one more paper on dynamic graphs (connectivity rather than shortest paths)

Efficient edge splitting-off algorithms maintaining all-pairs edge-connectivities

LC Lau, CK Yung - Integer Programming and Combinatorial Optimization, 2010 - Springer

Abstract In this paper we present new **edge splitting-off** results **maintaining all-pairs edge-connectivities** of a graph. We first give an alternate proof of Mader's theorem, and use it to obtain a deterministic O(r_\max^2 · n^2)-time complete **edge splitting-off algorithm** for **...**

Cited by 2 Related articles All 7 versions Cite Save

From: http://scholar.google.ca/scholar?q=%22Efficient+Edge+Splitting-Off+Algorithms+in+Maintaining+All-Pairs+Edge-Connectivities&btnG=&hl=en&as_sdt=0%2C5

will start here in F 2015

spanners

Given an edge-weighted graph, make it sparse while approximately preserving shortest paths.

original graph G, new graph G'

$\forall u,v \in V \quad d_{G'}(u,v) \leq t \cdot d_G(u,v)$

t constant — t – spanning ratio = stretch factor

criteria

min. # edges in G'

min $\sum_{e \in G'} w(e)$

make G' "nice" e.g. planar, bounded degree

spanners of general graphs

greedy: given factor t

heuristic

initialize $E(G') = \emptyset$

consider $e \in E(G)$ ordered from min w to max

$e = (u,v)$

if $d_{G'}(u,v) > t \cdot d_G(u,v)$

then add (u,v) to G'.

(*) **On sparse spanners of weighted graphs**
I Althöfer, G Das, D Dobkin, D Joseph… - Discrete & Computational …, 1993 - Springer
Abstract Given a **graph** G, a subgraph G'is at-**spanner** of G if, for every u, v ε V, the distance from u to v in G'is at most t times longer than the distance in G. In this paper we give a simple algorithm for constructing **sparse spanners** for arbitrary **weighted graphs**. We then apply **...**
Cited by 383 Related articles All 6 versions Cite Save

From: http://scholar.google.ca/scholar?hl=en&q=On+sparse+spanners+of+weighted+graphs&btnG=&as_sdt=1%2C5&as_sdtp=

geometric graphs

— complete Euclidean graph

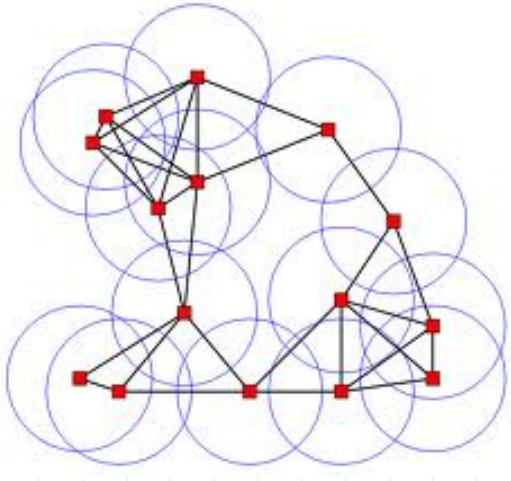
Given n points in plane G – (implicit) complete graph with Euclidean weights

Construct G'

$d_{G'}(u,v) \leq t \cdot |uv|$

Euclidean distance

— unit disc graph



Given n points in plane

G has edge (u,v) if $|uv| \leq 2$

Find good spanner $G' \subseteq G$

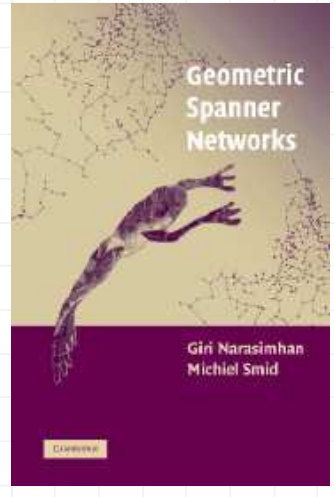
spanners (not to present, just for reference)

Spanning trees and spanners
D Eppstein - Handbook of computational geometry, 1999 - books.google.com
This survey covers topics in geometric network design theory. The problem is easy to state: connect a collection of n sites by a "good" network. For instance, one may wish to connect components of a VLSI circuit by networks of wires, in a way that uses little surface area on ...
Cited by 317Related articlesAll 12 versionsCiteSave

