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Comparative Performance Analysis for Selected Behavioral Learning Systems versus Ant Colony System Performance: Neural Network Approach

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Abstract : This piece of research addresses an interesting comparative analytical study. Which considers two concepts of diverse algorithmic computational intelligence approaches related tightly with Neural and Non-Neural Systems. The first algorithmic intelligent approach concerned with observed obtained practical results after three neural animal systems' activities. Namely, they are Pavlov's, and Thorndike's experimental work. Besides a mouse's trial during its movement inside figure of eight (8) maze, to reach an optimal solution for reconstruction problem. Conversely, second algorithmic intelligent approach originated from observed activities' results for Non-Neural Ant Colony System (ACS). These results obtained after reaching an optimal solution while solving Traveling Sales-man Problem (TSP). Interestingly, the effect of increasing number of agents (either neurons or ants) on learning performance shown to be similar for both introduced systems. Finally, performance of both intelligent learning paradigms shown to be in agreement with learning convergence process searching for least mean square error LMS algorithm. While its application for training some Artificial Neural Network (ANN) models. Accordingly, adopted ANN modeling is a relevant and realistic tool to investigate observations and analyze performance for both selected computational intelligence (biological behavioral learning) systems.

Keywords : artificial neural network modeling, animal learning, ant colony system, traveling salesman problem, computational biology
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