CLOSENESS CENTRALITY WEIGHT AND EDGE CLOSENESS CENTRALITY WEIGHT OF GRAPHS

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Abstract. Centrality measures play a pivotal role in understanding the importance and influence of vertices within a graph. While various centrality metrics have been proposed for vertices, there exists a growing need to assess the significance of edges in a network, especially in complex networks. One of the most well-known centrality measures in social network analysis is the normalized closeness centrality. It determines the relative importance of a particular edge within a network or a graph by taking the reciprocal of the sum of the geodesic distances from this edge to each of the other edges and then normalizing it. The main purpose of this paper is to build a theoretical approach for numerically analysing closeness centrality weight and also the edge closeness centrality weight of some important families of graphs.

Keywords. centrality measures, closeness centrality, edge closeness centrality, closeness centrality weight, edge closeness centrality weight..

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1 Introduction

A common set of online or offline connections between individuals or organizations or between individuals and organizations can be considered as a network. For example, farmers' networks, business networks and social networks like WhatsApp, Facebook, Linkedin, X.com etc. Nowadays social networks have become part and parcel of human life. The most important and basic task is to identify the central or influential element in these networks. One of the important indices towards the centrality measure. There are various centrality measures developed and applied in these networks. Closeness centrality is one of these effective centrality measures. Closeness centrality has gained prominence as a measure of vertex importance based on the average shortest path lengths to all other vertices. However, existing centrality measures predominantly focus on vertices and overlook the significance of edges in network dynamics. In this study, we propose the concept of