CS564 - Course Project Proposal

Hasan ŞEREFAL 21903941 , Utku Şahin 21903940
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1 Geometric Search, Point location, Chain method

1.1 Introduction

The chain method of Lee and Preparata(1977) aims to locate which face of the PSLG contains any arbitrary point by dividing regular PLSG into monotone polygons. A vertex fails to be regular if incoming or outgoing edges mandated by the definition are missing. To regularize a PSLG, the missing edges must be added to those vertices where they are missing. A PSLG is regularized by regularizing each non-regular vertex. The process may add “artificial” faces by splitting existing ones. The two faces share the same identity for point location purposes.

1.2 Steps of Chain Method

Basic pipeline of the Chain method is like following:

1. If PSLG is not regular, Regularizing the PSLG
2. Construction of the Monotone Complete Set of Chains by Y-Axis
3. Querying Monotone Complete set of Chains

1.3 Algorithmic Complexity

Our algorithmic complexity aim is as following;

- Query: Log n x Log n
- Pre-processing: O N Log N

Normally chain method claims regularization step of PSLG takes O(NlogN) time but it has flaw. We must check if newly added edge intersects with any existence edge, therefore our complexity becomes O(n^2). We are planning to solve this flaw with algorithm in O(NlogN), Partitioning a Simple Polygon into Monotone Polygons by Using Sweep Line Method as our Instructor suggested.

1.4 Environment

We are planning to use C++11 to develop steps of chain method and Qt5 to depict PSLG.

1.5 Group Members

1. Hasan ŞEREFAL 21903941
2. Utku Şahin 21903940