Introduction to Graph Theory

Why Graphs?

Alexander Golovnev

Outline

What is a Graph?

Graph Examples

Graph Applications

Graphs

- A set of Objects

Graphs

- A set of Objects
- Relations between pairs of objects

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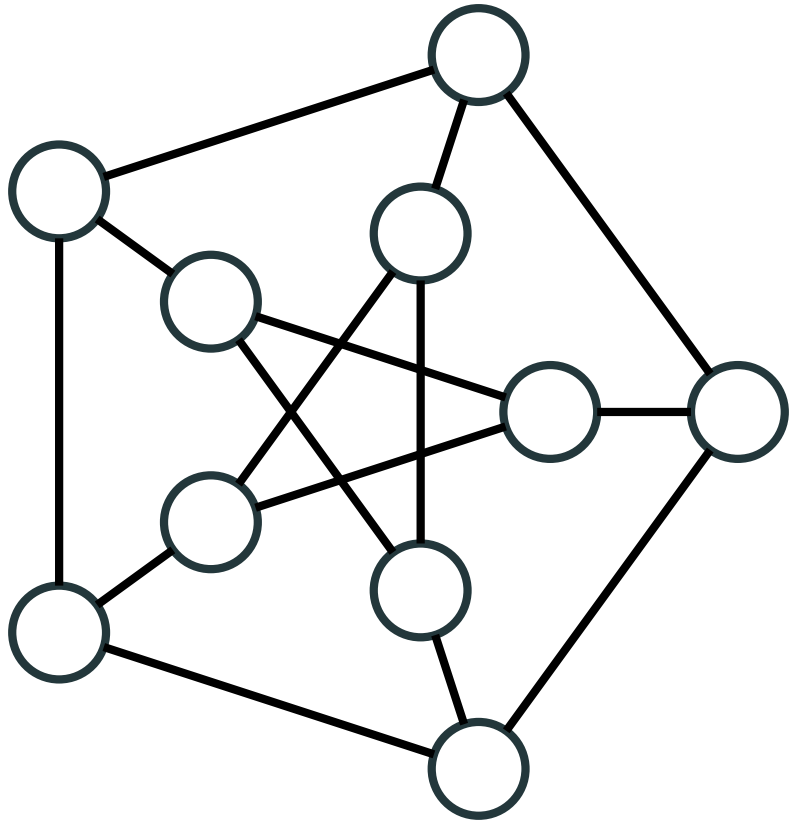
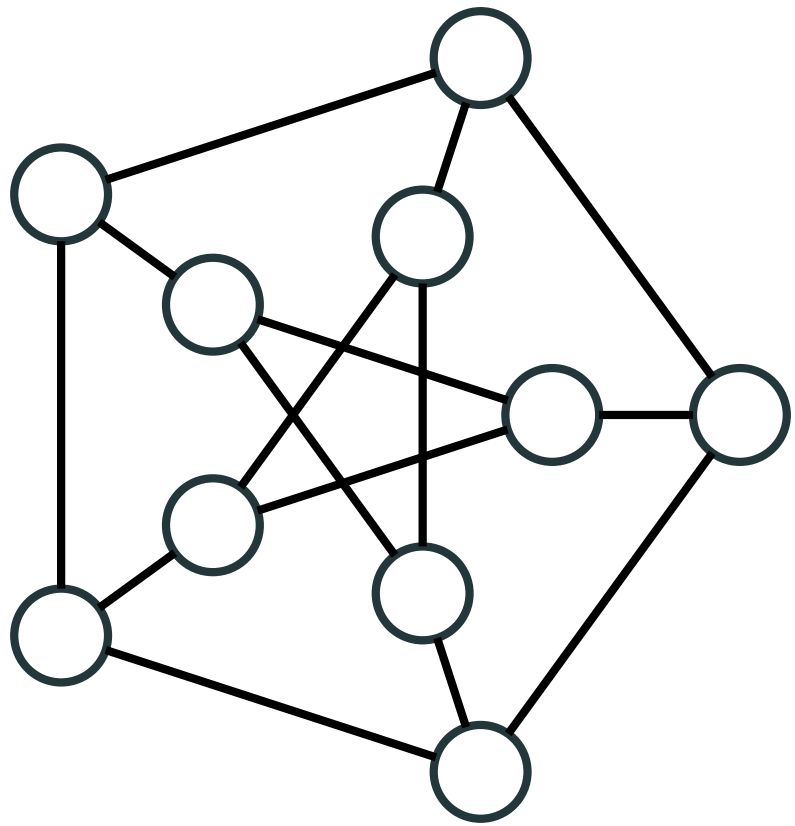
- Relations between pairs of objects



