PLANARITY TESTING

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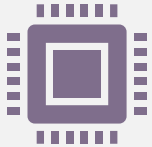
AGENDA

- Introduction
- Simple Math
- Our Solution
- Live Demonstration
- Conclusion

INTRODUCTION

What is a planar graph?

How does a computer read planar graphs?



What can planar graphs be used for in the real world?

DUAL GRAPHS & THE FOUR COLOUR THEOREM

Given any separation of a plane into contiguous regions (like a political map of the world), no more than **4 colors** are required to color the regions so that no two adjacent regions share the same color.

By converting the map to a Dual Graph, mathematicians could apply graph theory rules (like Euler's formula) to solve the map-coloring problem.

IMPLEMENTATION OF 3D SPHERES

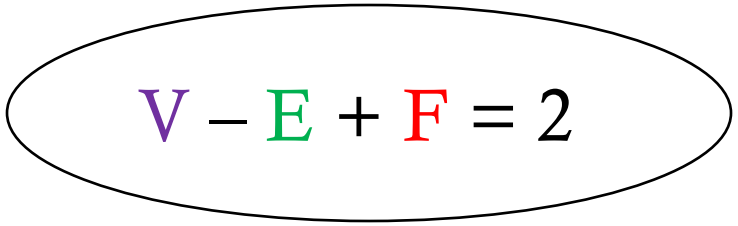
In computer science, treating a planar graph as if it lives on a sphere (rather than a flat plane) solves several messy coding problems.

Used in multiple areas such as procedural generation

SIMPLE MATH

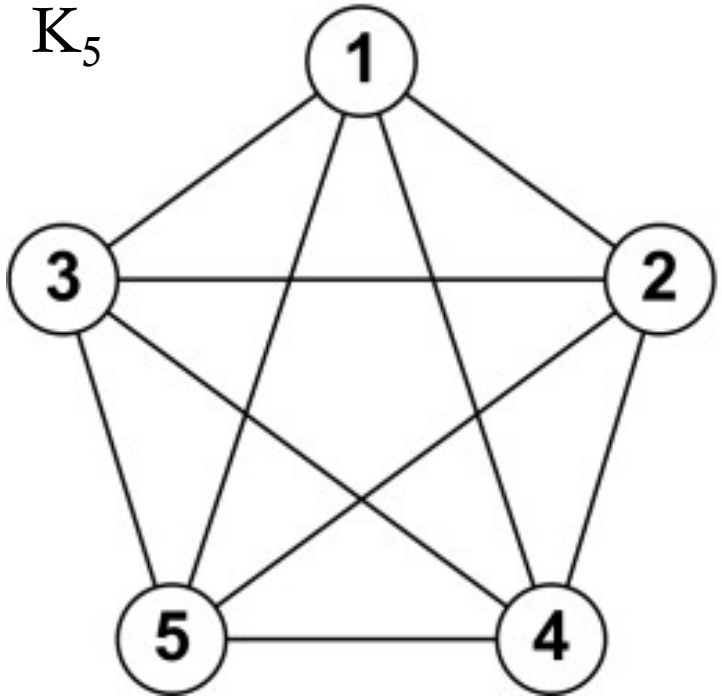
Euler's Formula

- What is Euler's Formula?

