradient Algorithms and the Levenberg-Marquardt Back-Propagation Neural Networks, are employed this thesis for comparing the system learning speed (circulation updating sequence) and the correction of characters recognition. The experimental results show that in both the learning speed and correction of character recognition, the Levenberg-Marquardt Back-Propagation Neural Networks in recognition of the capital English characters and the Arabic numbers is the best approach.
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