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Artificial Neural Network Approach for Real-Time Density-Based Traffic Signal Control System

Chandrasekara W.A.C.J.K.[1], Rathnayaka R.M.K.T.[2], Chathuranga L.L.G.[3]

[1]*Department of Computing & Information Systems, Faculty of Applied Sciences, Sabaragamuwa University of Sri Lanka*
[2]*Department of Physical Science and Technology, Faculty of Applied Sciences, Sabaragamuwa University of Sri Lanka*
[3]*Department of Computer Science, Faculty of Science, University of Ruhuna, Sri Lanka*

The lack of efficient traffic light control systems leads to traffic congestion and accidents. This problem causes many issues for society, the economy, and the environment. The research suggests an approach to the implementation of an efficient traffic light control system based on real-time conditions. This research consists of two components. A real-time data capture processing model and an Artificial Neural Network model to predict the outcomes concerning data in real-time. The principal component analysis uses to identify and minimize the dimensionality between the features. Image processing was used to count the number of vehicles in each lane and measure the length of the queue. The data of each lane was sent to the ANN model. The trained model was used to decide on the lane and time limits needed to allow the green phase, depending on the real-time situation and other dependent factors. The final ANN model gives 92% accuracy in the testing process. The introduced ANN model has one input layer, three hidden layers, and one output layer. The introduced traffic lights control system changes dynamically according to the conditions of real-time traffic rather than existing fixed time traffic light control system or traditional computation algorithms. This system decreases the average wait time and enhances traffic clearance performance.

Key words: *Traffic Congestion, Traffic Control System, Image Processing, Artificial Neural Network*

*Corresponding author: wacjkchandrasekara@std.appsc.sab.ac.lk