Definition

- A Graph $G = (V, E)$



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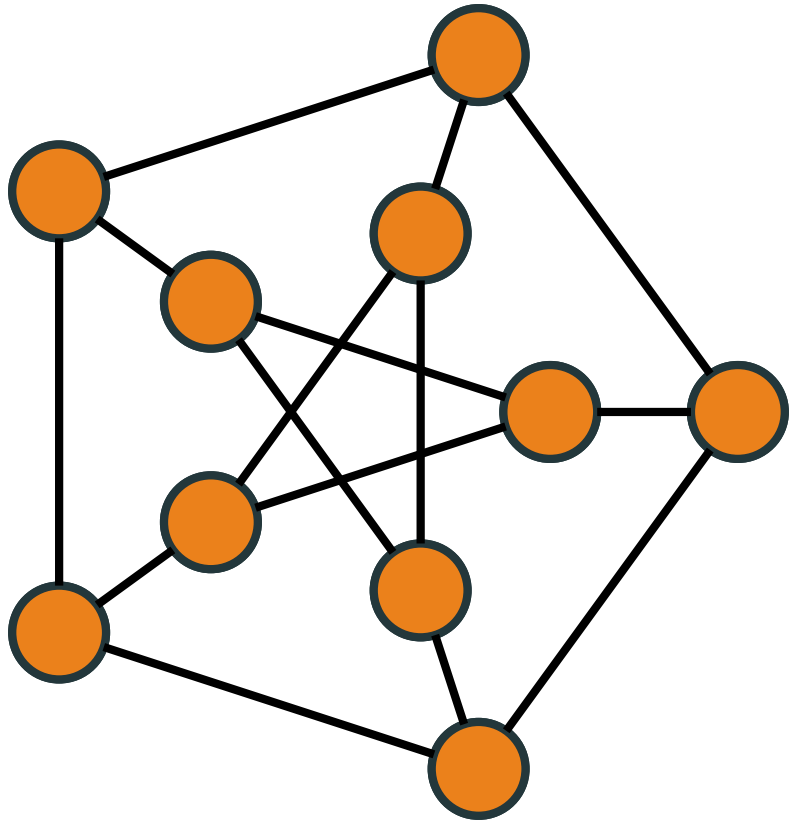
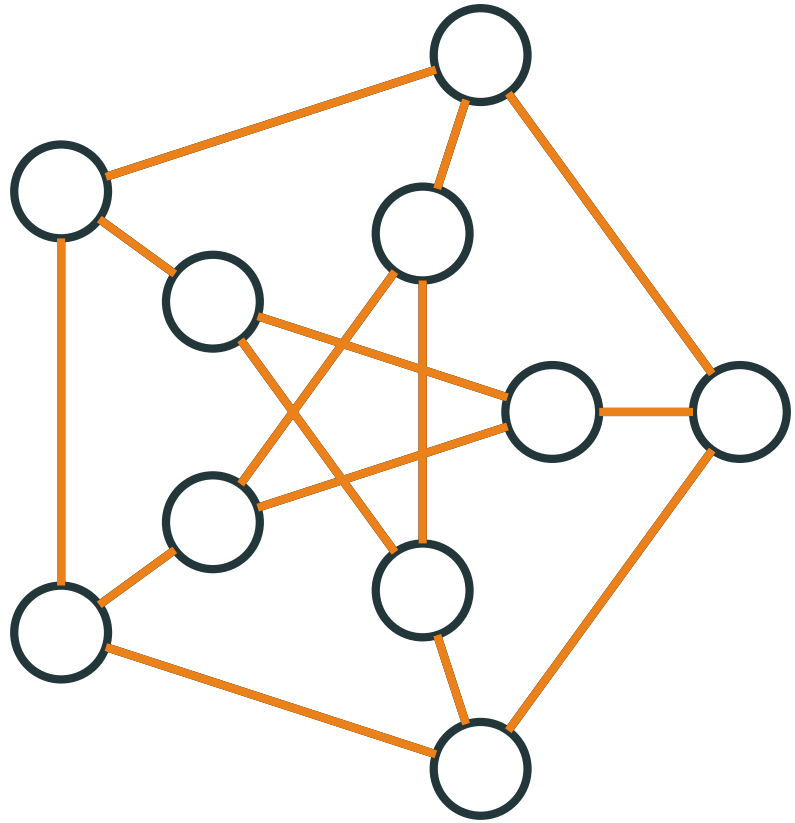


Definition

- A Graph $G = (V, E)$
- A set V of Vertices/Nodes
- A set E of Edges



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Drawing a Graph

Objects: {A,B,C,D}

Relations: {{A,C},{D,A},{B,D},{C,B}}

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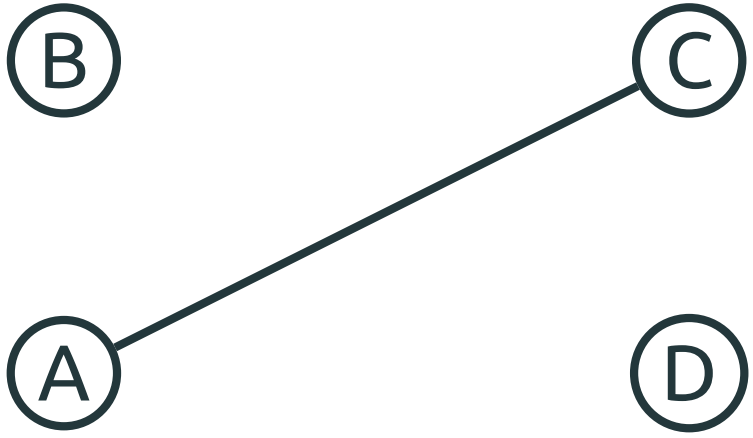

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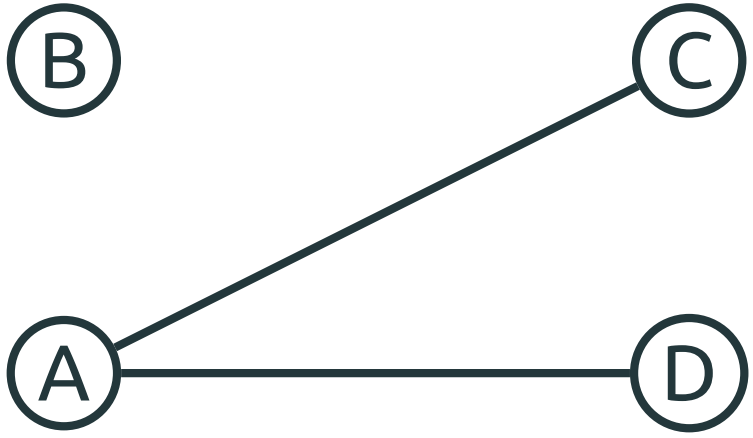

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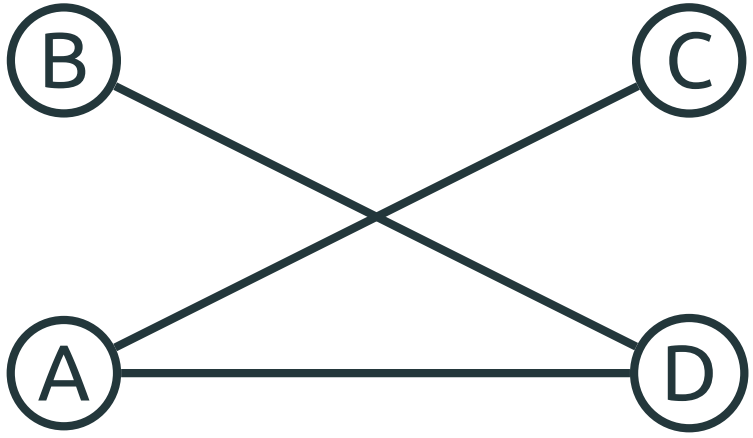

