Evolving Connectionist Systems: Methods and Applications in Bioinformatics, Brain Study and Intelligent Machines

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Abstract – This presentation gives a brief introduction to Evolving Connectionist Systems (ECOS) and their applications in Bioinformatics, Brain study and Intelligent Machines. These systems evolve their structure and functionality through learning from data in both on-line and off-line incremental mode, in a supervised or unsupervised mode, and facilitate data and knowledge integration, rule extraction and rule manipulation. The evolving processes of ECOS are defined by parameters, "genes" [1]. Both ECOS parameters and the input variables (features) for a particular problem are optimized through evolutionary computation techniques. ECOS extend further the classical knowledge-based neural networks [2]. In order to facilitate the development of practical applications of ECOS a general-purpose environment NeuCom has been developed (see **www.theneucom.com**) that will be used for illustrations.

ECOS are applied to challenging problems in three major areas: (1) Bioinformatics - microarray gene expression analysis, gene regulatory networks (GRN), medical prognostic systems [1]; (2) Brain study – modeling visual and auditory perception [1]; (3) Intelligent machines: speech and image multimodal processing; autonomous robots; adaptive time series prediction.

Computational neurogenetic modeling [3,4] is pointed as a future direction in the development of ECOS.

***Keywords**:* Adaptive, knowledge-based neural networks, Evolving connectionist systems, Neuroinformatics, Bionformatics, Computational neurogenetic modeling, Autonomous robots.

References

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