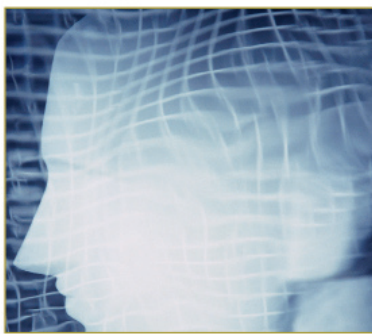


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**ADVANCING ARTIFICIAL INTELLIGENCE
THROUGH BIOLOGICAL PROCESS APPLICATIONS**

PREMIER REFERENCE SOURCE

**Advancing Artificial
Intelligence through
Biological Process
Applications**



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Advancing Artificial Intelligence through Biological Process Applications presents recent advances in the study of certain biological processes related to information processing that are applied to artificial intelligence (AI). Describing the benefits of recently discovered and existing techniques to adaptive AI and biology, this book will be a highly valued addition to libraries in the neuroscience, molecular biology, and behavioral science spheres.

In *Chapter I* a new mathematical analysis of the temporal structure of neuronal responses during tactile stimulation of the spinal trigeminal nucleus is studied. *Chapter II* aims to present some basic neuronal mechanisms involved in crayfish walking and postural control. *Chapter III* reviews the underlying mechanisms and theoretical implications of the role of voltage-dependent dendritic currents on the forward transmission of synaptic inputs. *Chapter IV* is a quick survey of spiking neural P systems, a branch of membrane computing which was recently introduced with motivation from neural computing based on spiking. *Chapter V* presents an evolution of the RANN to enforce the persistence of activations within the neurons to create activation contexts that generate correct outputs through time. *Chapter VI* shows the functioning methodology of the ANGNS and the application of possible implementation of the artificial glia to classification problems.

Chapter VII presents the experience gained when developing the path generation modules of autonomous robots, starting with traditional AI approaches and ending with the most recent techniques of Evolutionary Robotics. In *Chapter VIII*, two important issues concerning associative memory by neural networks are studied: a new model of hebbian learning, as well as the effect of the network capacity when retrieving patterns and performing clustering tasks. *Chapter IX* contains the theoretical development of the model and some simple tests executed over an implementation of the model. *Chapter X* presents the interrelations between computing and genetics, which both are based on information and, particularly, self-reproducing artificial systems. *Chapter XI* discusses guidelines and models of Mind from Cognitive Sciences in order to generate an integrated architecture for an artificial mind that allows various behavior aspects to be simulated in a coherent and harmonious way. *Chapter XII* presents a general CPG architecture for legged locomotion. The presented *Chapter XIII* tries to establish the characterisation of the multimodal problems and offers a global view of some of the several approaches proposed for adapting the classic functioning of the GAs to the search of multiple solutions. *Chapter XIV* focuses on the description of several biomolecular information-processing devices from both the synthetic biology and biomolecular computation fields. *Chapter XV* describes how to provide greater control over swarm intelligence systems, and potentially more useful goal-oriented behavior, by introducing hierarchical controllers in the components. In *Chapter XVI* it is proposed a bio-inspired approach for the construction of a self-organizing Grid information system.

Chapter XVII presents GBEA. *Chapter XVIII* aims to explain and analyze the connection between Artificial Intelligence domain requirements and the Theory of Systems with Several Equilibria. *Chapter XIX* involves an application of Artificial Intelligence in the field of Civil Engineering. *Chapter XX* employs the fuzzy decision tree classification technique in a series of biological based application problems.

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