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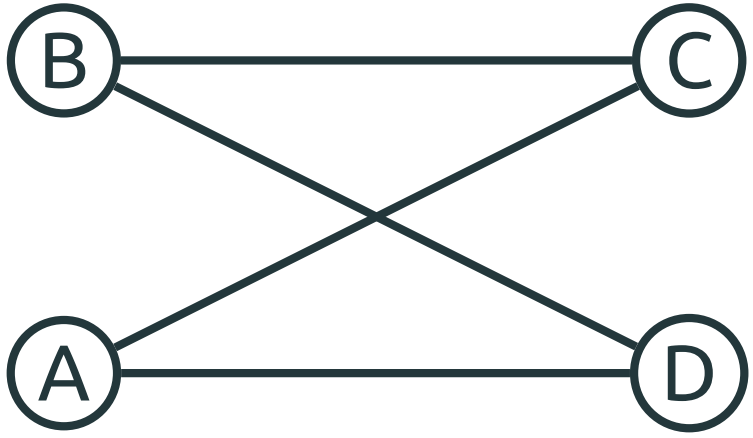

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- They describe asymmetric relations
- There is a flight from A to B, but not the other way around
- Such a graph is called Directed

Drawing a Directed Graph

Objects: {A,B,C,D}

Relations: {(A,C),(D,A),(B,D),(C,B)}

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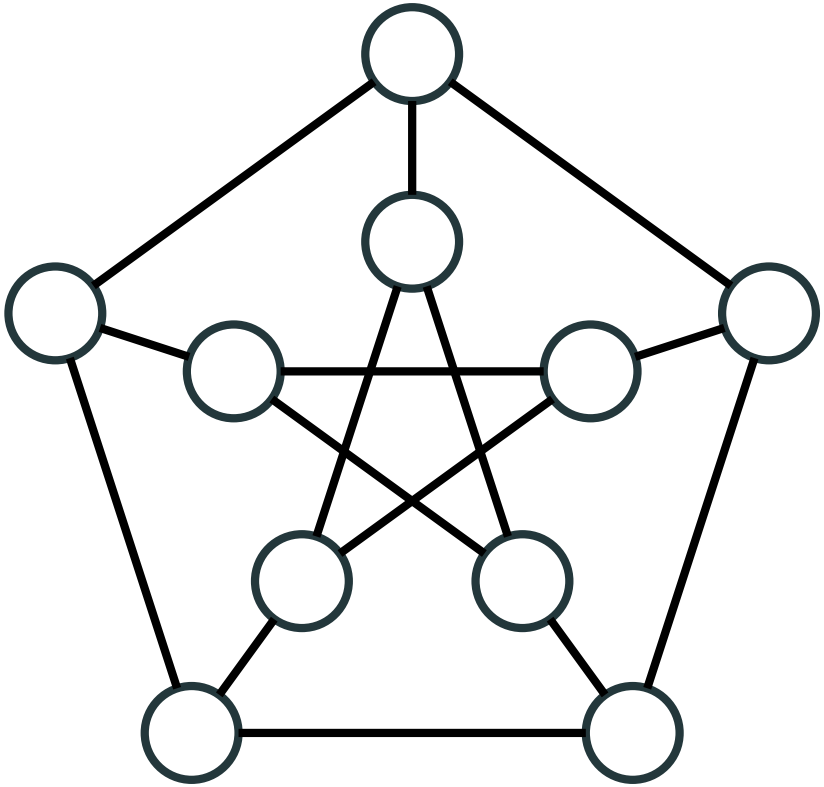
Many Ways to Draw a Graph



Many Ways to Draw a Graph

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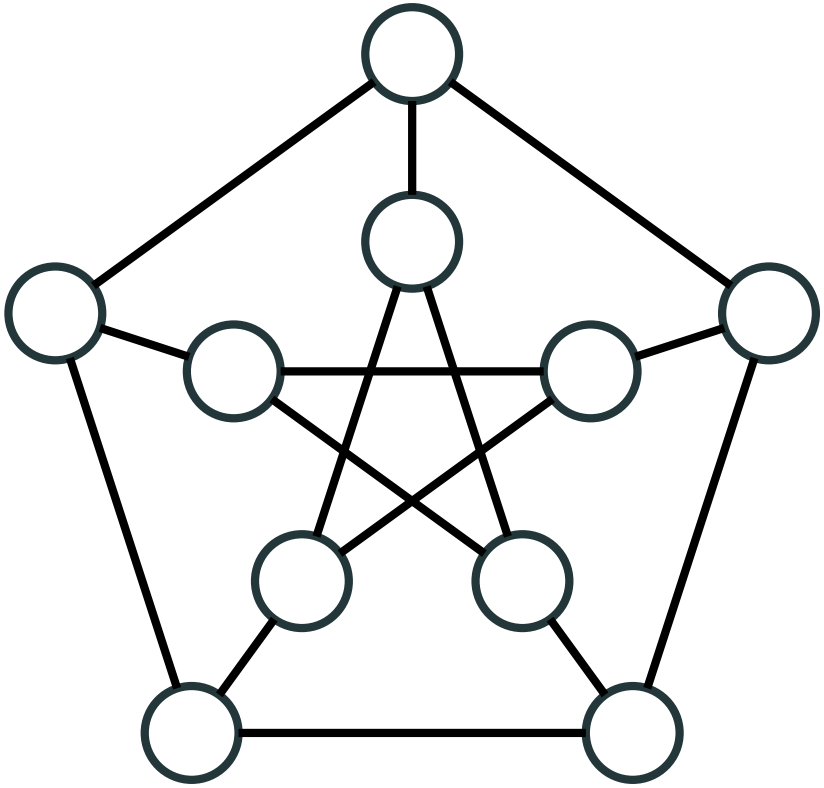

