

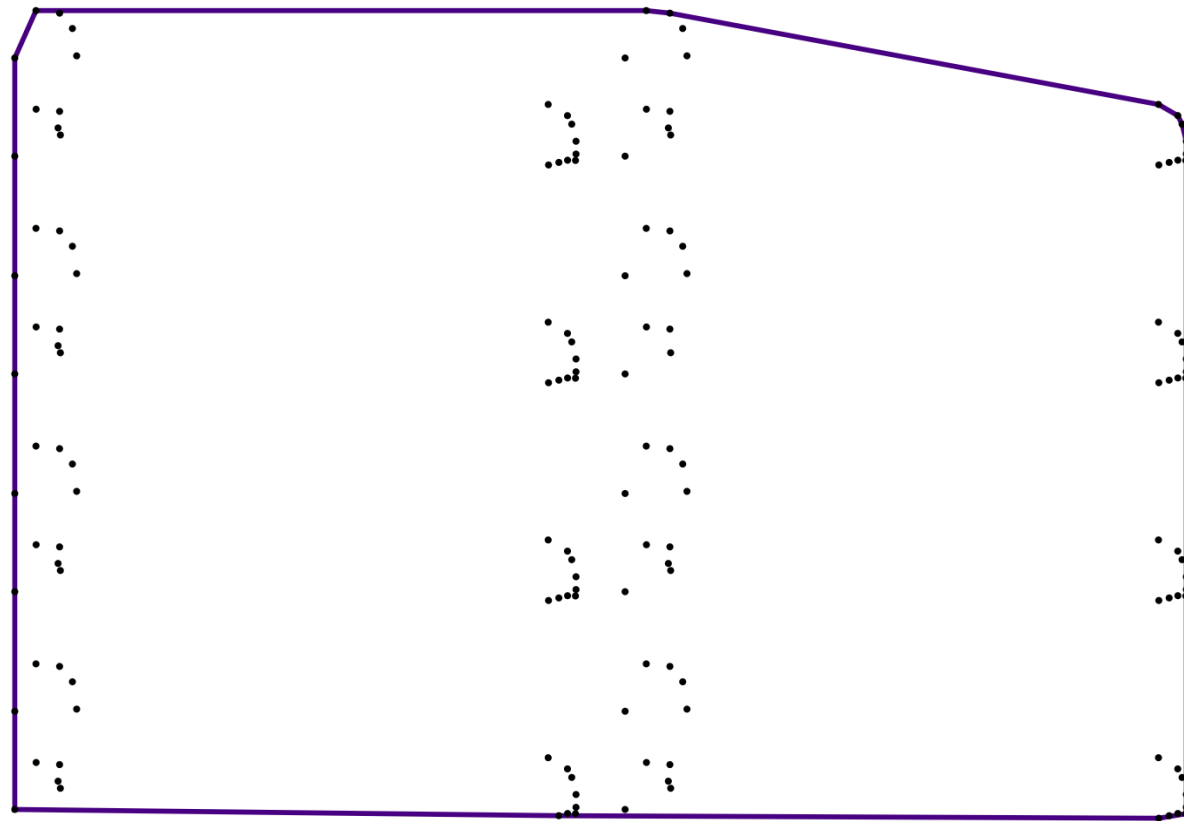
Computational Geometry: Solving Hard Optimization Problems (CG:SHOP)

