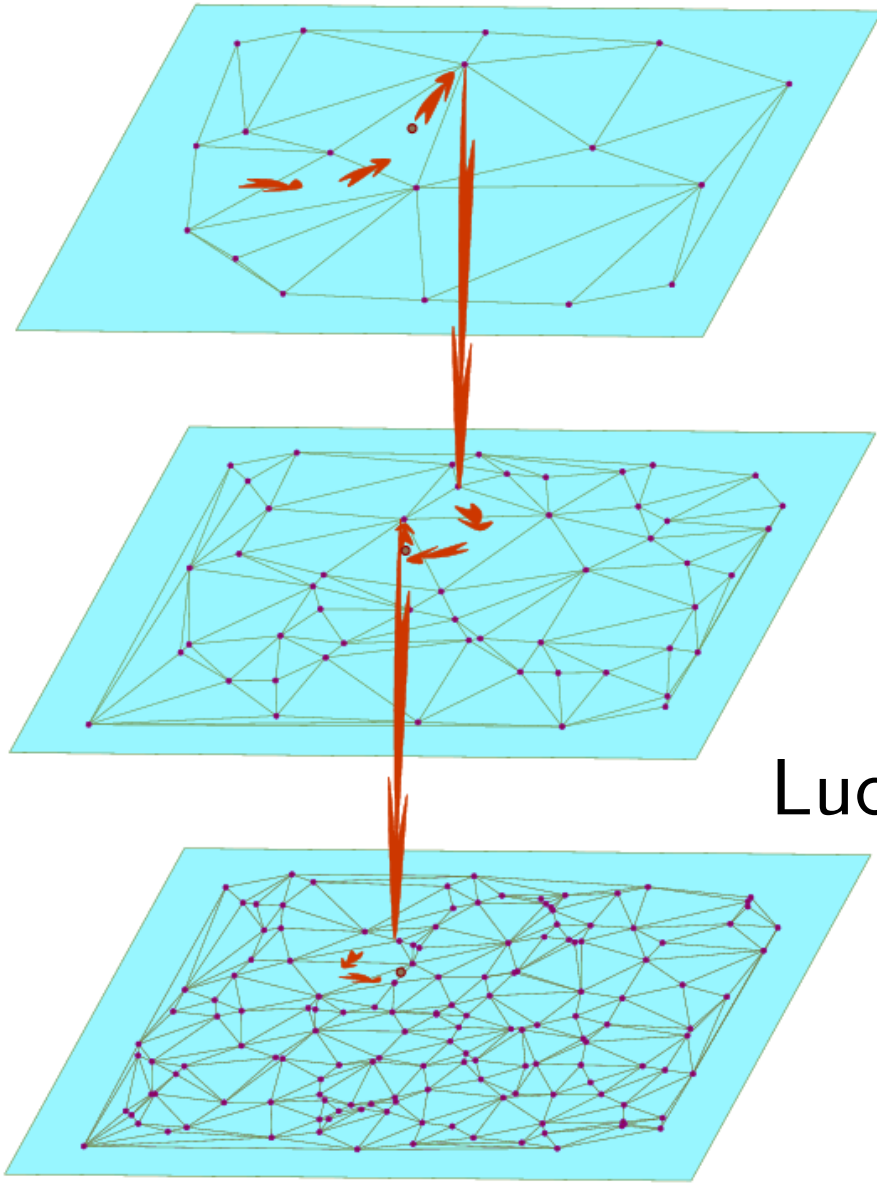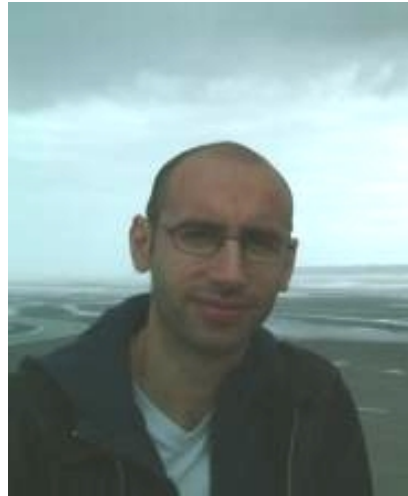# INF562 — Computational Geometry from Theory to Applications
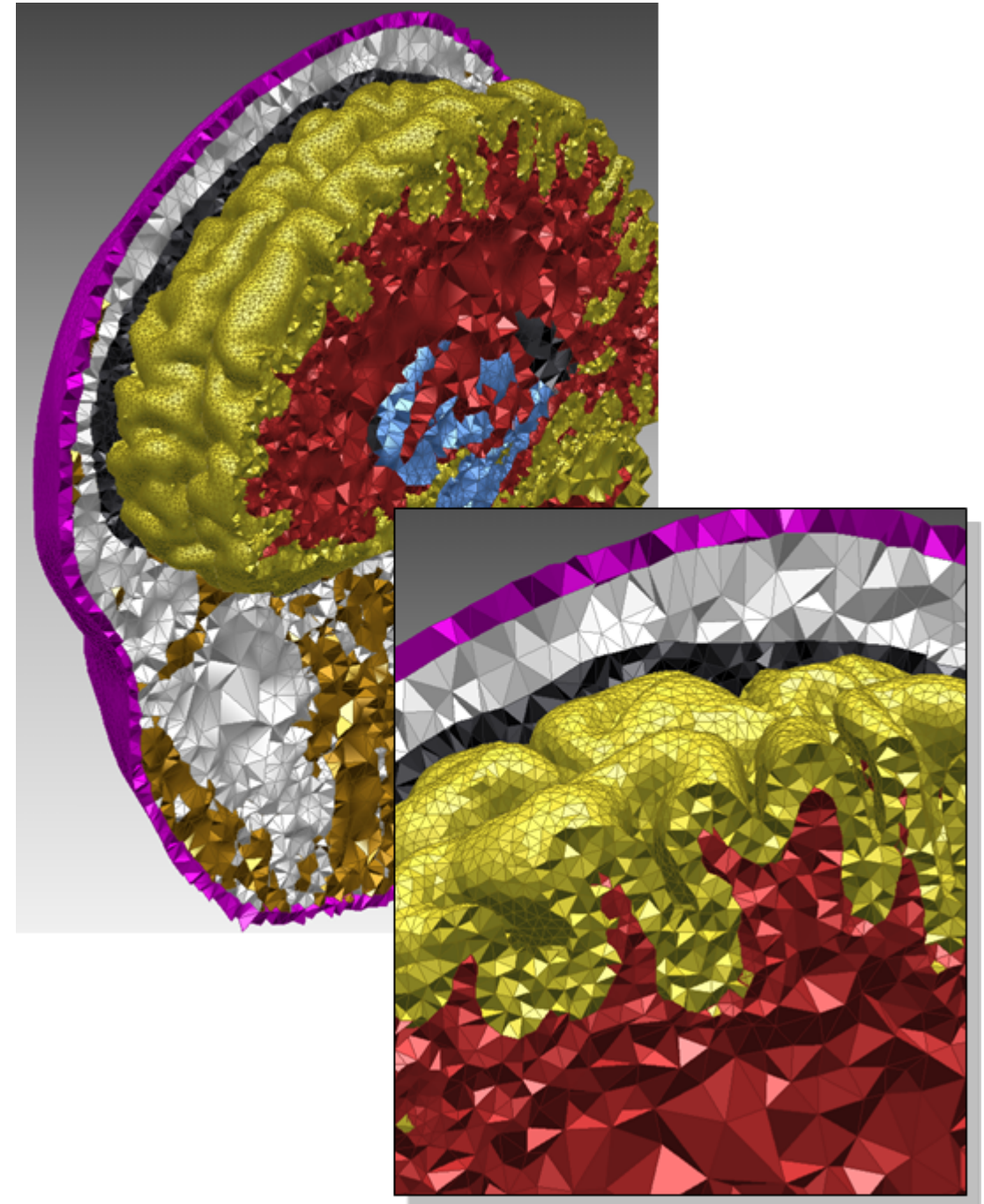