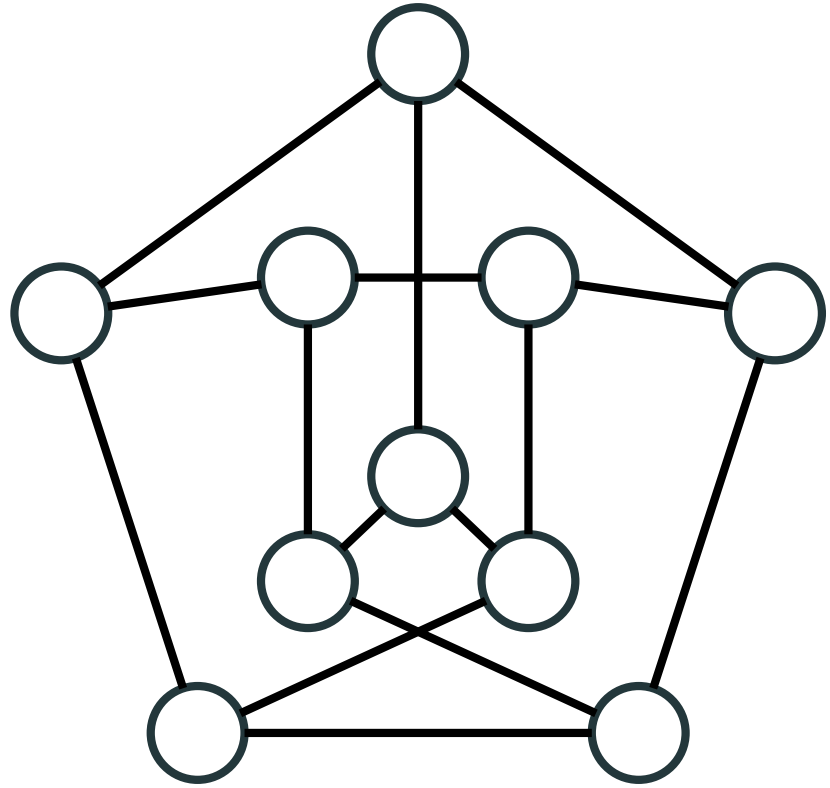

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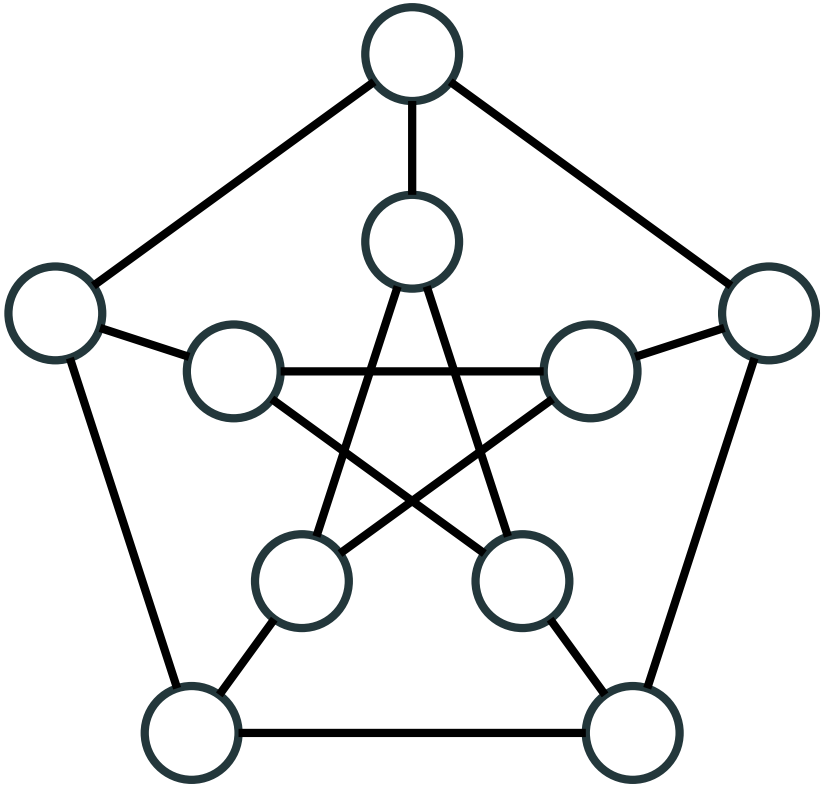