CG Challenge 2025

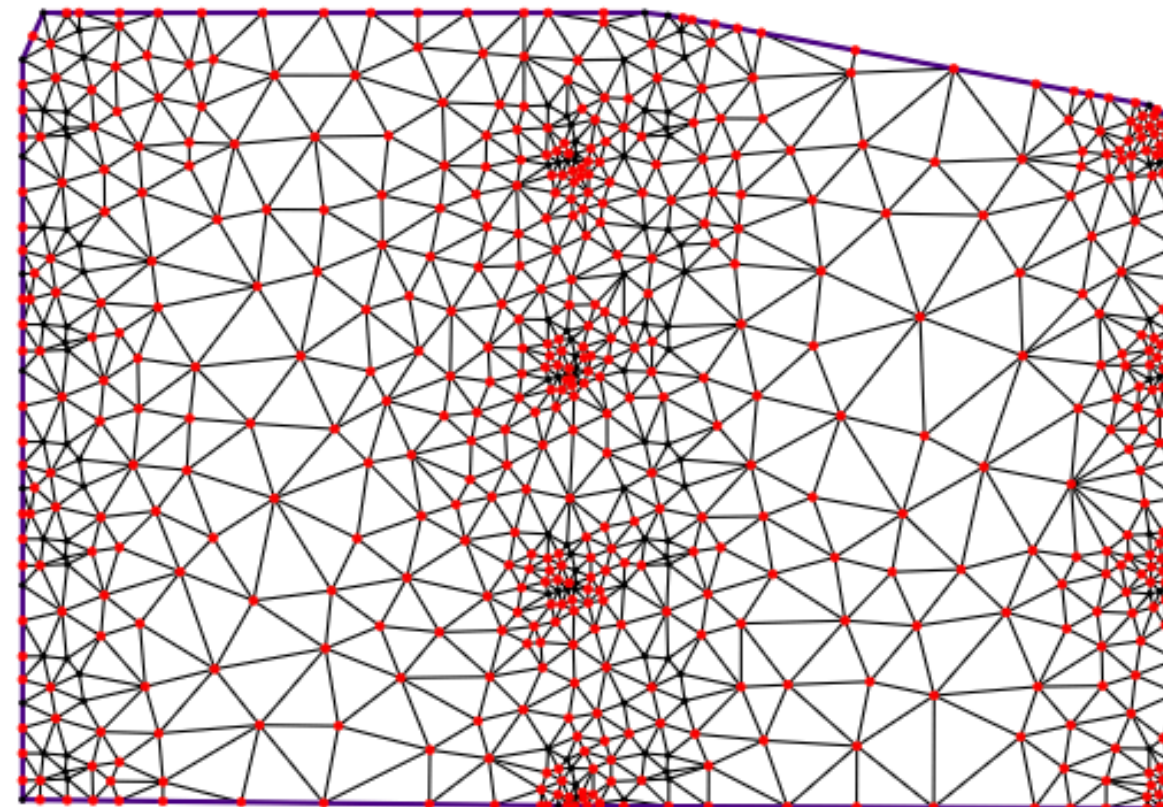
**Sándor P. Fekete, Dominik Krupke,
Phillip Keldenich, Stefan Schirra**

Minimum Non-Obtuse Triangulations

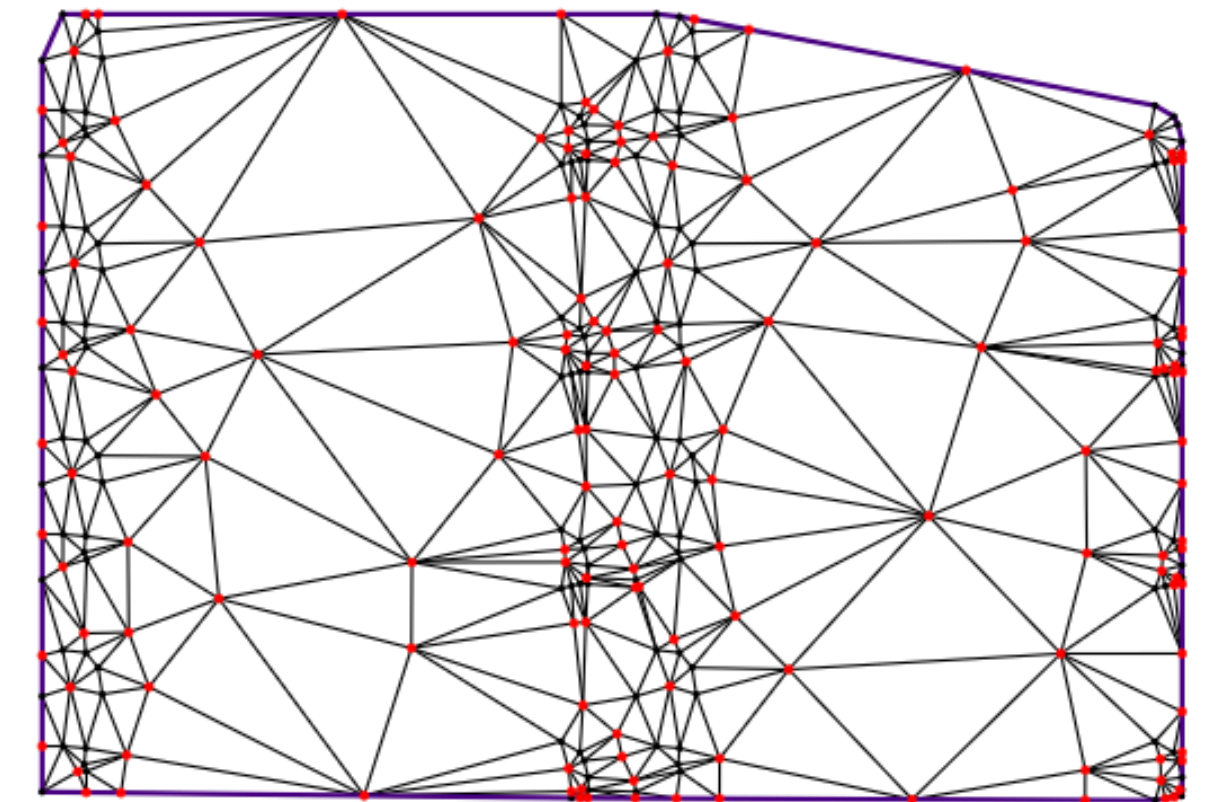
Given:



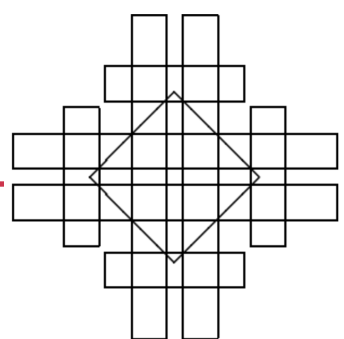
Wanted (1):



Wanted (2):



Proposed by Mikkel Abrahamsen, Copenhagen



Contest Setup

CG:SHOP 2025

Organized by:

Sándor Fekete (TU Braunschweig),
Phillip Keldenich (TU Braunschweig),
Dominik Krupke (TU Braunschweig),
Stefan Schirra (University of Magdeburg)

20 teams participating

Sept. 30, 2024, 2 p.m. (UTC) - Jan. 22, 2025, 11:59 p.m. (AoE)

Download

Submit Solution

[view all competition news](#)

Official Competition Ranking Released

01/24/2025
8:28 a.m.

We are excited to announce that the official ranking for this year's competition is now available! While there may still be minor updates to individual scores, we have verified—right down to pen and paper—that any potential changes will not impact the final order of the leaderboard.

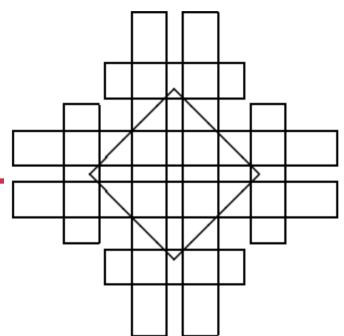
We would like to congratulate all participants on their outstanding efforts on this challenging problem and thank you for your patience throughout this process.

[read](#)

Shoutout to:
Phillip Keldenich, Dominik Krupke!

Results

Rank	Team Name	Score	# feasible	Junior	Comment
1	Naughty NOTers	149.813	150		
2	Gwamegi	139.769	150	✓	
3	KITriangle	85.482	147	✓	
4	Obtuse Terminators	80.756	114	✓	
5	<anonymous>	61.541	81	✓	
6	die-obtuse	55.596	54	✓	
7	cheetos	25.973	0	✓	
8	Delaunay Baseline	25.935	0		<i>Delaunay Triang. as reference</i>



Results

Computing High-Quality Non-Obtuse Triangulations

Mikkel Abrahamsen ✉ 

University of Copenhagen, Denmark

Florestan Brunck ✉ 

University of Copenhagen, Denmark

Jacobus Conradi ✉ 

University of Bonn, Germany


Benedikt Kolbe

University of Bonn, Germany

André Nusser ✉ 

Université Côte d'Azur, CNRS, Inria, France

Incremental algorithm and local search for minimum non-obtuse triangulations

Taehoon Ahn ✉ 

Graduate School of Artificial Intelligence, Pohang University of Science and Technology, Pohang, Korea

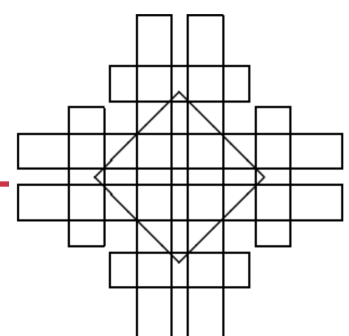
Jaegun Lee ✉ 

Department of Computer Science and Engineering, Pohang University of Science and Technology, Pohang, Korea