© O. Devillers

Luca Castelli Aleardi

Steve Oudot

© J.-P. Pons

The *Wordle* of Computational Geometry

SoCG 2009 Abstracts

© P. Raman

The *Wordle* of Computational Geometry

© P. Raman

——— our itinerary

The *Wordle* of Computational Geometry


SoCG 2009 Abstracts

© P. Raman

—— our itinerary

Course Outline

1. Fundamentals I — Convex hulls, triangulations

2. Fundamentals II — Delaunay triangulations I

3. Fundamentals III — Delaunay triangulations II, arrangements

4. Geometric aspects of graph theory I — Graph embeddings

5. Geometric aspects of graph theory II — Graph separators

6. Curve and surface reconstruction — with guarantees, multiscale

7. Proximity Problems — nearest neighbor(s) in high dimensions

8. Geometric Approximation I — Travelling Salesman Problem

9. Geometric Approximation II — Convex geometry, center points
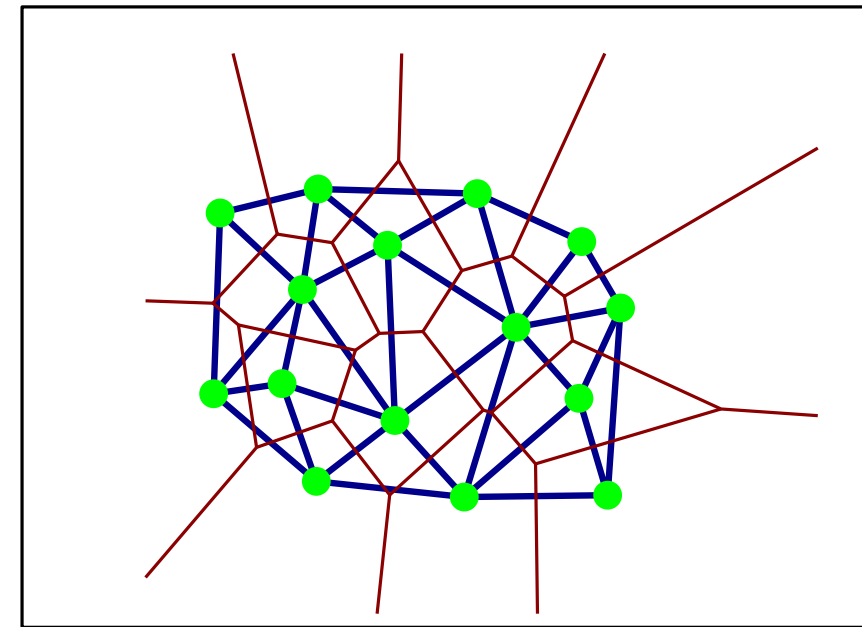
Fundamentals of Computational Geometry
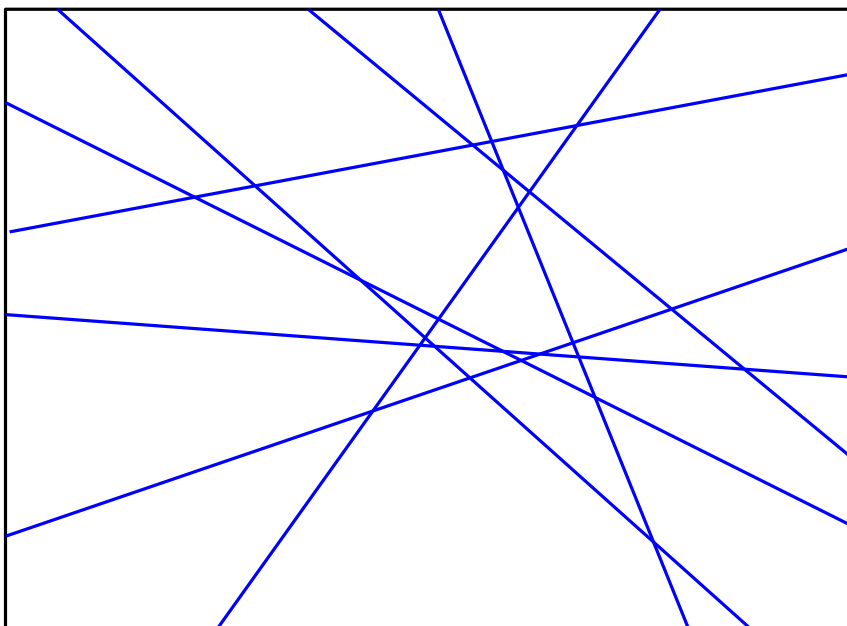
2D convex hull
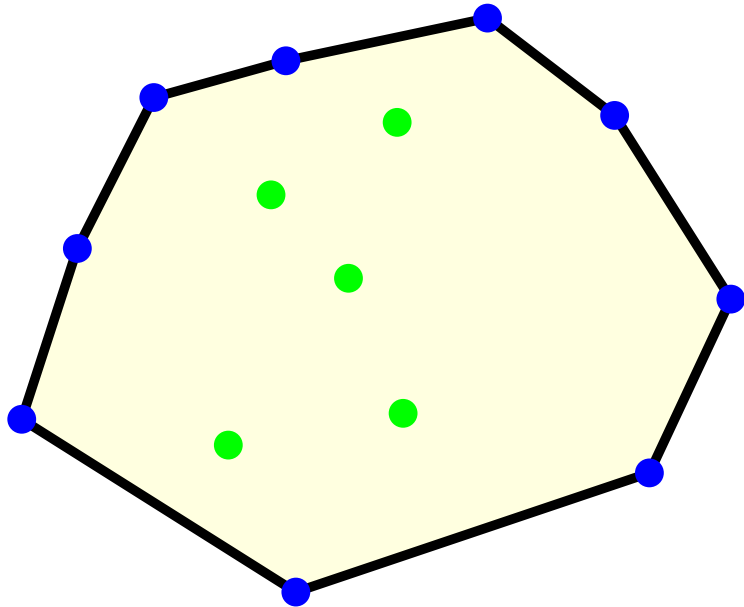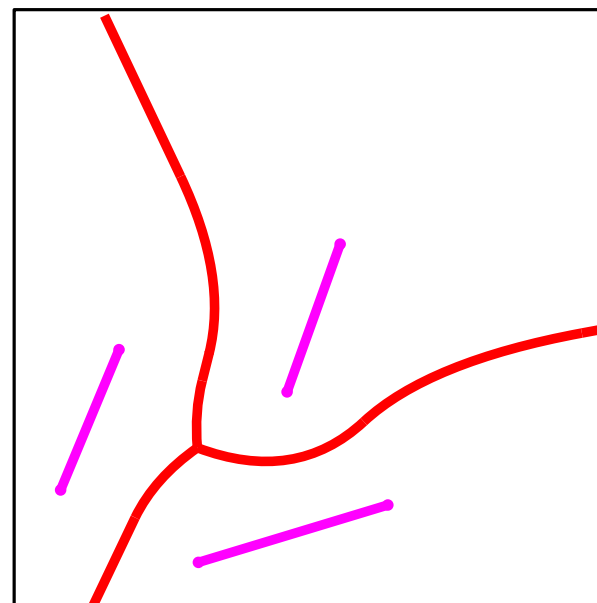
Voronoi diagram
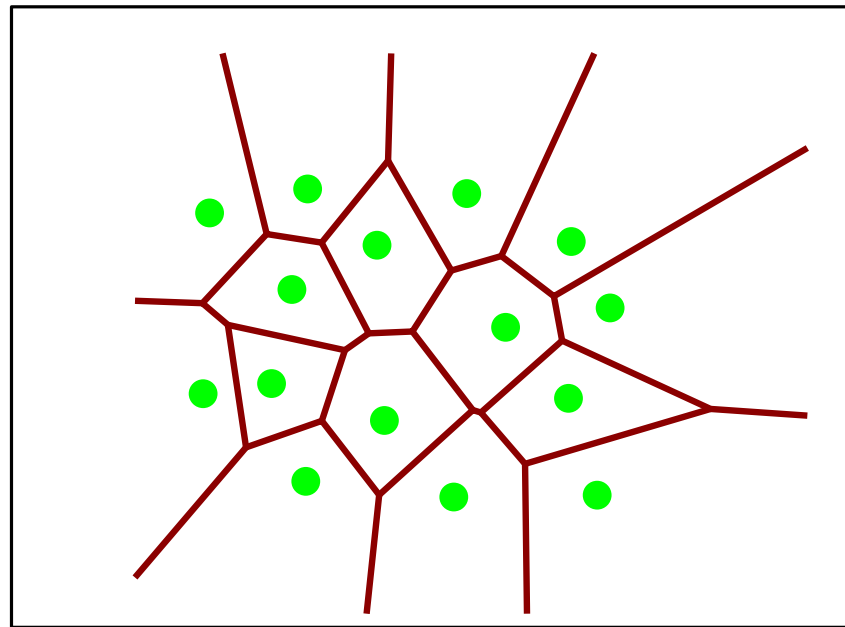
Delaunay triangulation

