

# An Inquiry for Computerized Algorithms and Displaying Methods of Network Diagrams

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**Keywords:** Network diagram, Computerized algorithms, Displaying methods

**Abstract.** With the development of science and technology, more and more practical problems in life need to use mathematical models to analyze and to solve. So the utility ration of digital technology is becoming higher and higher in terms of discrete structural problems, which has powerfully promoted the development of network diagram theory, solving a lot of difficulties in people's production and living, improving work efficiency and promoting further development of science and technology. This paper mainly provides an analytic study in the respect of computerized algorithms and displaying methods of network diagrams.

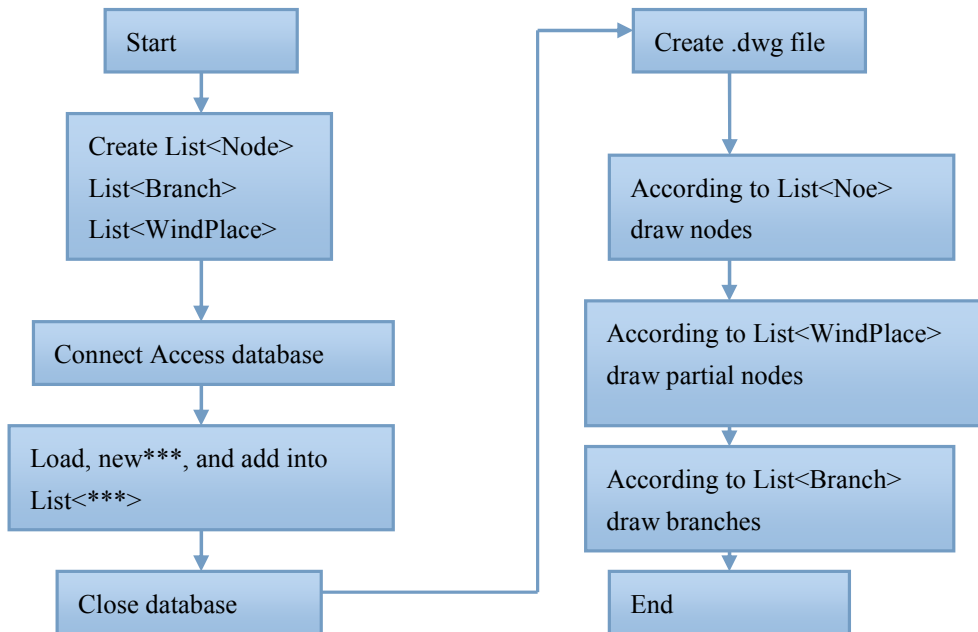
## Introduction

The 21st century is a period of rapid development of network information technology, during which computer technology has become matured and humans have made much progress in the development of science and technology. Beneficial from the progressive development, the tight coupling of network diagram theory and computer technology are provided with advantageous conditions. Especially in the respect of graph entity and graphic relation, by the application of network diagram theory network diagrams can be better optimized in the quantitative and qualitative treatments. In recent years, driven by information technology and digital technology, network diagram theory has developed rapidly, of which the display and control algorithm have reached the most rapid development as well as become a hot spot of research in recent years.

## Summary of the Development of Network Diagram Theories

In real life many practical problems in China can be solved by means of establishing mathematical models. The research involved in this respect can be traced back to as early as 1850 AD. For example, in Europe the research involved the question of the "queen" in chess as how to both use the least to obtain the least squares, which is exactly the prototype of the earliest network diagram. It was not until the 18th century that people developed diagram theory in terms of the study of points and lines to such an extent that they formed a graphic science based on the combination of points and lines. In 1736, Euler posed the question as "whether or not it is possible to cross each of the seven bridges exactly once in the case of no repeated approach adopted", assuming the question unanswerable and gave it a rigorous justification—a move that indicates the realization of digital transformation of abstract problems. Since then graph theory has been turned into a theory applied to many areas. Until the 1960s, Berge for the first time introduced several concepts of computerized algorithms in graph theory. After that, Ore introduced control algorithm in graph theory for the first time. Thus the real form the network diagram theory came into being

and has promoted the development of the combination of mathematics and computer network technology. Fig. 1 is the automatically generated process of a network diagram.