Byeonguk Kang ✉ 

Department of Computer Science and Engineering, Pohang University of Science and Technology, Pohang, Korea

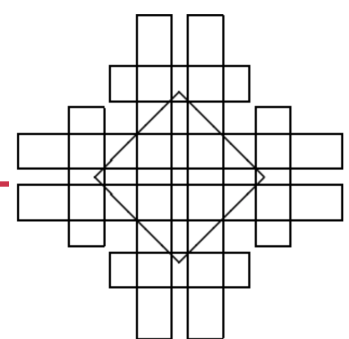
Hwi Kim ✉ 



Overall Situation

- Advisory Board:
 - Bill Cook
 - Andreas Fabri
 - Dan Halperin
 - Michael Kerber
 - Philipp Kindermann
 - Joe Mitchell
 - Kevin Verbeek
- Special issues 2019, 2021, 2022, 2023, 2024
- Problem for 2026!
- Renewal looks good - stay tuned!

Supported by:
DFG Deutsche
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June 25, 2025 | CG Challenge 2025 | CGWEEK 2025



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About the Journal

Statement of purpose

Computing in Geometry and Topology aims to support the broader computational geometry and topology community by being a peer-reviewed scientific journal that provides diamond open access. Computing in Geometry and Topology is sponsored by the Society for Computational Geometry.

With the broader computational geometry and topology community, we include researchers in discrete and combinatorial geometry, and any application area of computational geometry and topology. We also include algorithm engineering for geometric computations.

The journal publishes two types of papers. Firstly, the journal publishes original research of sufficient depth and interest. Secondly, the journal publishes high-quality survey papers. Every paper has been thoroughly reviewed by experts in the area.

To emphasize the breadth of the interpretation of computational geometry and topology, the editorial board has different sections that represent the algorithmic and mathematical aspects, the applied aspects, and the engineering aspects.

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Collection

CG:SHOP

API



Maximum Polygon Packing

Optimal packing a set of objects into a given container.

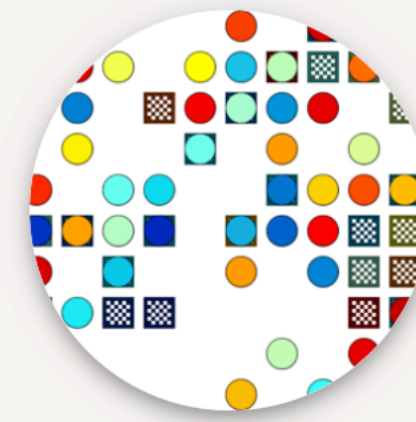
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Minimum Convex Partition

Partition a point set into a smallest set of convex faces.

LEARN MORE



Multi Agent Path Finding

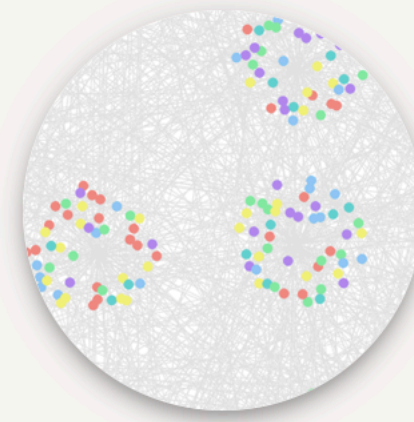
Compute a set of feasible trajectories a given set of robots and targets.

LEARN MORE



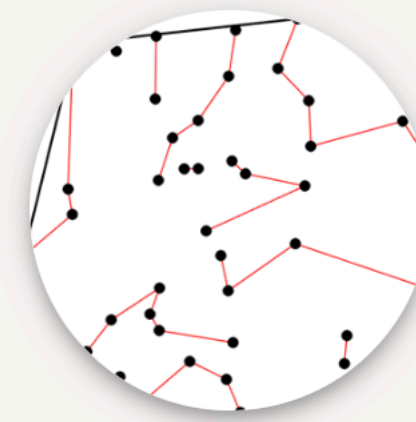
Minimum Coverage by Convex Polygons

Compute a minimum coverage of a polygon by convex polygons.



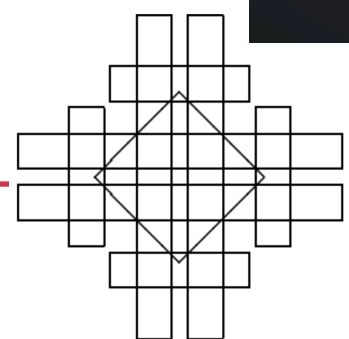
Minimum Partition into Plane Subgraphs

Partition a graph into minimum plane subgraphs.



