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THITINAN TANTIDHAM : AN APPLICATION OF NEURAL NETWORKS TO THE OPTIMAL PATH COMPUTATION IN COMPUTER NETWORKS. THESIS ADVISOR : SUPACHAI TANGWONGSAN Ph.D., DAMRAS WONGSAWANG Ph.D. 74 p. ISBN 974-589-293-9

This research work represents an application of the Hopfield neural network model to the optimal path computation in computer networks, which was based on the original method proposed by Fauzi Kamoun and Mustafa K. Mehmet Ali. The method utilized by this research intended to solve a flaw in the previous approach that could not obtain an optimal path within the criteria of a minimum number of hops and a minimum of cost at the same time. The strategy chosen was to add a key variable for the number of hops in the energy equation and then apply the searching technique to neural networks in order to obtain the optimal solution.

The energy equation consisted of terms that were classified as strong and weak constraints. The equation was the sum of five key terms, including the term of total link cost. The sixth term was then added for the number of hops in the equation. For the resultant, the sum of the number of hops term and the total link cost term are both considered as weak constraints. Furthermore, one may choose to set up the priority of the hops term higher than the link cost term, or vice versa. This can be done by varying the parameters in both terms as desired.

The concept was then implemented and tested on several computer networks : undirected 5-node, directed 8-node, undirected triangular 21-node, and an undirected hexagonal 50-node network with satellite links. The results all show the determination of the optimal solution with the minimum link cost, as well as the minimum number of hops. It was further concluded that the inclusion of a key variable for the number of hops in this sixth term is feasible to determine the optimal solution for computer networks.