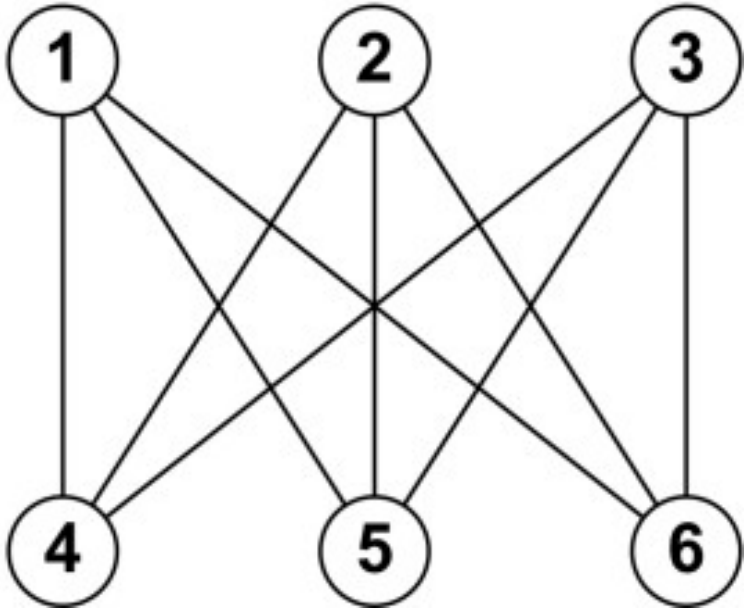


- V = Vertices
- E = Edges
- F = Faces

K_5



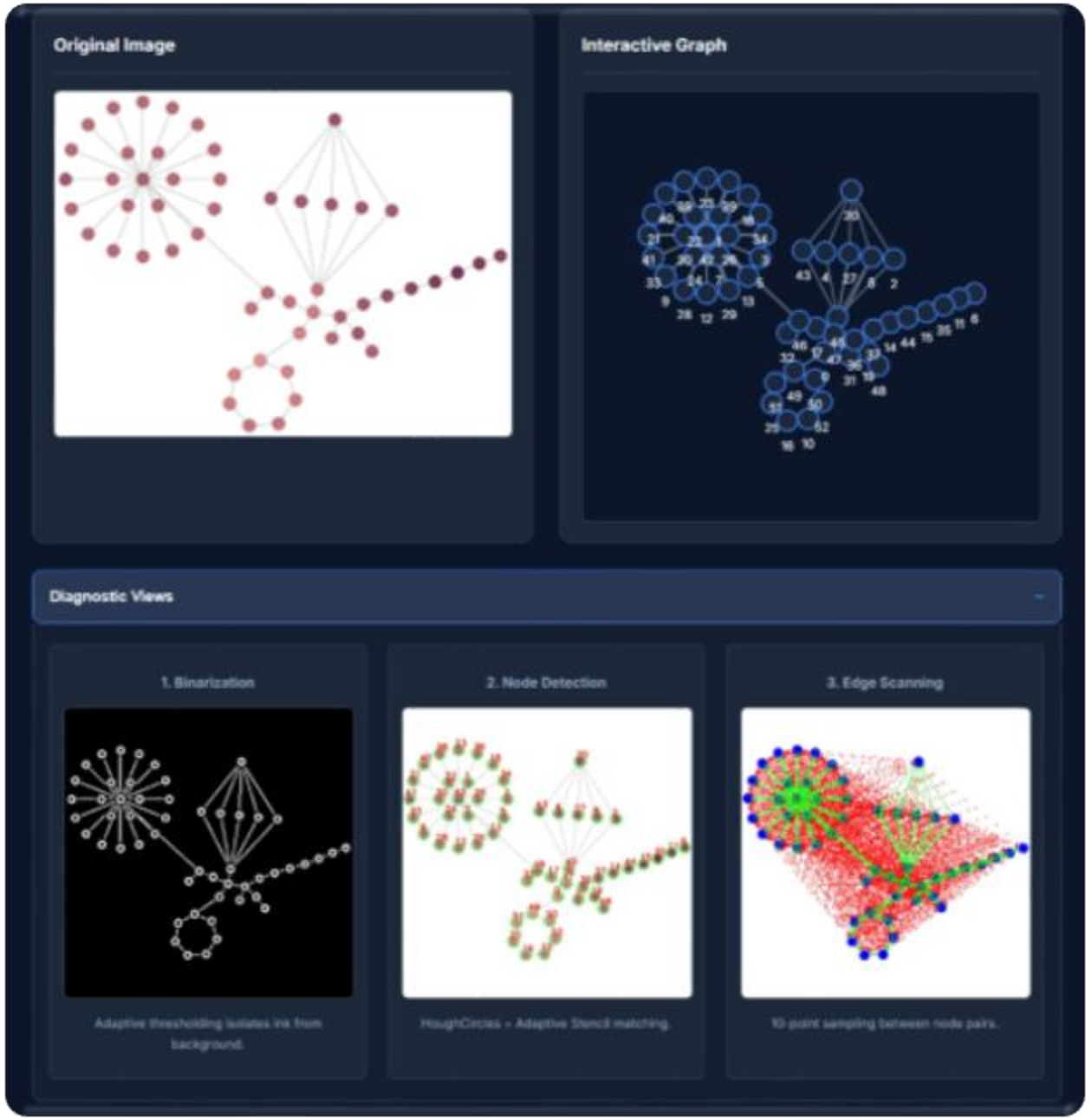
$K_{3,3}$



SIMPLE MATH

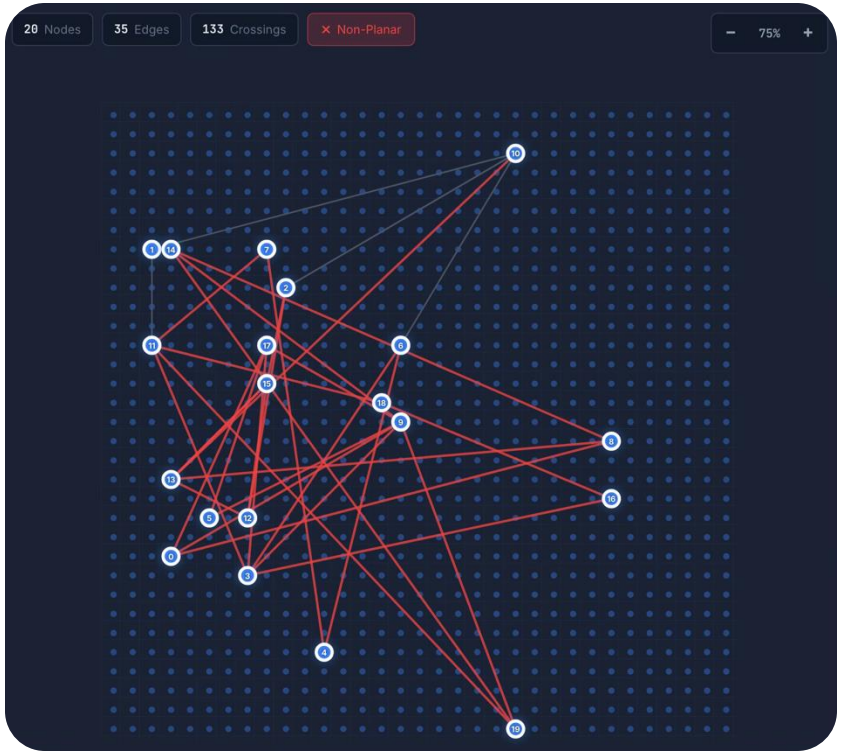
Kuratowski's and Wagner's Theorem

GRAPH OPTICAL IMAGE RECOGNITION

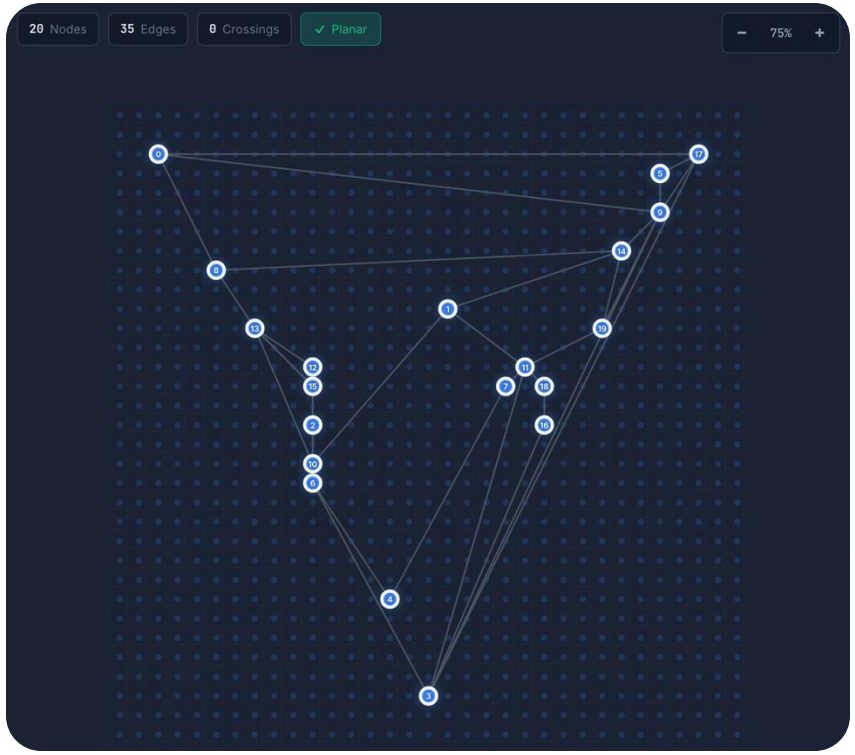


OUR SOLUTION

A Planarity Checker



- 20 Nodes
- 35 Edges



POSSIBLE REAL WORLD APPLICATIONS

- Electronic Design Automation (EDA): VLSI & Circuit Layout
- Geographic Information Systems (GIS) & Cartography
- City Infrastructure Planning
- Neuromorphic Hardware

LIVE DEMONSTRATION

FUTURE UTILIZATIONS

- Network Security & IT : Fixing “Spaghetti Diagrams”

- Circuit Designers : Finding Bottlenecks

THANK YOU FOR LISTENING?

ANY QUESTIONS?