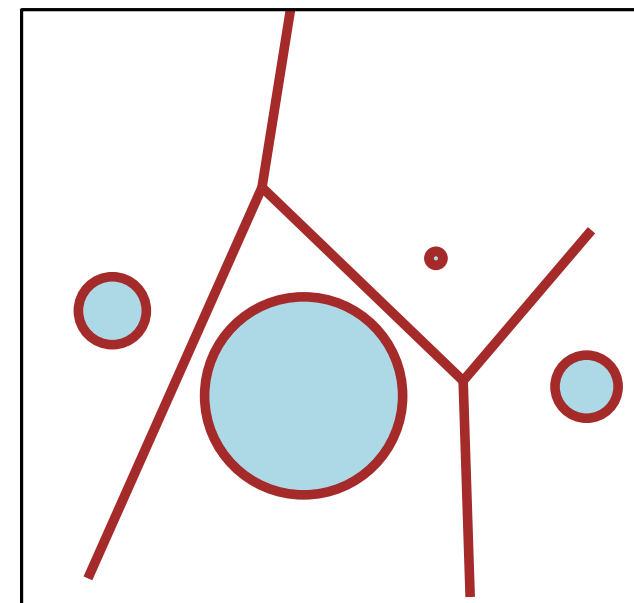and their generalizations

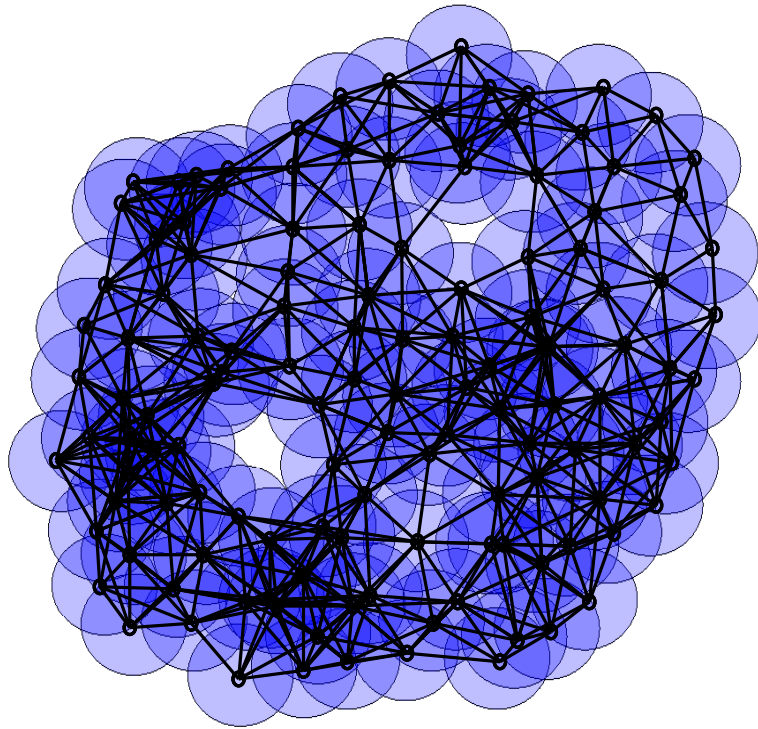**Line arrangements**

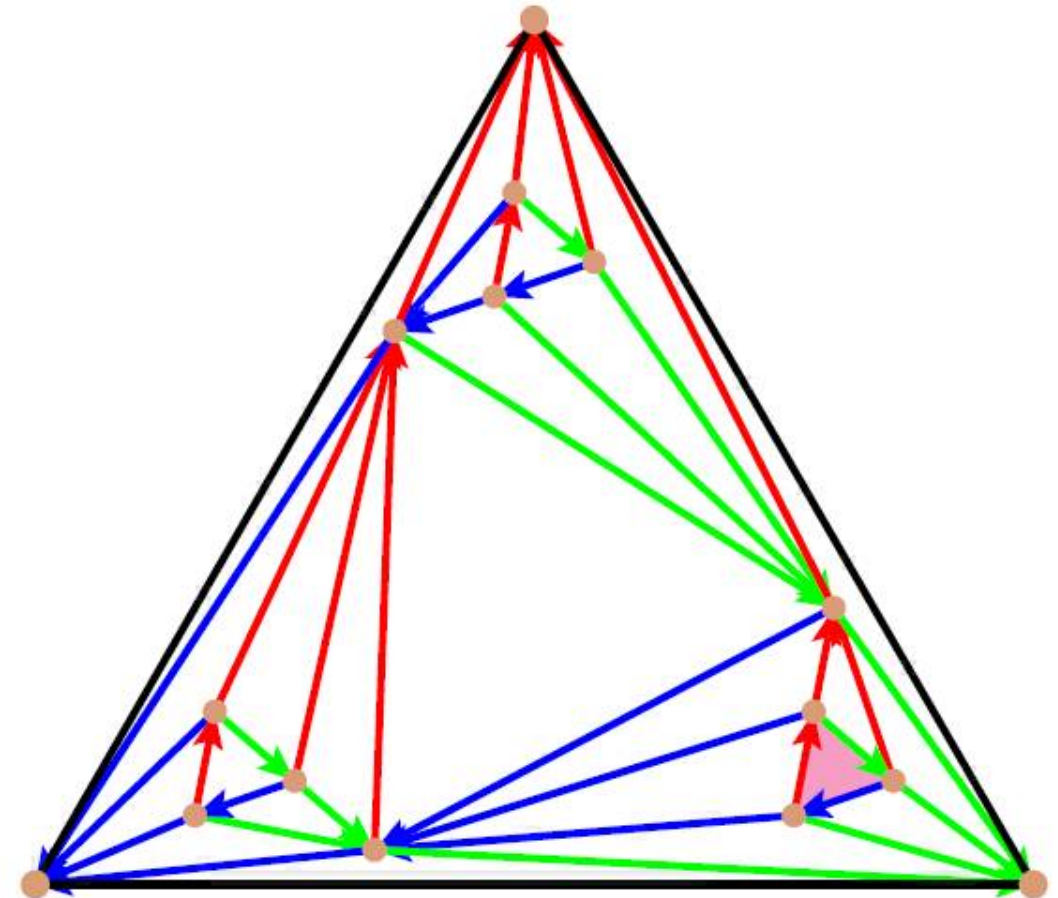**Voronoi of line segments**

Power diagram

Embeddings of geometric planar graphs

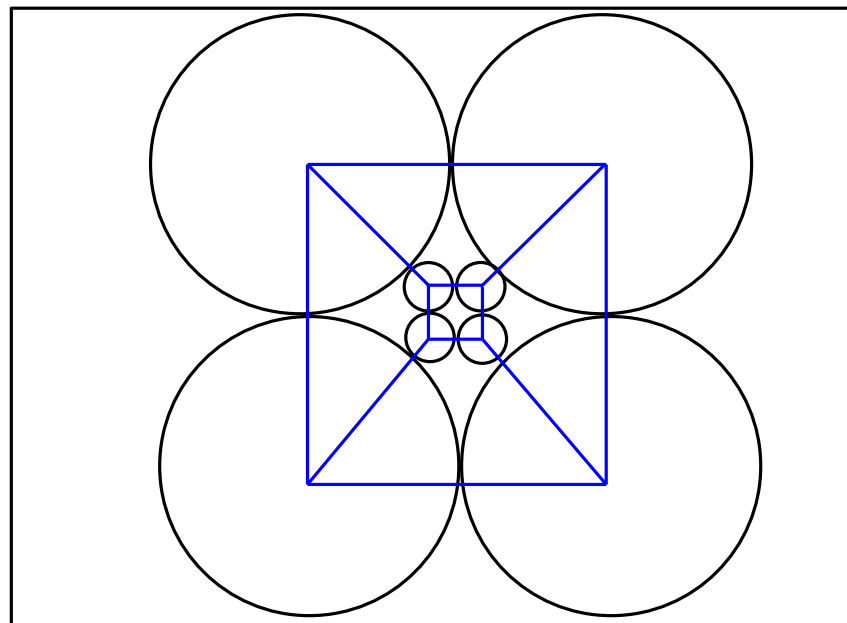Schnyder drawing of a triangulation