**Figure 1** Automatically Generated Process of a Network Diagram

### Analyses of the Computerized Algorithms and Displaying Methods of Network Diagrams

**An Analysis with Dot Notation Control Algorithm.** Dot notation control algorithm is defined by J.E. Dunbar for the first time in 1995, which mainly studies local dominant problems, a variety for the study of local dominant theory. In 2011, on the basis of dot notation control algorithm Michael A. Henning furthers the research and puts forward signed total control algorithm. There are essential differences between the two algorithms. Dot notation control algorithm requires conditions to be met on closed neighborhood of the dot while signed total control algorithm requires conditions to be met on open neighborhood of the dot. As regards China's research on graphic theory, Xing Huaming introduces the issues of the minimum and the maximum and analyzes the lower boundary range of signed total control algorithm in 2003. On this basis, Michael A. Henning provides further analysis and research and sums up specific network diagrams. Wang Junxiu makes comprehensive improvement in terms of the problems of the lower boundary and proposes a more perfect boundary ratio in 2006. In 2009, Lv Xinzhong et al. further the study of signed total control algorithm and enrich its content. Leaning on the basis of predecessors' studies, Xu Baogen also for the first time changes of signed total control algorithm into anti- signed total control algorithm, thus promoting the further development of the research.

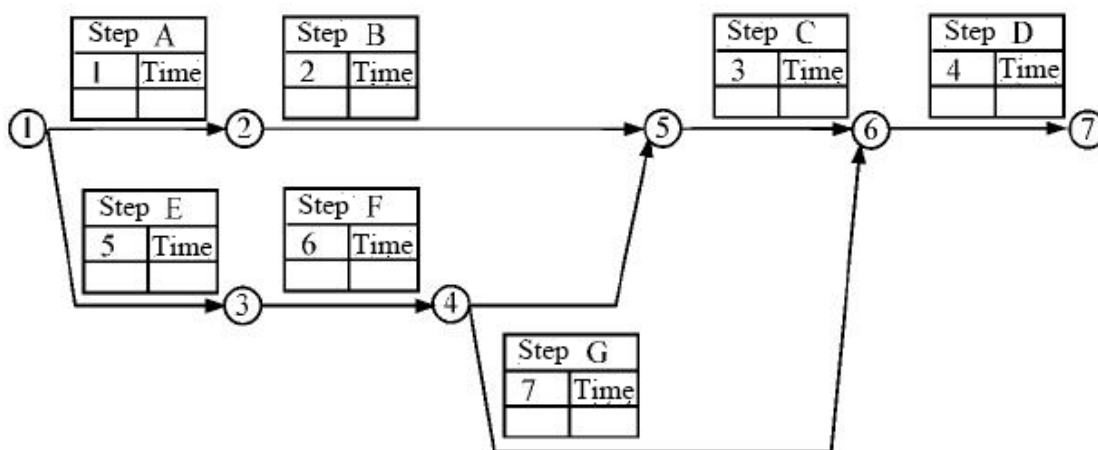
**Edge Symbol Control Algorithm.** Early this century, Xu Baogen proposes edge symbol control algorithm for the first time, which define the boundary control algorithm. Then he continues the research on edge symbol control algorithm and elicits the upper and lower boundaries of general network diagrams and the exact value of some special symbols of network diagrams. Reducing edge control algorithm is transformed from signed edge domination algorithm. They are different in range of function value as the former changes the latter's range of function value  $\{-1,1\}$  into  $\{-1,0,1\}$ . In actual research, reducing edge control algorithm is more difficult than other control algorithms, leading to less research findings.

**Display of Network Diagrams.** Fig. 2 is an instance of activity-on-arrow network diagram drawing. Generally speaking, network diagrams should be displayed through the computer. In order to display network diagrams on the screen, people tend to use language programs to realize the drawing of network diagrams. Here we employ C language to draw network diagrams because it can complete the work in a relatively easy and fast way as well as improve display speed.

