6.854 Final Project

Arsen Mamikonyan; Hayk Saribekyan

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Abstract

In this paper we review and implement two algorithms presented by Bokal et al.[1], and Chan and Pratt [2], presented in SoCG'15 and SoCG'16 respectively. Both works introduce novel approaches to finding maximal subsequences with given hereditary properties.

1 Introduction

With increasing number of sensors and location-tracking devices, there are massive datasets describing movements of people, animals, robots, etc. Most of the location data points are associated with a timestamp as they describe a movement of an entity.

Here is the text of your introduction. We are using [1] and [2]

2 Our contribution

We've implemented

- In $O(n)$ time we can find all maximal subsequences that define monotone paths in some (subpath-dependent) direction. [1]
- In $O(n \log^2 n)$ time time we can find all maximal subsequences with diameter at most 1. [2]

3 Algorithms

3.1 k^*

Let $k^*(i) = \inf_{m \geq i}\{d(i,m) > 1\}$. **Claim** $j^*(i-1) = \min(j^*(i), k^*(i-1))$. Thus after we calculate $k^*(i)$ for all elements, we can calculate $j^*(i)$ in $O(n)$ time by looping over all indices in the reverse order.

3.2 Bokan et al Overview

Upper triangle method

3.3 Chan, Prat Overview

Range tree method.

4 Implementation Details

Talk about sweep line, etc.

5 Experimental Results

Talk about sweep line, etc.

6 Conclusion

This was a great project!

References

[1] Drago Bokal, Sergio Cabello, and David Eppstein. Finding All Maximal Subsequences with Hereditary Properties. In Lars Arge and János Pach, editors, *31st International Symposium on Computational Geometry (SoCG 2015)*, volume 34 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 240–254, Dagstuhl, Germany, 2015. Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik.

[2] Timothy M. Chan and Simon Pratt. Two Approaches to Building Time-Windowed Geometric Data Structures. In Sándor Fekete and Anna Lubiw, editors, *32nd International Symposium on Computational Geometry (SoCG 2016)*, volume 51 of *Leibniz International Proceedings in Informatics (LIPIcs)*, pages 28:1–28:15, Dagstuhl, Germany, 2016. Schloss Dagstuhl–Leibniz-Zentrum fuer Informatik.