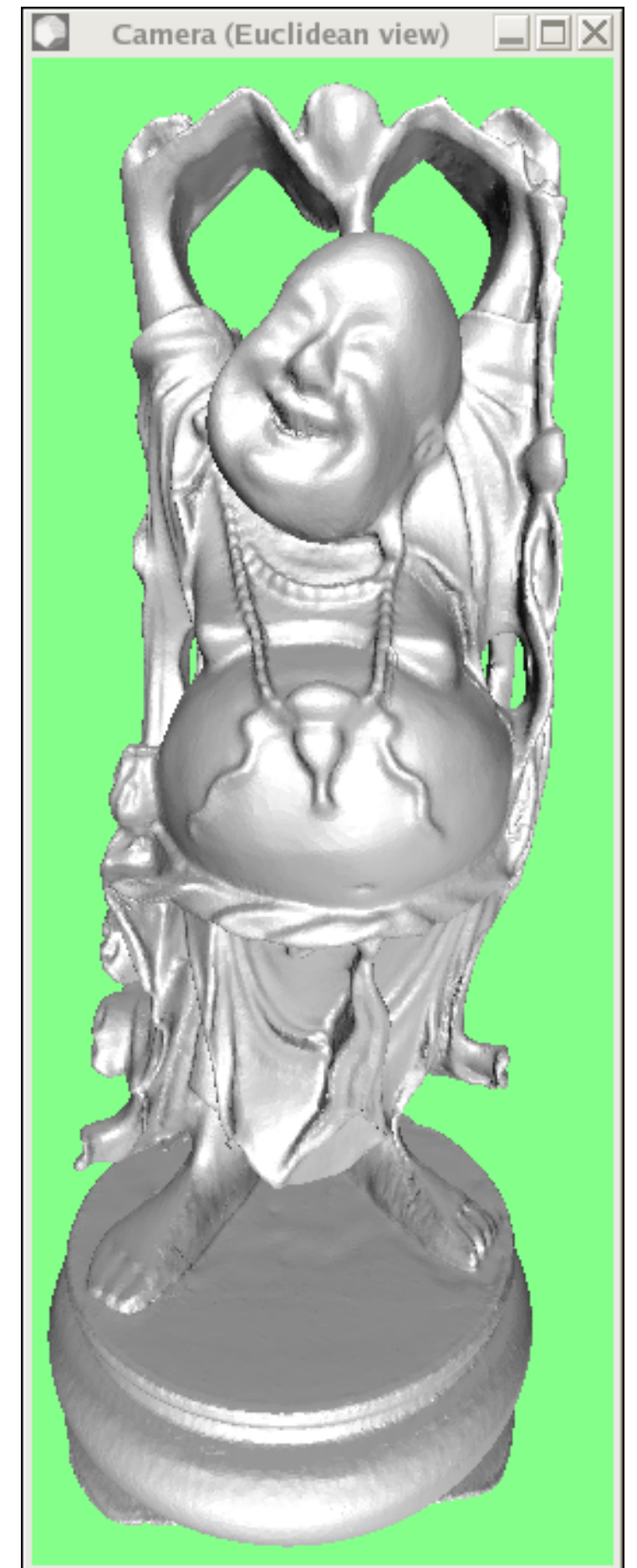© R. Ghrist, A. Muhammad

Application to sensor networks

application to greedy routing

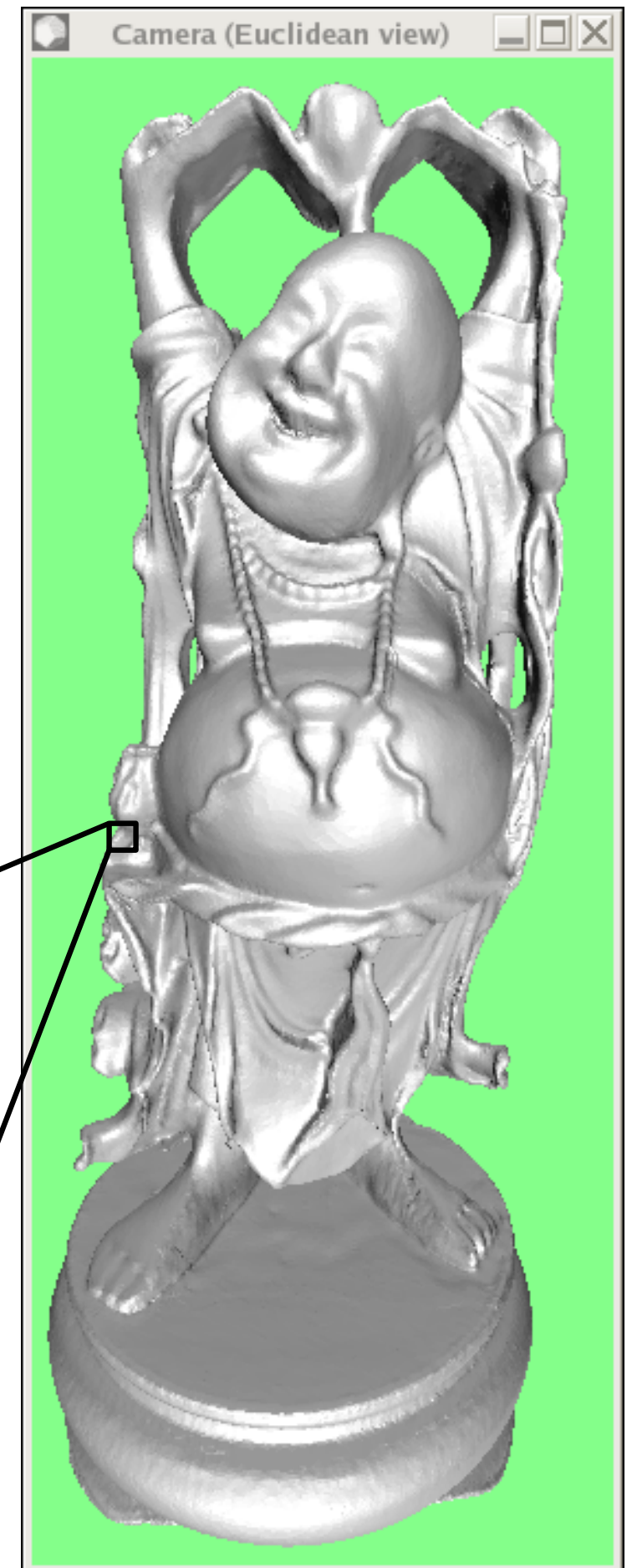

circle packing

Multiscale Reconstruction

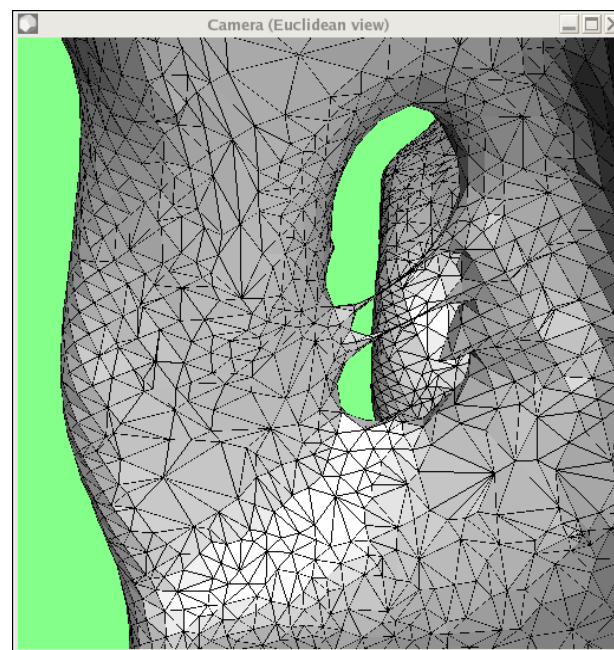scan + reconstruction

Camera (Euclidean view)