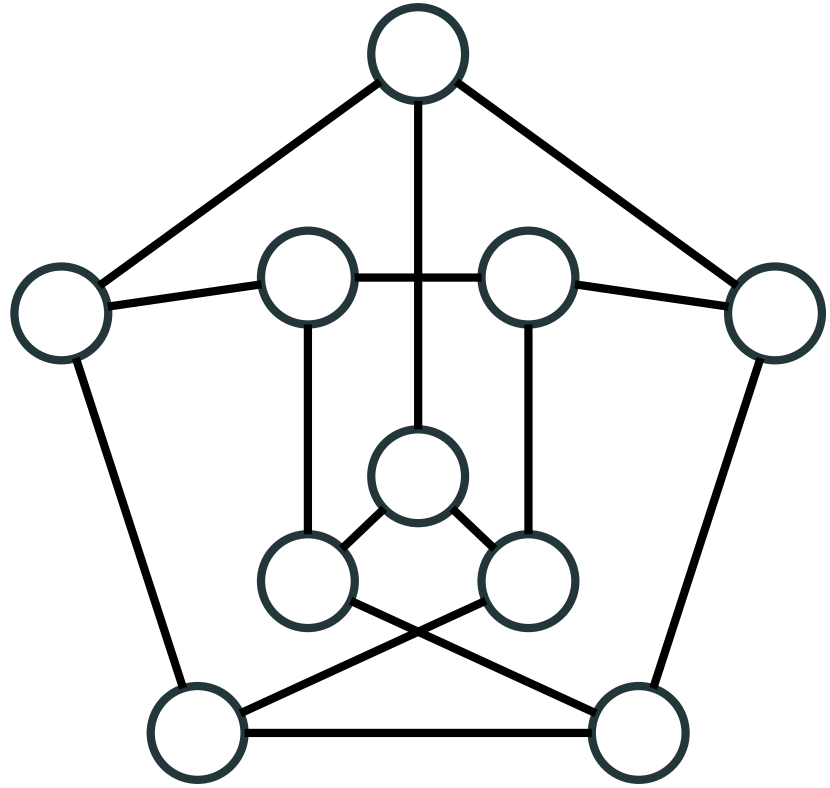

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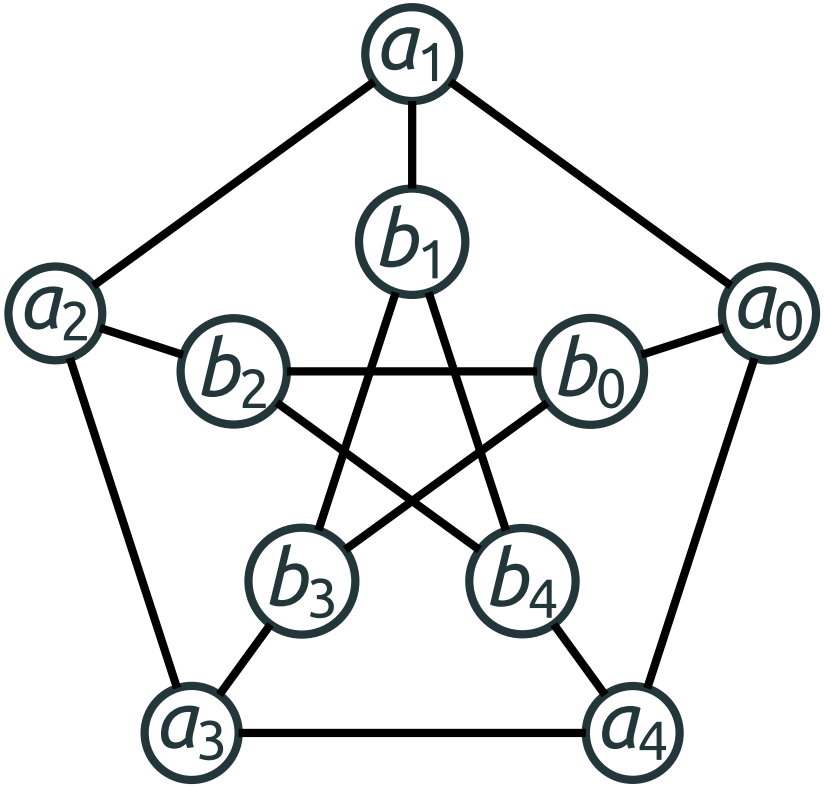

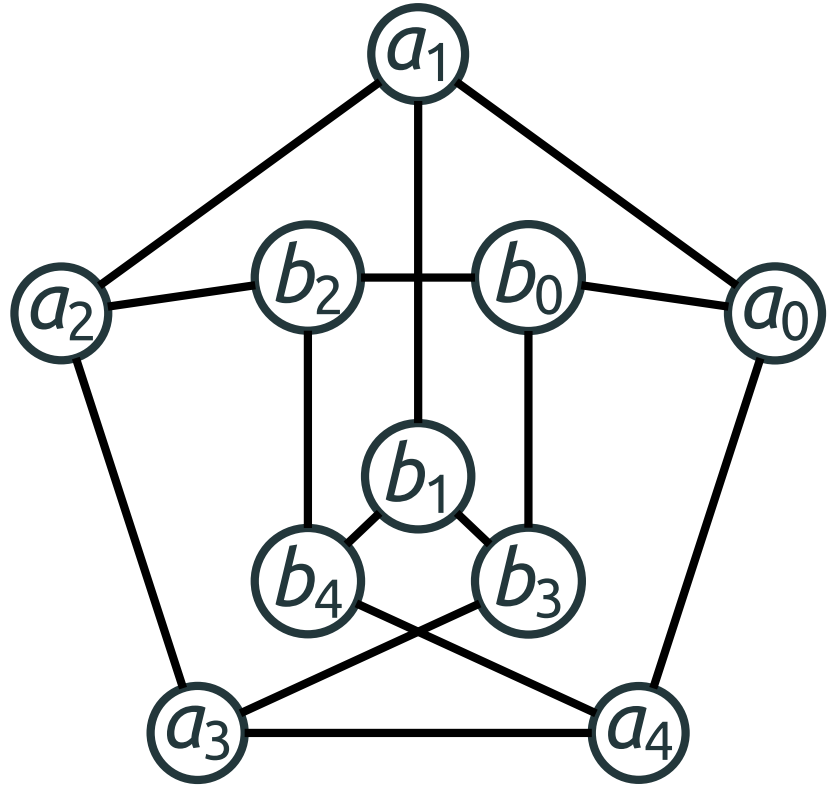

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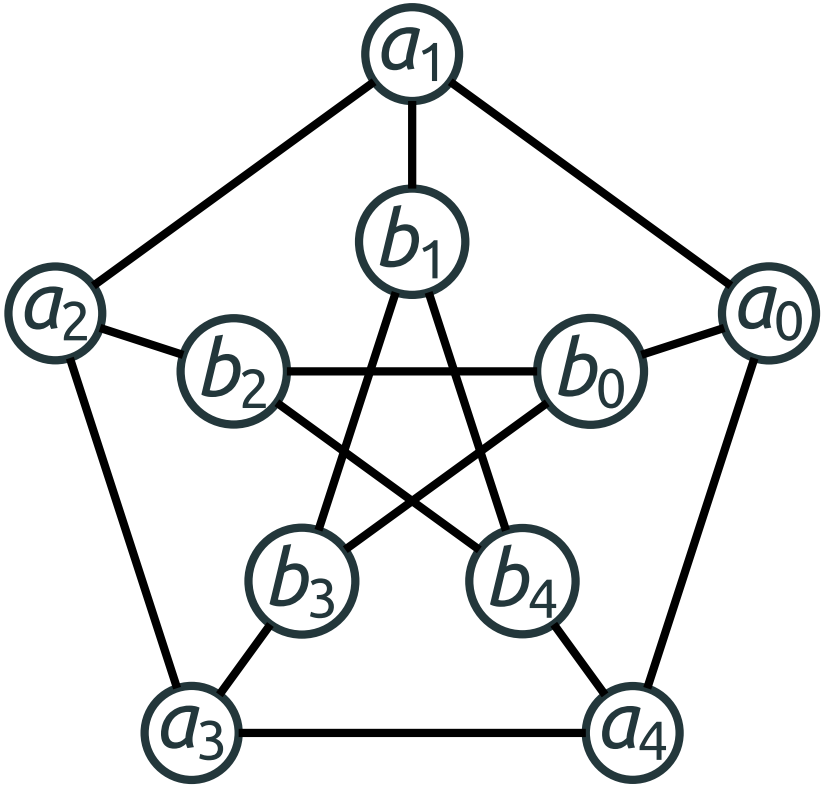

