ANTHONY RATLEDGE AND WEIDONG LIAO, Department of Computer Science, Mathematics and Engineering, School of Natural Sciences and Mathematics, Shepherd University, Shepherdstown, WV 25443. Biologically Inspired Optimization Solutions for Homeostatic Maintenance

Optimization when applied in computer science refers to implementation of methods to solve problems more efficiently: to realize the most cost effective or highest achievable performance from a computing system. Traditional computation is done primarily through serial processing; one process after another is done, and so on. It is highly inefficient when dealing with complex factors, such as nonlinear computation, multi-objective functions, or nondeterministic variables. Researchers and scientists have found inspiration for such optimization problems in nature and developed an entire design philosophy called biologically inspired computing.

   This poster discusses optimization with an emphasis on homeostatic maintenance, which involves adapting internal systems to regulate a consistent state in response to the external stimuli of the environment. In nature, this is an automatic, ongoing process accomplished by the peripheral nervous system through reflexes. This presentation will explore several different biologically inspired optimization software solutions in two rather broad categories: non-swarm intelligence-based algorithms and swarm intelligence-based algorithms. It will then delve into the construction of artificial neural networks as a proposed optimization solution, which features both hardware and software considerations, ultimately to argue in favor of one swarm intelligence implementation for homeostatic maintenance, with experimental support. Finally, this poster presentation will propose a swarm optimization implementation into an artificial neural network to achieve homeostatic maintenance.