Multiscale Reconstruction

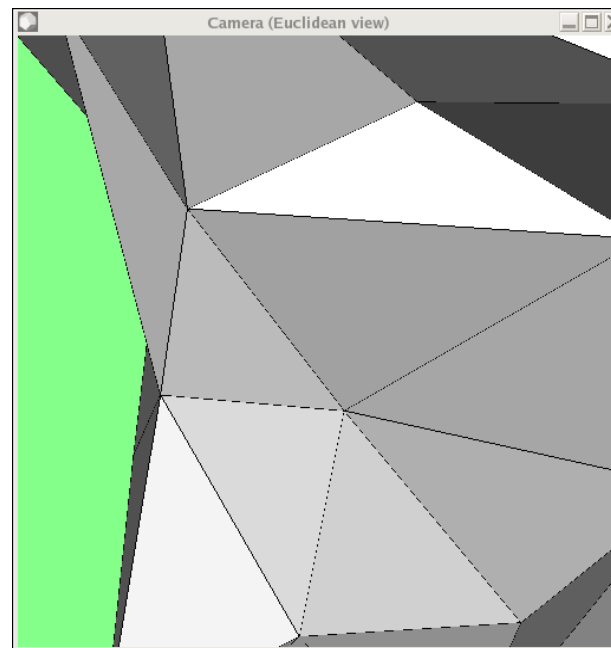scan + reconstruction

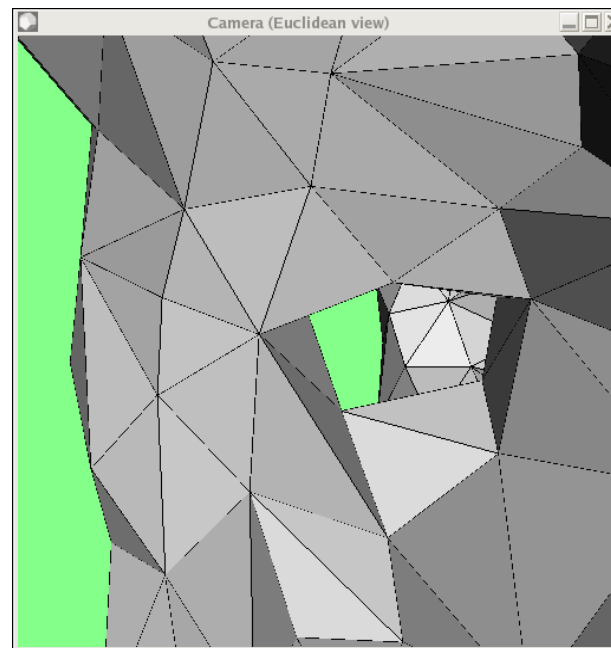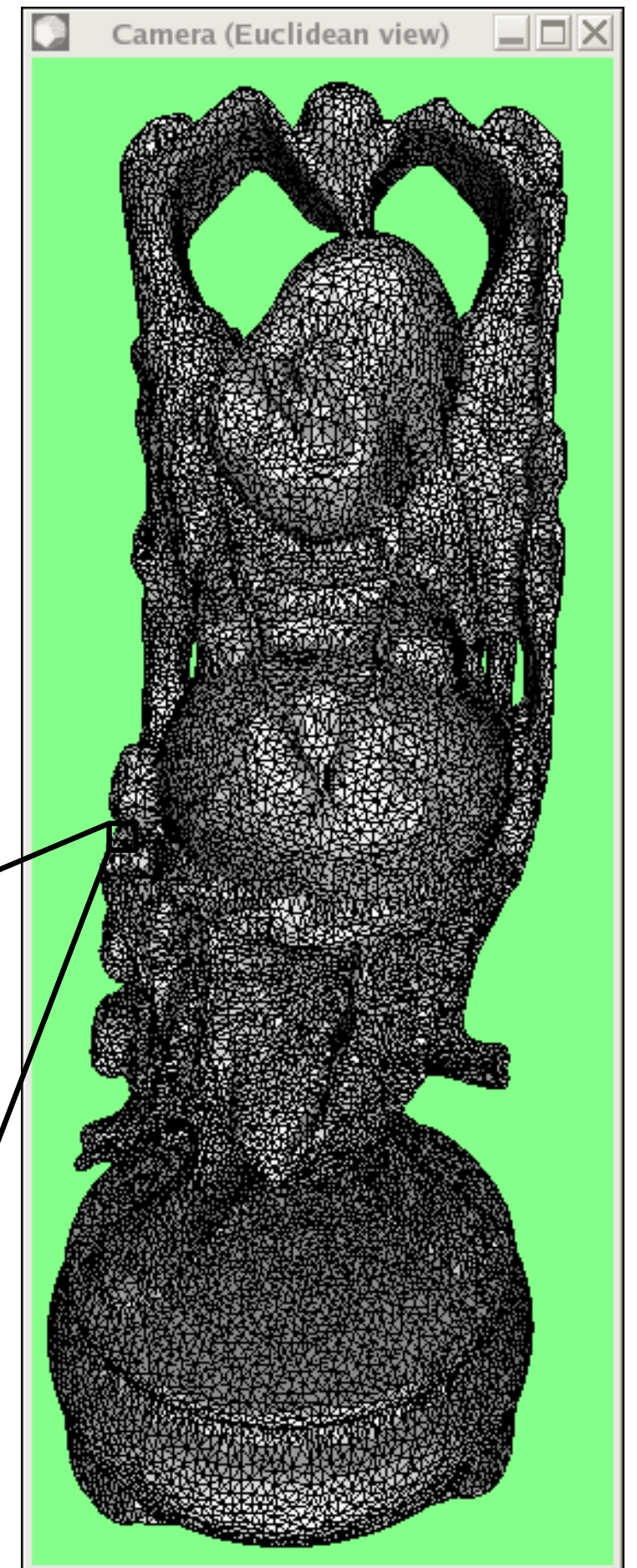Camera (Euclidean view)

Camera (Euclidean view)

© Stanford shape repository

Multiscale Reconstruction

multiscale
scan + reconstruction

Camera (Euclidean view)

Camera (Euclidean view)

Multiscale Reconstruction

multiscale
scan + reconstruction

Camera (Euclidean view)