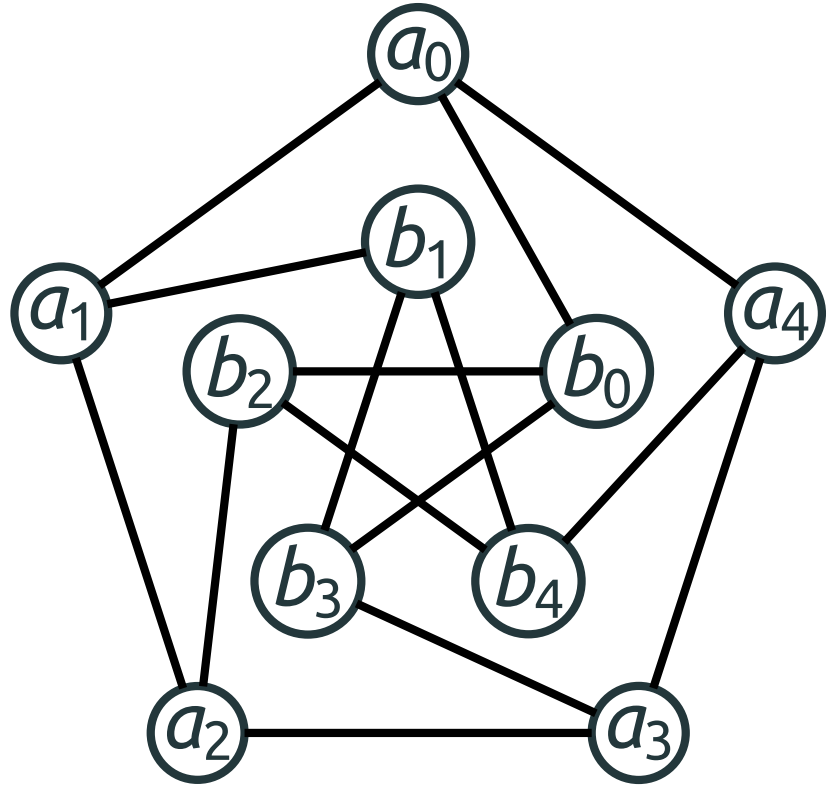

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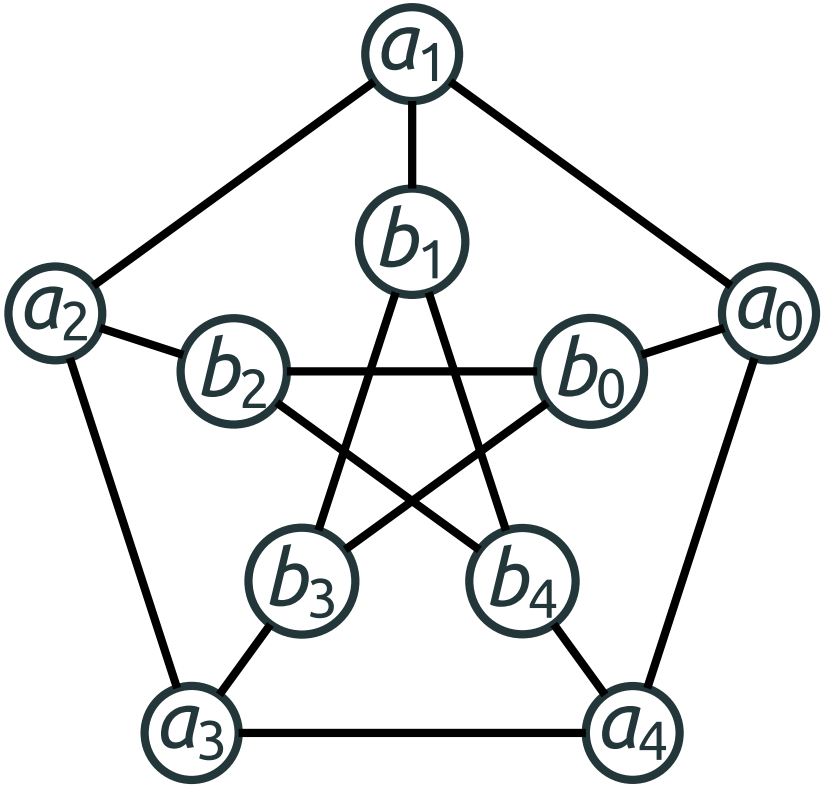