Minimum Non-Obtuse Triangulation

Find a feasible non-obtuse triangulation using a minimum number of Steiner points



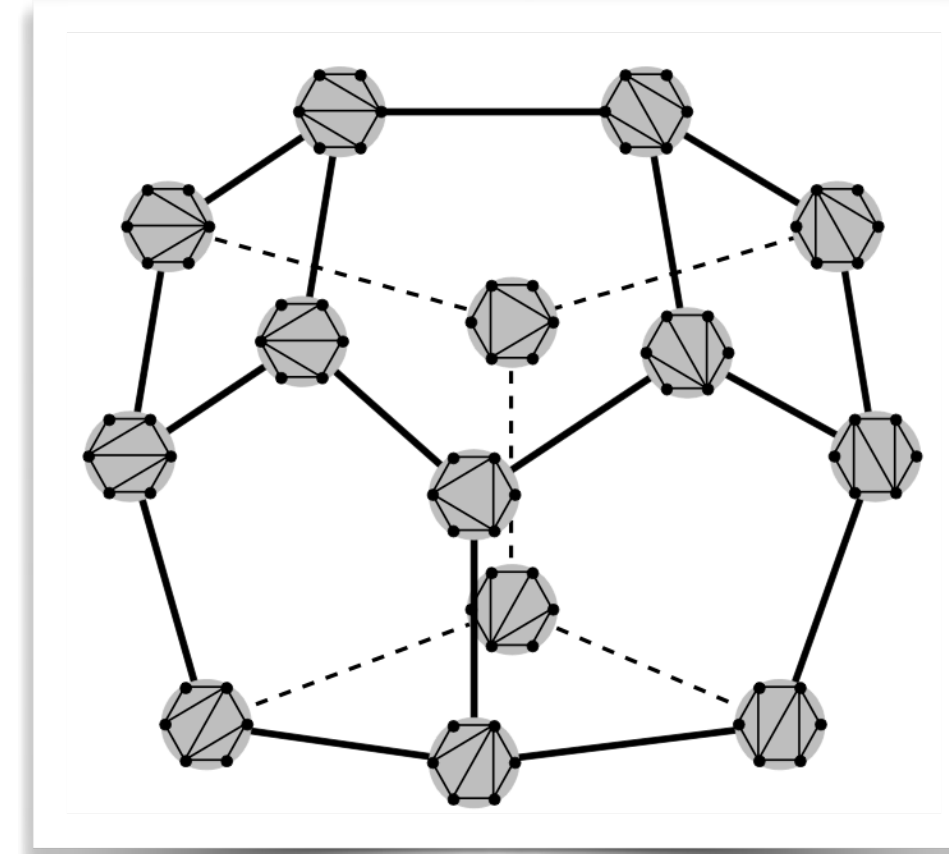
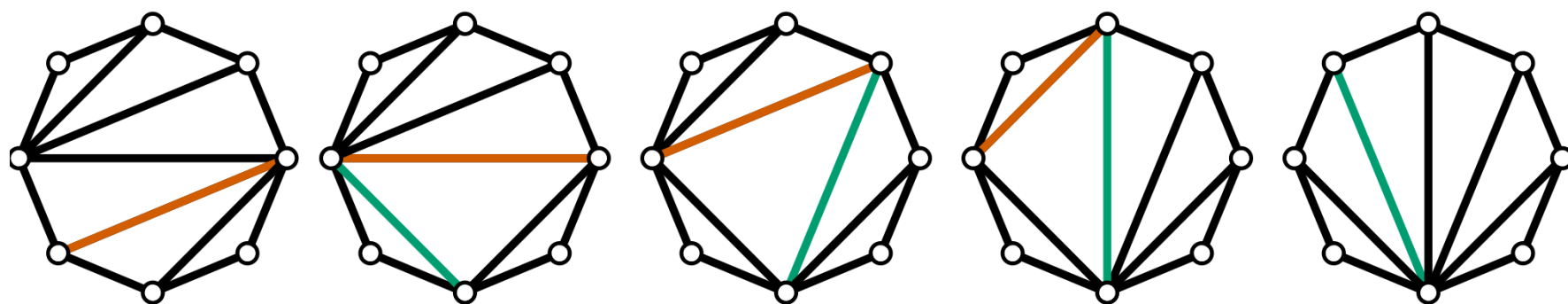
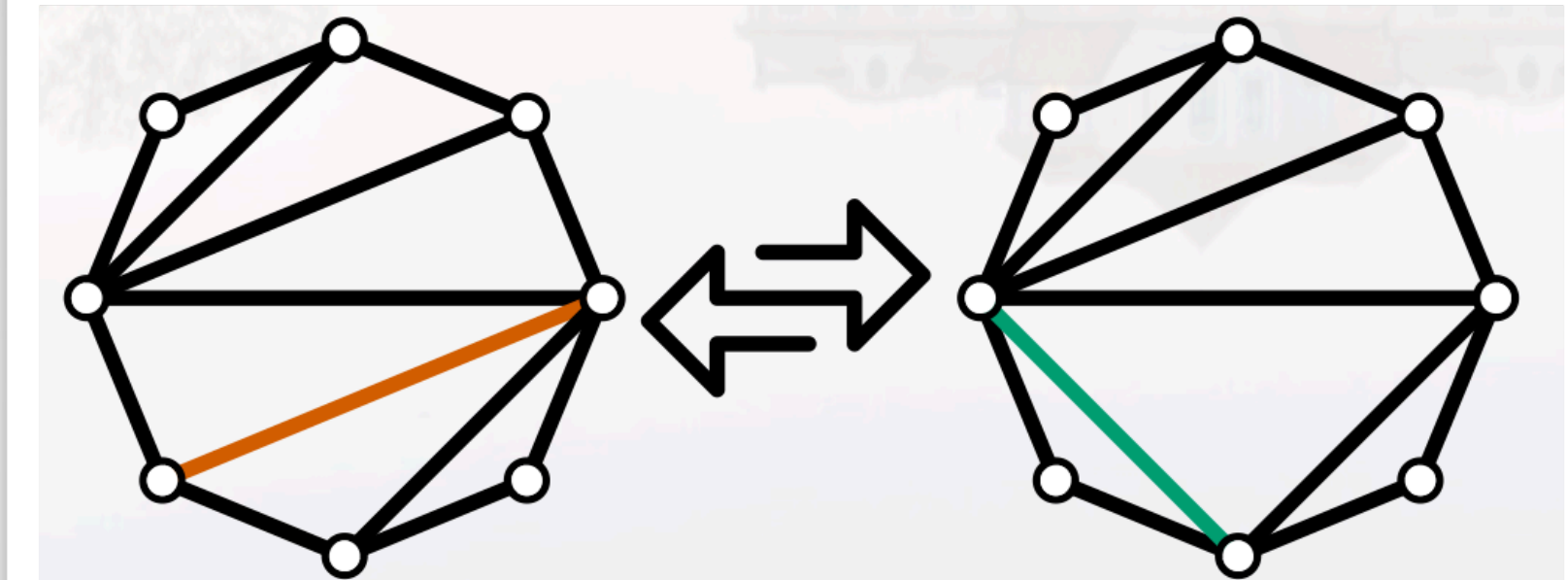
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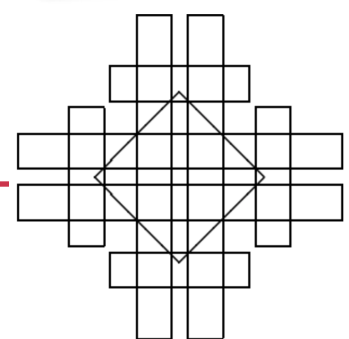
Challenge 2026: Flipping Triangulations

Flips in Plane Graphs Old Problems, New Results

Oswin Aichholzer



- Computing the flip distance between two triangulations of a **planar point set** is
 - NP-complete [Pilz 2012] and [Lubiw, Pathak 2012]
 - APX-hard [Pilz, 2014] (reduction from VERTEX COVER), i.e., no polynomial-time algorithm to approximate the flip distance by $1 + \varepsilon$, $\varepsilon \geq 0.36$ exists
 - fixed-parameter tractable for flip distance k : $O^*(k \cdot 32^k)$ [Feng, Li, Meng, Wang 2021], for convex sets $O^*(3.82^k)$ [Li, Xia 2025]
- Computing the flip distance between two triangulations of a **simple polygon** is NP-complete [A., Mulzer, Pilz, 2015] reduction from RECTILINEAR STEINER ARBORESCENCE



Thank you!