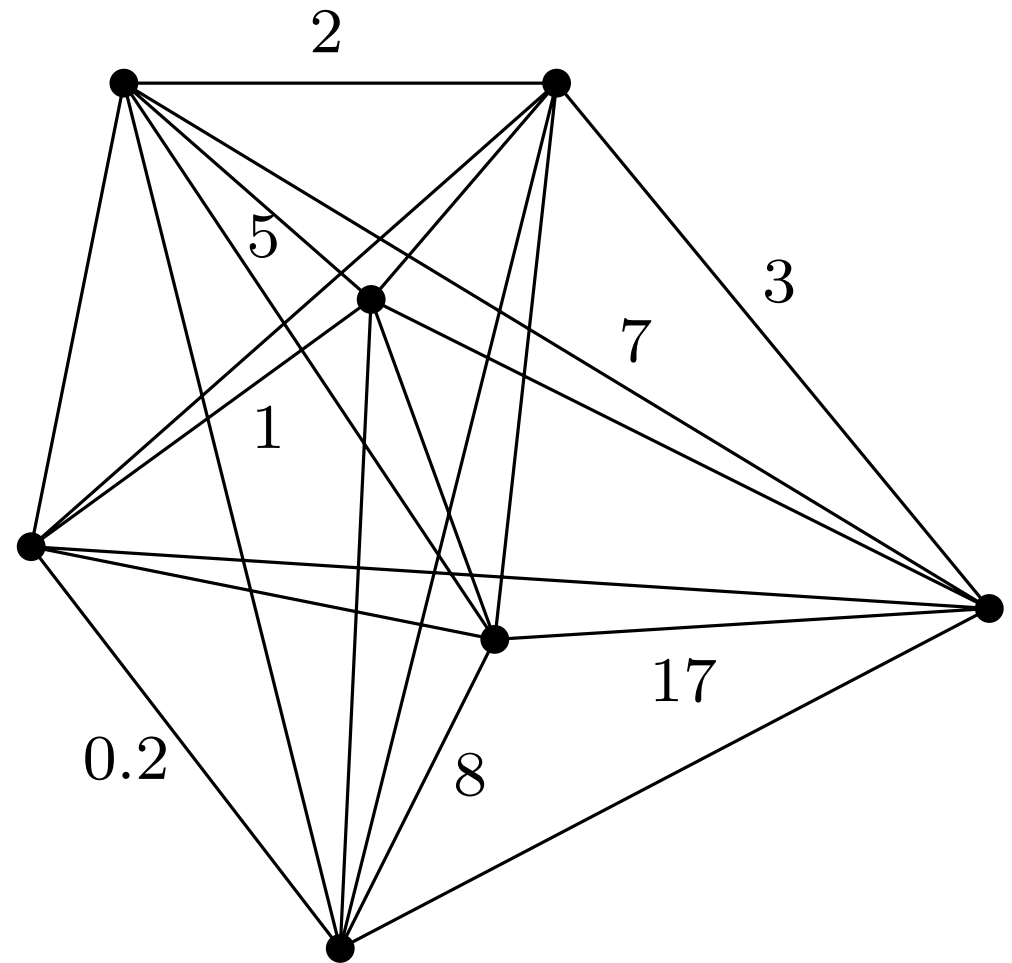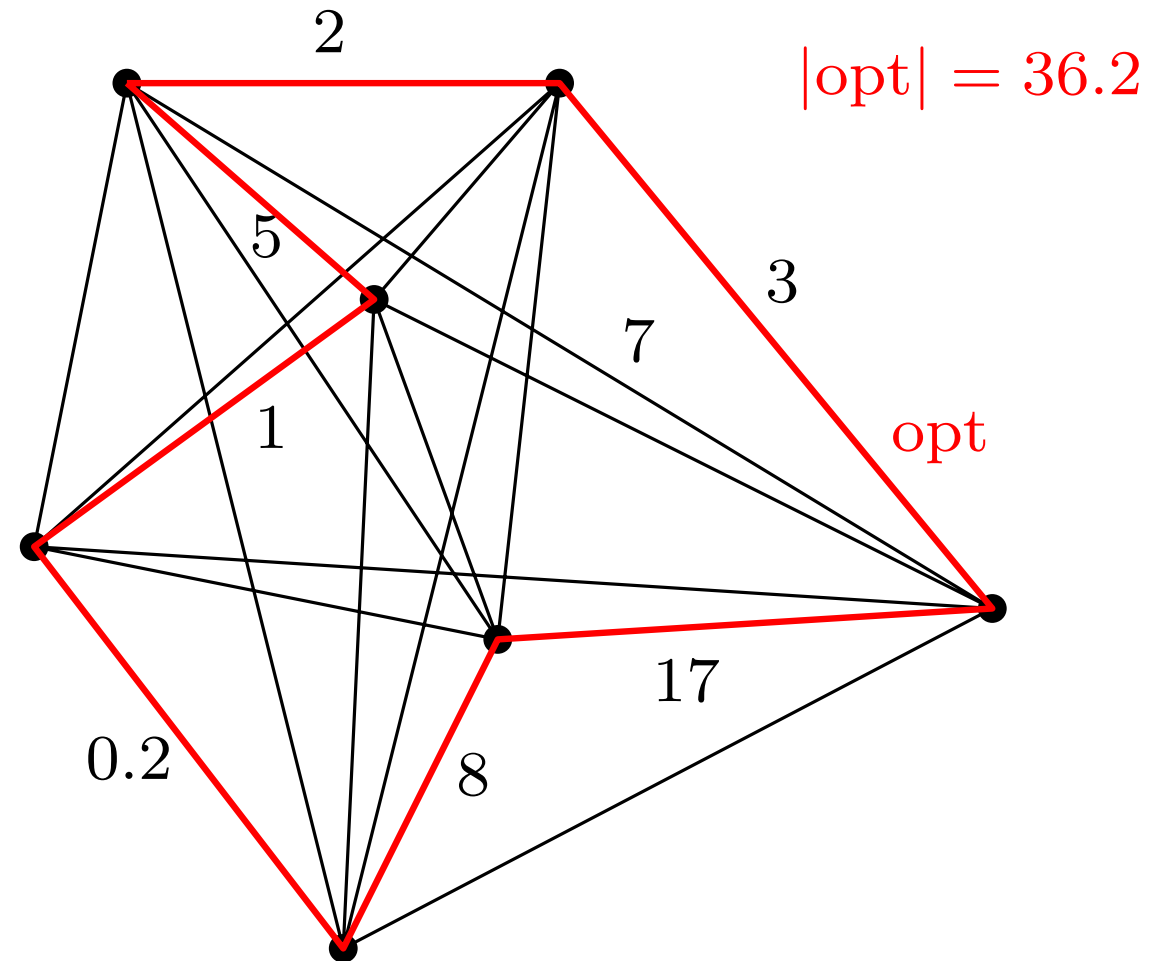