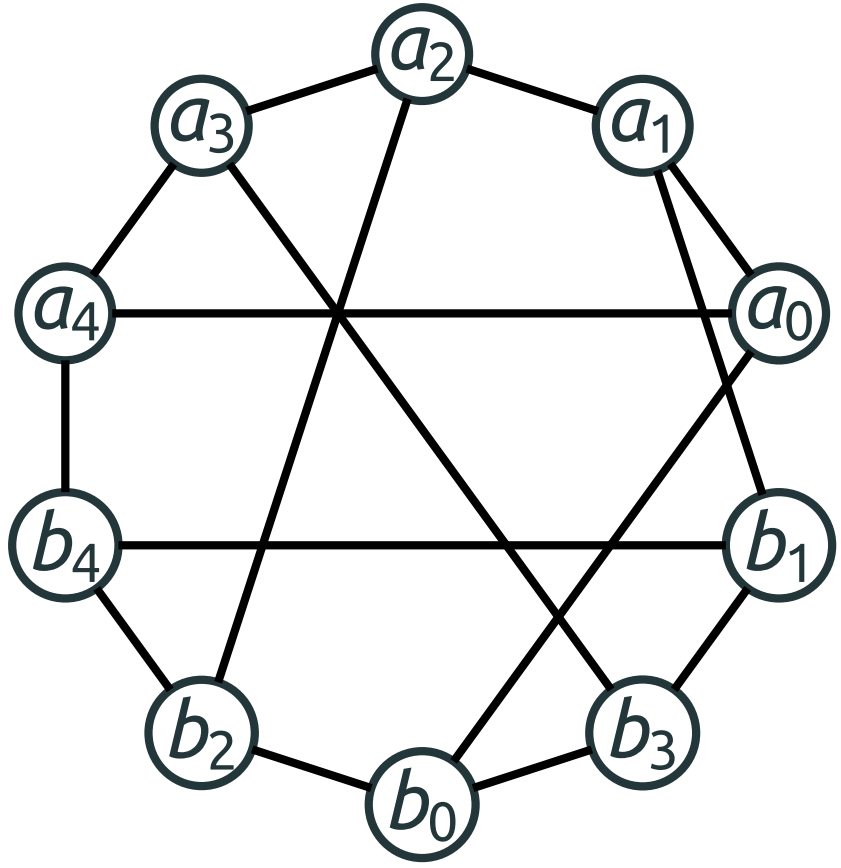

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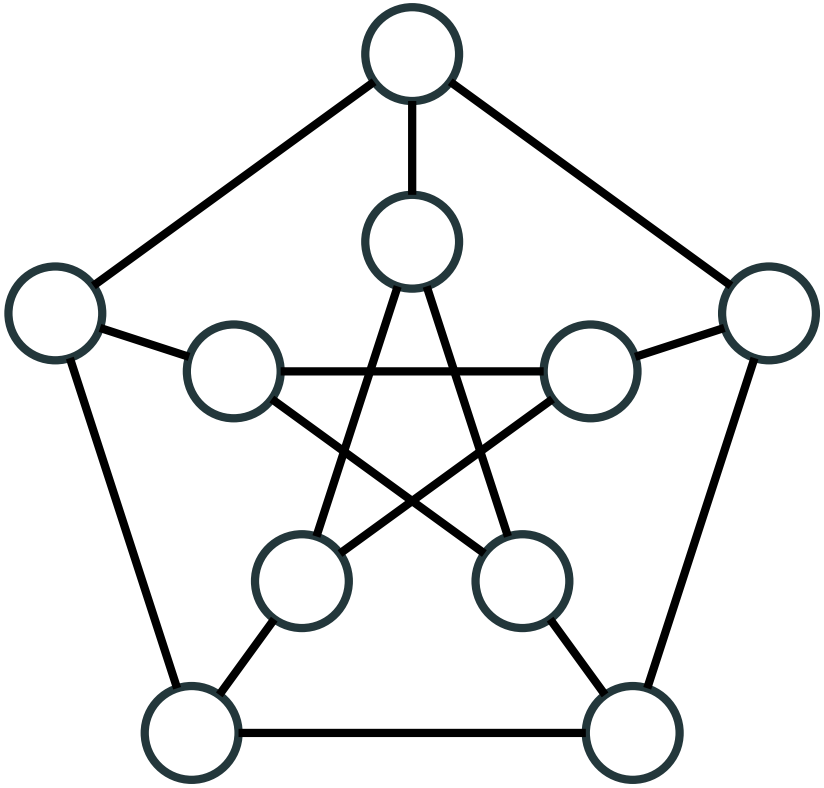

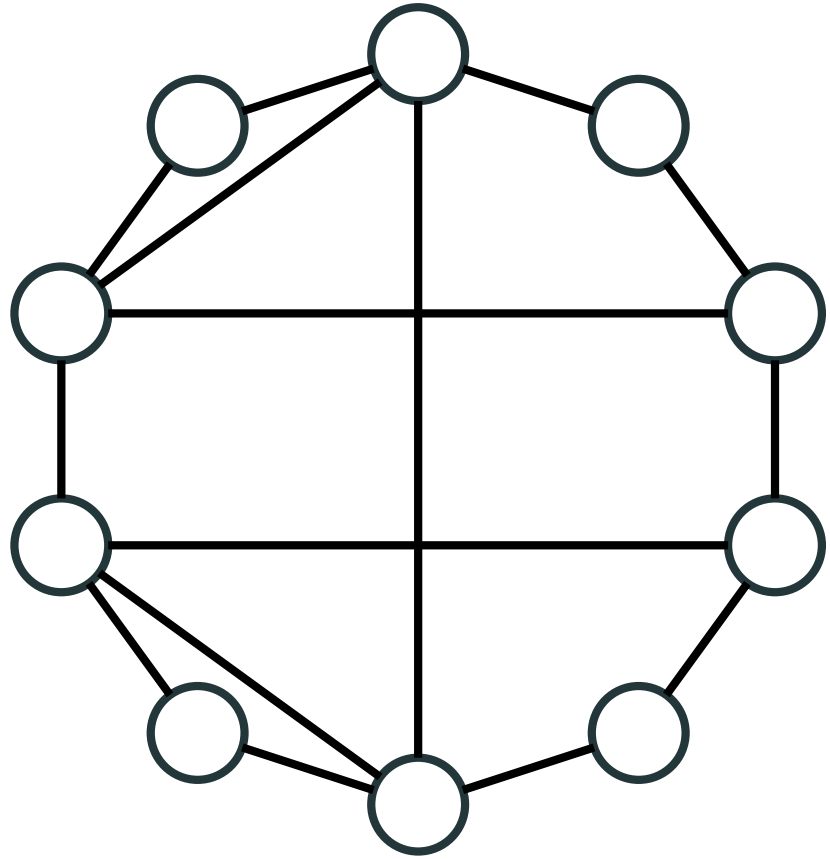

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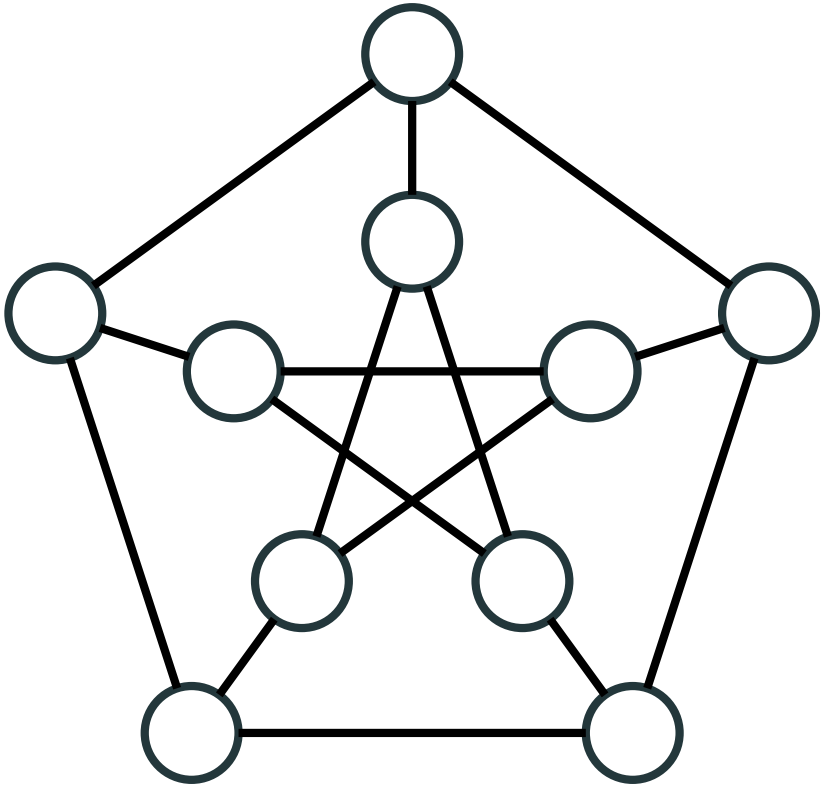