From: http://scholar.google.ca/scholar?hl=en&q=Spanning+trees+and+spanners&btnG=&as_sdt=1%2C5&as_sdtp=

[BOOK] **Geometric spanner networks**
G Narasimhan, M Smid - 2007 - langtoninfo.com
11.1 Chapter overview 196 11.2 Dumbbells 197 11.3 A packing result for dumbbells 198 11.4 Establishing the length-grouping property 202 11.5 Establishing the empty-region property 205 11.6 Dumbbell trees 207 11.7 Constructing the dumbbell trees 209 11.8 The ...
Cited by 262Related articlesAll 3 versionsCiteSaveMore

From: http://scholar.google.ca/scholar?hl=en&q=geometric+spanner+networks&btnG=&as_sdt=1%2C5&as_sdtp=



On plane geometric spanners: A survey and open problems
P Bose, M Smid - Computational **Geometry**, 2013 - Elsevier
Given a weighted graph G=(V, E) and a real number t⩾ 1, a t-**spanner** of G is a spanning subgraph G′ with the property that for every edge xy in G, there exists a path between x and y in G′ whose weight is no more than t times the weight of the edge xy. We review ...
Cited by 17Related articlesAll 8 versionsCiteSave

From: http://scholar.google.ca/scholar?q=On+plane+geometric+spanners%3A+A+survey+and+open+problems&btnG=&hl=en&as_sdt=2005&sciodt=0%2C5&cites=10723818189643881305&scipsc=

papers on geometric spanners — for complete Euclidean graph

planar spanners — O(n) edges

P. Chew, There are planar graphs almost as good as the complete graph, Journal of Computer and System Sciences 39 (1989) 205–219.

- used type of Delaunay graph
- spanning ratio 2

Competitive routing in the half-θ 6-graph
P Bose, R Fagerberg, A van Renssen… - Proceedings of the …, 2012 - dl.acm.org
Page 1. **Competitive Routing** in the **Half-θ6-Graph** ∗ **...** D 4 **Routing** in the **Half-θ6-Graph**
In this section, we give matching upper and lower bounds for the **competitive routing** ratio on the **half-θ6- graph**. We begin by defining our model. **...**
Cited by 11 Related articles All 28 versions Cite Save

From: http://scholar.google.ca/scholar?q=Competitive+routing+in+the+half-%CE%B86-graph&btnG=&hl=en&as_sdt=0%2C5

- easier pf. of above
- bounded degree

standard Delaunay as a spanner?

The stretch factor of the Delaunay triangulation is less than 1.998
G Xia - SIAM Journal on Computing, 2013 - SIAM
Let S be a finite set of points in the Euclidean plane. Let D be a Delaunay triangulation of S. The stretch factor (also known as dilation or spanning ratio) of D is the maximum ratio, among all points p and q in S, of the shortest path distance from p to q in D over the **...**
Cited by 6 Related articles All 11 versions Cite Save

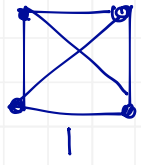
From: http://scholar.google.ca/scholar?cites=16099590622383505695&as_sdt=2005&sciodt=0,5&hl=en

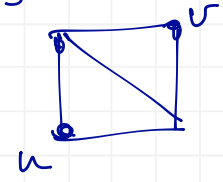
standard Del. triangulation breakthrough

lower bound 1.581

papers on geometric spanners

limit on spanning ratio for planar spanner





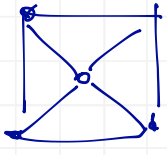
only planar spanner G'

$d_{G'}(u,v) = 2$

$|uv| = \sqrt{2}$

So we cannot beat $\sqrt{2}$ for spanning ratio

What about adding extra points – "Steiner" points



Planar spanners and **approximate shortest path queries among obstacles** in the **plane**
S Arikati, DZ Chen, LP Chew, G Das, M Smid… - Algorithms—ESA'96, 1996 - Springer
Abstract We consider the problem of finding an **obstacle**-avoiding **path between** two points s and t in the **plane**, amidst a set of disjoint polygonal **obstacles** with a total of n vertices. The length of this **path** should be within a small constant factor c of the length of the **shortest ...**
Cited by 92 Related articles All 10 versions Cite Save

From: http://scholar.google.ca/scholar?hl=en&q=Planar+spanners+and+approximate+shortest+path+queries+among+obstacles+in+the+plane&btnG=&as_sdt=1%2C5&as_sdtp=