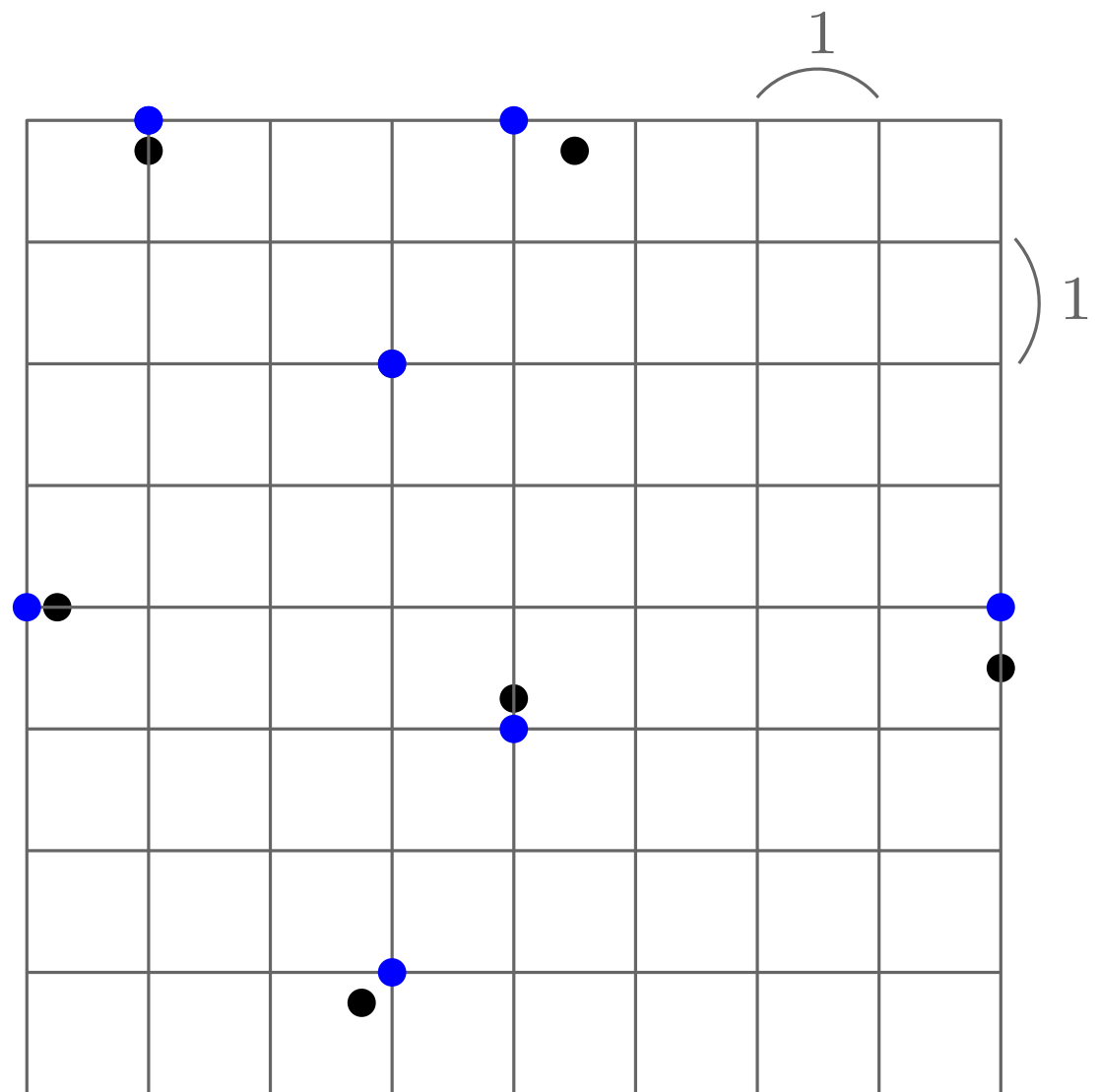# Euclidean TSP (Travelling Salesman Problem)

