Development of Shortest Path Network with Minimum Nodes for the National Roads to Maximize the Accessibility using Breadth-first search algorithm

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Sri Lanka, as a developing country, needs data also in the form of classification for things like reservoirs, irrigation schemes, roads etc. Most of the infrastructure facilities in Sri Lanka have been built; nevertheless, they have not been classified fully into categories for further advanced studies in its own field. Roads in Sri Lanka are such as instance.

Most of the Sri Lankan roads have been classified as class A, class B, class C and class D roads. Among them class A and B roads have a clear definition, whereas, class C and D roads have failed. Over the time these roads are upgraded by the government when such a demand, due to the development and increase in traffic, is faced by the relevant authorities.

Sri Lankan government has made great achievement in economic and social development. One of the most important policies of Sri Lankan government has been sticking to is to prioritize infrastructures construction, including transportation, energy and telecommunication, among which, transportation especially road network was realized as vital of economic development by Sri Lankan government.

However, in Sri Lanka, road of total length 72000 km are in the state of unclassified. The reason is, the objective found in constructing such road was to just connect villages and small community centers. As the time permitted us to the next stage from this level, classification of these roads is of concern.

The paper is focused on development of a low volume road classification system based on minimum node shortest path concept in network analysis

The sample road network was selected in Kesbewa DSD for the study. In creating the road network, all junctions were defined as nodes and all road sectors were defined as edges. Find the all minimum paths to specific goal node. This process will be continued several times. Ultimately this will come up with the most important shortest paths. According to this shortest path, the sample road network can be divided into sub networks. Breadth-first search algorithm is uses to identity the minimum node path in a subnet work.

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All the nodes in Class A, B, roads are marked as goal nodes in the sub network and a start node is selected from the rest. In the (Breadth-first search algorithm) program is executed and the shortest minimum node paths can be found. This process is continued to all nodes in the region excepting goal nodes. The minimum nodes path in the sub network are arranged by the descending order depend on number of minimum nodes in those minimum paths and weights are assigned to road links according to the survey data analysis. The links are ranked according to the weight range they fall in.

This analysis will help to identify the most important link in a network to improve the accessibility to National road network.

Key words: Breadth-first search algorithm, minimum paths, minimum node paths.