Fair Convex Partitions of Convex Polygons

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Summary

We will be tackling open problem 67 from the list of open problems provided. The problem talks about whether a given convex polygon can be divided into n convex pieces of equal areas and perimeters, where n is a natural number. This problem has solutions for some values of n. This problem has been partially solved for n = p^k where p is a prime number and k is an integer.

A fair partition of a convex polygon is described as partitions that have equal areas and perimeters. A fair partition is convex if the pieces are also convex.

We would also like to create an online tool that finds partitions as mentioned above, for any random convex polygon.

Timeline

Week #	Deliverables	Artifacts
4	Dive deep into the scope of the solutions of the problem.	
5	Recreate the known solutions ourselves and create the framework for an online tool for demonstrating these solutions.	- Week 6 presentation document
6	Present the overview of the project. Start developing new approaches to solving the problem.	
7	Test new approaches to tackle the problem for different values of n.	- Experiment results document
8	Continue with testing new methods. Create an online tool that finds a partition of a ploygon for the known solutions.	- Online tool to demonstrate the problem's solutions
9	Make UI improvements on the online tool. If alternative or new solutions are found, update the online tool.	
10	Present work done so far on the project and steps to wrap up the project.	- Week 10 progress presentation document
11	Document our findings and report any failures or successes achieved during the entire process.	- Final project document
12	Final presentation	- Final presentation document

Work Distribution

PARITOSH

- Responsible for researching the problem and figuring out the scope and extent of the solutions to the problem.
- Responsible for testing new approaches to solving the problem.
- Responsible for updating the final project document.

VINEET

- Responsible for creating the online tool for demonstrating the solutions to the problem.
- Responsible for researching new improvements to existing solutions.
- Responsible for updating the final project document.

Sources

http://cs.smith.edu/~jorourke/TOPP/P67.html#Problem.67
https://parasol.tamu.edu/~amato/Courses/620/openProblems/csce620-openProblem-P67_FairPartitioning_NicolasCastet.pdf
https://arxiv.org/abs/0812.2241 for 2^k partitions
https://arxiv.org/abs/1011.4762v2 for p^k partitions where p is any prime number
https://arxiv.org/abs/1011.4762v2 for p^k partitions where p is any prime number