Cellular Neural Networks with Switching Two-Type Templates for Image Processing

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SUMMARY

Cellular Neural Networks (CNN) were developed by Chua and Yang in 1988. The main characteristics of the CNN are the local connection and the parallel signal processing. The CNN consists of cells connected each other. The performance of the CNN depends on the parameters which is called the template. When the template has a good influence of processing, the CNN can perform complex processing.

In this study, we propose Switching Two-Type Templates CNN. In our proposed method, 3×3 template and 5×5 template are switched according to the output values around a cell in processing. In CNN processing, each template has merit and demerit. Processing with 3×3 template is quick but the delicate process is difficult. On the other hand, processing with 5×5 template is brady and easy to receive noise effect but the delicate process is possible. Two templates are switched by difference between the maximum and the minimum output values of each 5×5 neighborhood. In the case of the difference value is larger than a certain value, the computer figures out using 5×5 template. In the other case, the computer figures out using 3×3 template. This switching process is conducted every certain number of culculation. Using our proposed CNN, we obtain better results compared with the conventional CNN.