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## **Facebook Network Analysis Based on Graph Theory**

H. C. Koralegedara<sup>1\*</sup>, M. H. L. Weerasinghe<sup>1</sup>

<sup>1</sup>Department of Mathematics, University of Kelaniya, Sri Lanka  
chiruni20@gmail.com\*

In the present world social media has become an essential part of humans' life. Most people use social networks to do their day today life activities. Analyzing real world social networks is also a very important and emerging research area. This research work mainly focused on Facebook social network and analyzed its properties using graph theory concepts. The network is assumed as a graph, that is, a set of vertices (or nodes) representing a person and a set of lines (or edges) representing one or more social relations among them. Graph theory techniques and properties help to analyze and visualize the behavior of networks. To construct our Facebook network, we collected real world data set by doing survey from group of university students. According to our data set we construct a network with 221 nodes and 698 edges to represent our Facebook model. To construct the Facebook model, we used Gephi, which is an open-source software for analyzing and visualizing networks. Real world networks are very complex and massive, and it is not easy to analyze. To analyze our Facebook network model, we basically used content analysis under the following categories such as metric, network structure, temporal, random walks, and visualization. Network metrics identify the most important or central character of the network. Under metric analysis we discussed homophily, density, centrality, and transitivity those are measure principal nodes in a network tends to have links to other nodes, how close the network is to complete, the most influential character of the network and tendency of the nodes to cluster together, respectively. In our model graph density is very low compared with complete. Closeness centrality is very low in the network and it is represented the connections among the people who are in the network is very distant. In the network structure basically discussed how we explore network from its structure, based on two areas such as network features and community detection. The page rank, Hyperlink – Induced Topic Search (HITS) and Stochastic Approach for Link Structure Analysis (SALSA) discussed under random walk. Random Walks is a path across a network created by taking repeated random steps. By temporal we analyze the explicit time dependent properties of the network. Probabilistic ties, time aggregated, media matrix, multi agent and discretization discussed under temporal. Visualization of the network is important, but it is impractical with the very large dataset. This work mainly focusses on analyzing our constructed Facebook model using graph theory properties. The method we used can be applied to find many interesting information in social networks.

**Keywords:** Facebook network model, Gephi, Graph theory, Social network analysis, Social media