A Network diagram is generally made up of connections between point and point. These connections constitute the relation graph between with these points and edges which are so complex that some points may be at 1 degree while others may be at degree greater than 1 as well as some points are at 0 degree. However, there must be two endpoints for each edge, so to draw the network diagram on the screen, the first step is to draw each vertex, and then add the attachment between the corresponding vertices, thus completing the drawing of each graph with the diagram.

Firstly, draw points on the computer screen. Then according to the already known graph, determine the coordinates (X, Y) of each point. In this process attention should be paid to the screen as to ensure that physical coordinates are adopted, i.e. on the top left corner of the screen, setting horizontal direction as the X axis and positive to the right while perpendicular direction as Y axis and positive to the lower.

In this coordinate system, the position of each point on the screen can be defined by coordinates (X, Y). In addition, note that X, Y must be a pair of integers and will have a certain value range, whose scopes are closely related with the graphical model set and have has a major relationship with the resolution of the screen. In the process of calculation, if the result of X, Y is not an integer, the decimal point should be rounded. Once the coordinates are determined, you can draw sides on the screen. After finding two vertices of a side, you can draw a straight line between the two vertices. If you need to add free vertices on the screen, you can also use the same method to draw, but you must draw the new added points with different color in order to enable users to be clear at a glance. C language generally provides 16 different color options for selection and can generally meet drawing requirements.



**Figure 2** An Instance of Activity-on-arrow Network Diagram Drawing

### Research on Improvement of the Computerized Algorithms and Displaying Methods in Specific Applications

Network diagrams have very extensive application in social daily life. This paper provides a systematic study of the application of edge symbol control algorithm and dot notation control algorithm in drawing network diagrams as well as implements a computer display analysis to

acquire a new system that enables the query and display of network diagrams. The application of the algorithm and structure can constitute a network graph query and display system. However, the system itself is not stable. If the system network diagram is modified for many times, for example, deleting and adding vertices and edges, then it will be extremely difficult to retrieve records of operations throughout the process. Therefore, it should be effectively combined with the database and record and query all the historical operations related to database storage. Only thorough solution of the demand for data query can make the system obtain comprehensive consummation. In the solution to problems in the field of daily life, improvement of the system should be in accordance with different objects. For example, in traffic network, there is a different computerized algorithm and display method, so actual situation and special rules must be taken into consideration. In social practice, the computer display method and algorithm must also be invested with a lot of knowledge, human and practice. Thus, the researchers can work out the network diagram technology that suits the demand of modern social development.

### **Summary**

The research on network diagram has been furthered with the development of information technology and mathematics. The proliferation of new control algorithms and graphic display methods also prove to be a huge extension of research directions. The research is not just confined to network diagrams proper as well as begins to develop in other fields, such as coding theory, computer network and so on, wherein network diagrams are widely used. This progress promotes the development of computer technology but enriches its application contents as well. Meanwhile, it provides people with a rich and colorful life. In addition, the research on the display of network diagrams also has achieved great results that lead to successful drawing, modification, processing and display of graphs through the computer screen and computer software for graphic drawing. The completion of the whole process of graphic display via computer technology and devices, in turn, boosts further development of network diagram techniques.

### **References**

- [1] Zou Song, Guo Chengcheng, Yan Puliu and Zhu Peihong, Research and implementation of generating network topology map based on web, *Computer Engineering and Applications*. 10, 40 (2004) 157-158.
- [2] Liu Naiwei, On the computerized algorithms of network diagrams, *Computer CD Software and Applications*. 13 (2014) 95-96.
- [3] Zou Hai, Qiu Huili, Research and implementation of drawing activity-on-arrow network, *Computer and Modernization*. 7 (2013) 176-177.
- [4] Peng Zhong, Research on computerized algorithms and displaying methods of network graphs, *Dissertation of Nanjing University of Science and Technology*. (2004) 123-124.