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SpringerBriefs in Nonlinear Circuits

Engineering : Computational Intelligence

Yalçın, M.E., Ayhan, T., Yeniçeri, R., Istanbul Technical University, Istanbul, Turkey

Reconfigurable Cellular Neural Networks and Their Applications

- Shows readers how neural networks can be adapted for practical applications
- Introduces new research directions based on recent findings using mixed excitatory and inhibitory neuronal populations
- Helps readers apply neural networks to bio-inspired sensory processing tasks

This book explores how neural networks can be designed to analyze sensory data in a way that mimics natural systems. It introduces readers to the cellular neural network (CNN) and formulates it to match the behavior of the Wilson–Cowan model. In turn, two properties that are vital in nature are added to the CNN to help it more accurately deliver mimetic behavior: randomness of connection, and the presence of different dynamics (excitatory and inhibitory) within the same network. It uses an ID matrix to determine the location of excitatory and inhibitory neurons, and to reconfigure the network to optimize its topology. The book demonstrates that reconfiguring a single-layer CNN is an easier and more flexible solution than the procedure required in a multilayer CNN, in which excitatory and inhibitory neurons are separate, and that the key CNN criteria of a spatially invariant template and local coupling are fulfilled. In closing, the application of the authors' neuron population model as a feature extractor is exemplified using odor and electroencephalogram classification.

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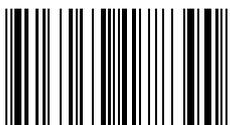
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