Algorithmic Issues in Graph Drawing

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Abstract

In this speech, the professor described graph drawing and techniques. We concentrate at introducing the technique at all.

1. Introduction

Graph drawing is an algorithm to construct geometric representations of graph in 2D or 3D. Inputting some formal expressions and transforming them into the form of graph for expressing knowledge in easy to understand is the main purpose. For easy to understanding, the graph have to own the property of readability. There are many categories of graph drawing like straight line, orthogonal, Grid, Circular, Polyline and Upward graph drawing have the property. Besides the necessary property of readability, the layout also a important method to representation in clearly, liking circular, star, layered layout which those graph drawing shapes are familiar to and easy to accept by human. Now we will focus on two famous graph drawing, Sugiyama method and force directed method and the ordering of components in the graph. To sum up of all in this section, The readability is the key concern.

2. Two famous graph drawing

Due to the readability, the planar graph and not crossing edge too much is important. So there have two spread methods in the graph drawing, the Sugiyama method and the force directed method, we describe below.

2.1 The Sugiyama method

The method, using the concept of the parallel sort network to clarify nodes layers and not allow edge crossing each other between layers, is based on directed and acyclic graph. The characteristics of this method are few edge crossings, straight as possible and the main purpose is expressing the node relationship. This method using layer-by-layer sweep, arranging node method in each layer, sort the least possible number of crossing edge.

2.2 The force directed method

The main idea is seem graph as system, the different layouts which generating from the graph are seem as the different system forms and then finding minimal energy in different system forms. We can also know that scale is not well in this method because that input a element into graph will generate too many forms to finding.

3. Canonical ordering and orderly span tree

According to the former section the planar is main key idea, in this section, we will describe some graph drawing techniques for planar graphs.

3.1 Canonical ordering

Purrifing of the original graph into several induced subgraphs. Each subgraph has some properties, the value of connected degree is two and internally triangulated and each subgraph is base on the previous subgraph.3.3 Orderly spanning tree

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Dividing a spanning tree into 4 patterns. Some patterns have an relation order between each other, Using this property to generating the canonical orderings.

3.2.1 Simple Floor planning

Let each relative model connecting together using rectangular to expression. We can easy to realize the relationship between each models are clearly. It is because that expressing clearly, we can use permutation and combination to calculate how many relationships in specific areas.

The speecher is providing a simple, polynomial time complexity floor plan to construct orderly spanning tree.

3.2.2 Podevs planning

The second result from speecher is using Podevs planning to compact the drawing. Podevs planning using a planar orthogonal planning with equal vertex size.

3.2.3 Rectangular planning

The last result that speecher say is rectangular planning, that is using the property of symmetry, to reducing the computing complexity

4. Conclusion

Using Symmetry to speedup calculate, using regular graph to clarify all relations and using orderly spanning tree to minimal the searching complexity and direct the basic order in the graph, we can using it in routing, for instance using the property of symmetry to calculate less frequency of routing, that is using symmetry to matching different sources and different destinations in the multicating environment.

5. Reference

[1] Chen-chin liao, Hsueh-I Lu and Hsu Chun Yen ”Fllor planning via orderly spanning trees”, NTU