Euclidean TSP (Travelling Salesman Problem)

Euclidean TSP (Travelling Salesman Problem)
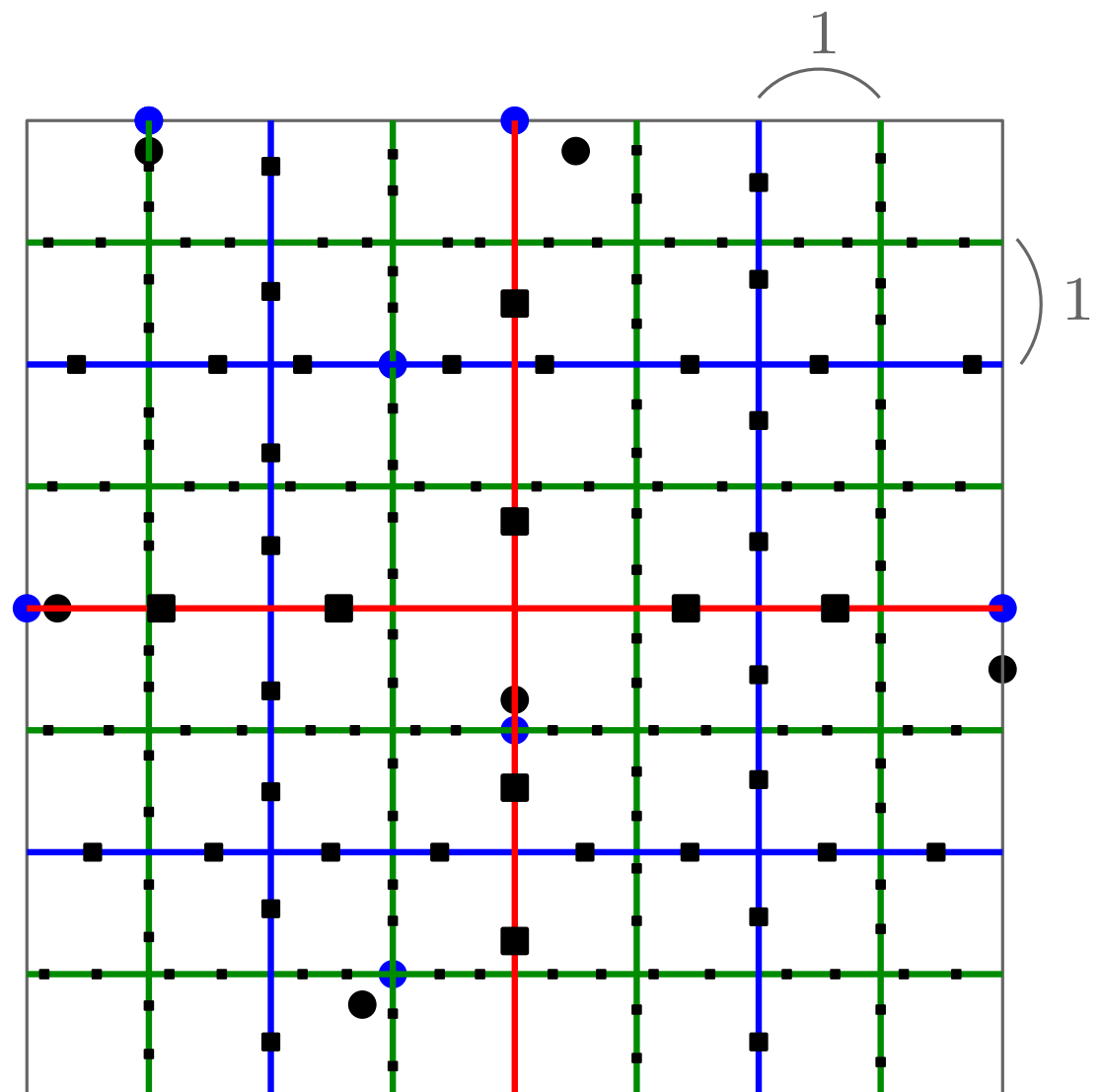
Euclidean TSP (Travelling Salesman Problem)

Euclidean TSP (Travelling Salesman Problem)

$$|\text{opt}| \le |T| \le (1 + \varepsilon)|\text{opt}|$$

level 1
level 2
level 3

© S. Arora