Investigation of Cellular Neural Network with dynamic changing template by the brightness

Kazushige Natsuno, Yoko Uwate and Yoshifumi Nishio
Dept. of Electrical Engineering
Tokushima University
Email: {natsushige, uwate, nishio}@ee.tokushima-u.ac.jp

Abstract

The animalfs retina sense external light stimulation. And, the photoreceptor cell of retina transform light stimulation into electrical signal. The photoreceptor cell of retina are two types that are rod and cone cells[1]. Cone cell is involved in cellular response to color vision. Mostly cone cell respond briskly in bright place. One the other hand, rod cell is involved in cellular response to brightness. In the chemical present in rod cell, a visual purple is heavily involved in the reaction of rod cell. The visual purple increase in response by insensible illuminant. Mostly rod cell respond briskly in dark place. In the comparison with behavior of rod and cone cell, the behavior of CNN have a resemblance to rod cell. However, the behavior of conventional CNN are less sensitive than the behavior of rod cell. Therefore we consider that reaction of visual purple are used in behavior of CNN.

In this study, we propose the new system which mimic the function of rod cells. The template of proposed system is changing dynamically by input and output values. In general, The template of conventional CNN is spatially uniform. This feature is able to implementation easily. However, it is not able to obtain effective result because of same template are assigned at every possible condition. With that, the propose system execute processing of different conditions by template are updated for each cell value. From simulation results, we confirm the behavior of proposed system and the output characteristic of proposed system.

REFERENCES

[1] E. R. Kandel, J. H. Schwartz and T. M. Jessell: “Principles of neural science,” Prentice Hall International, London, [99].