

h International Conference on Innovation and Research in Engineering Sciences

GEORGIAN INTERNATIONAL ACADEMY OF SCIENCES AND STUDIES

31 July 2021 - TBILISI GEORGIA

social network clustering with genetic algorithm

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Abstract— Many people today establish part of their relationship with friends through virtual social networks. One of the most practical issues in computer science is the issue of data clustering, which has many applications in the field of social networking, pattern finding, and data similarity. Many researchers in various fields have done various researches about it. On the other hand, the possibility of modeling many problems has caused widespread attention to graph clustering. Since single-objective optimization algorithms can not optimize all the objectives of community discovery, in this research, a two-objective meta-heuristic algorithm is proposed for this purpose. Researchers have used several genetic algorithms to identify communities, but the proposed algorithm uses two goals together, which form the basis of defining communities, which improves efficiency and accuracy. The performance results of the proposed method are compared with other genetic-based algorithms by standard data sets in the field of social network analysis and the results show the superiority of the proposed method over other methods.

Keywords: Social Networks, Optimization Algorithms, Two-Objective Genetic Algorithm, Modularity, Pareto Front, Fitness Function

I. INTRODUCTION

Due to the spread and influence of the Internet in today's life, structures such as social networks have emerged. Networks usually consist of a set of nodes that are connected to each other by connections called links. Computers that are connected to each other, web pages that exchange information with each other, or a group of people on social networks form a network with each other as friends[1].There are many types of complex networks. For example, social

networks, technology networks, information networks, biological networks, etc are examples of networks that exist around us[2].Social networks represent a social structure that includes a set of nodes that represent individuals or organizations that are associated with one or more specific types of affiliations, such as kinship, friendship, business exchanges, ideas, and so on[3]. The analysis of social networks is done with the help of graphs. Therefore, the entities and communications within the network are mapped to a set of nodes and edges [4]. In the real world, like online social networks, features represent the distribution of strong rules. These networks have many scattered and empty connections. But dense connections within the network can be considered as a community. Society in social networks has criteria that introduce interconnected nodes as a group. Scattered connections exist only between groups (communities) in networks. Figure 1 shows a simple example communities social networks, and connections of [5].Complex networks are widely used in human societies. Community recognition is the center of research in the study of complex networks [6].