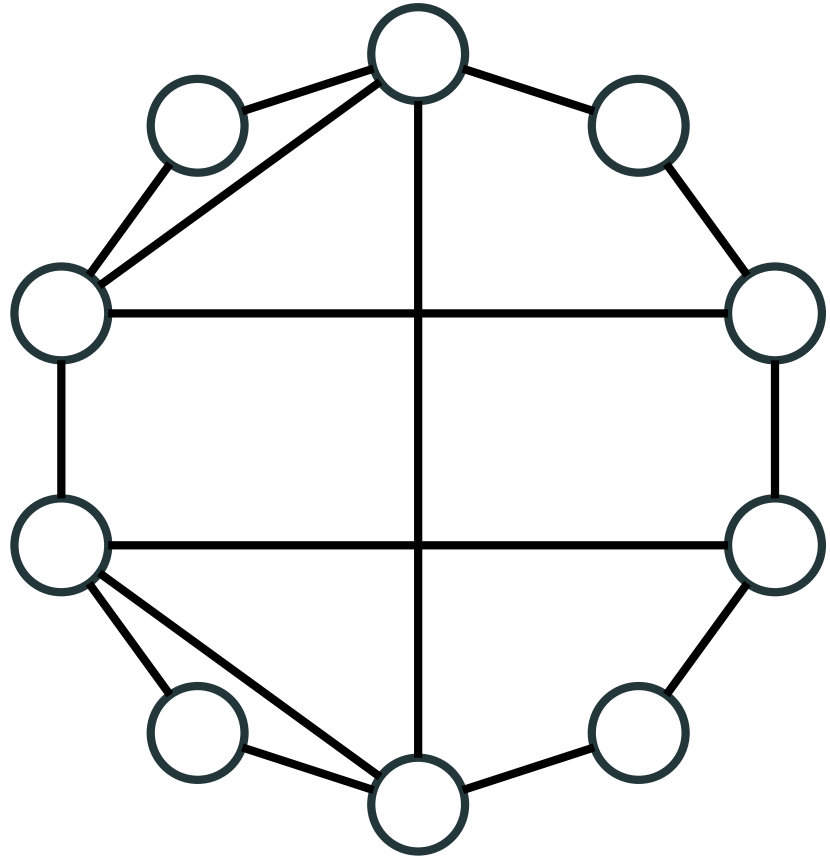

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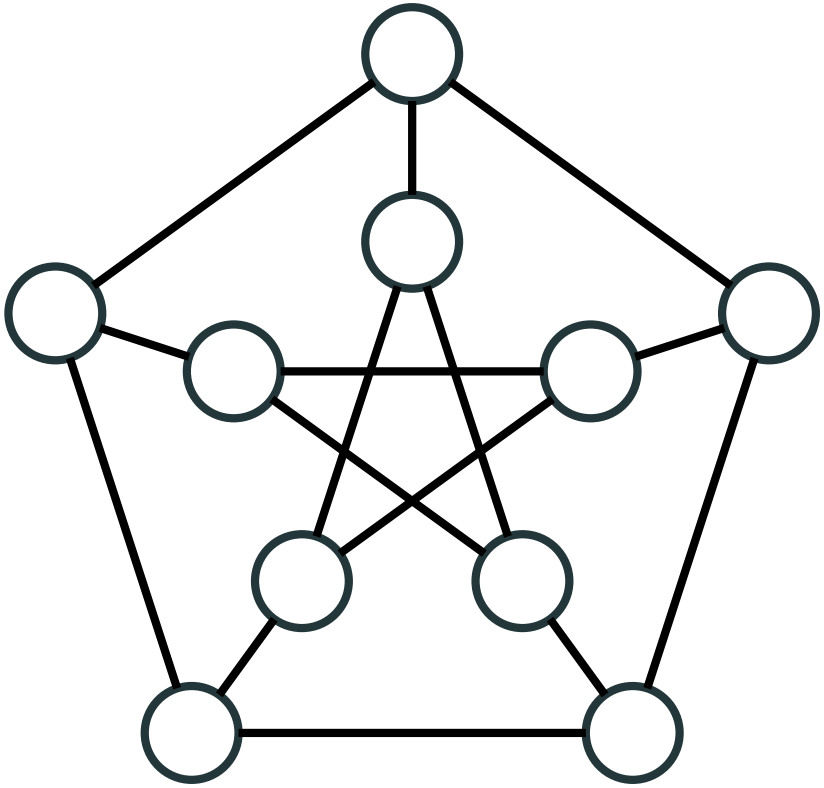

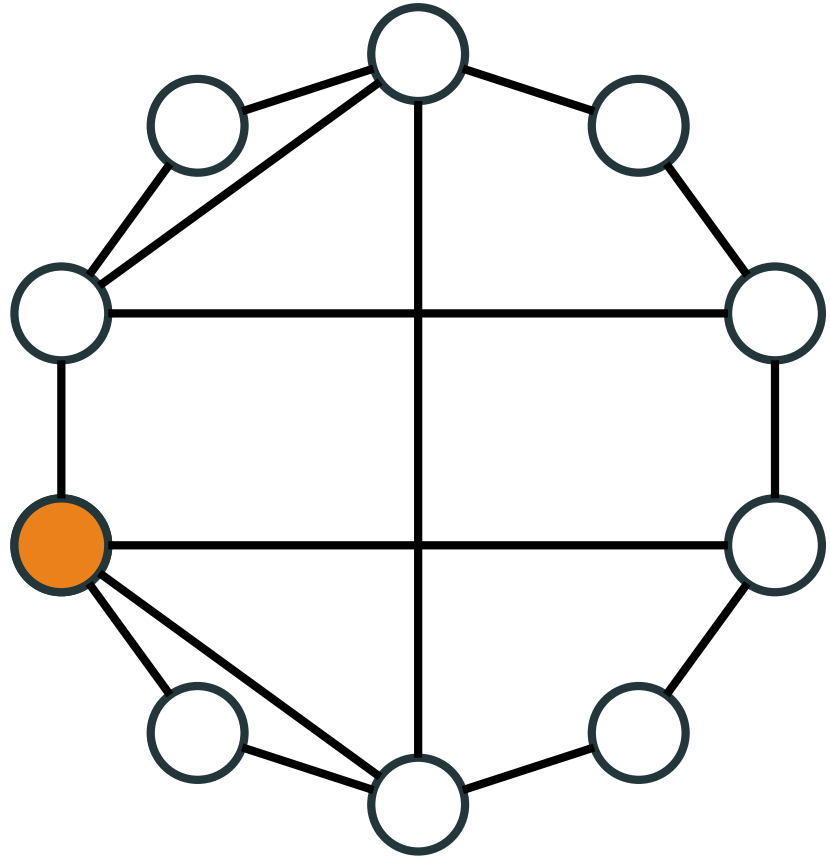

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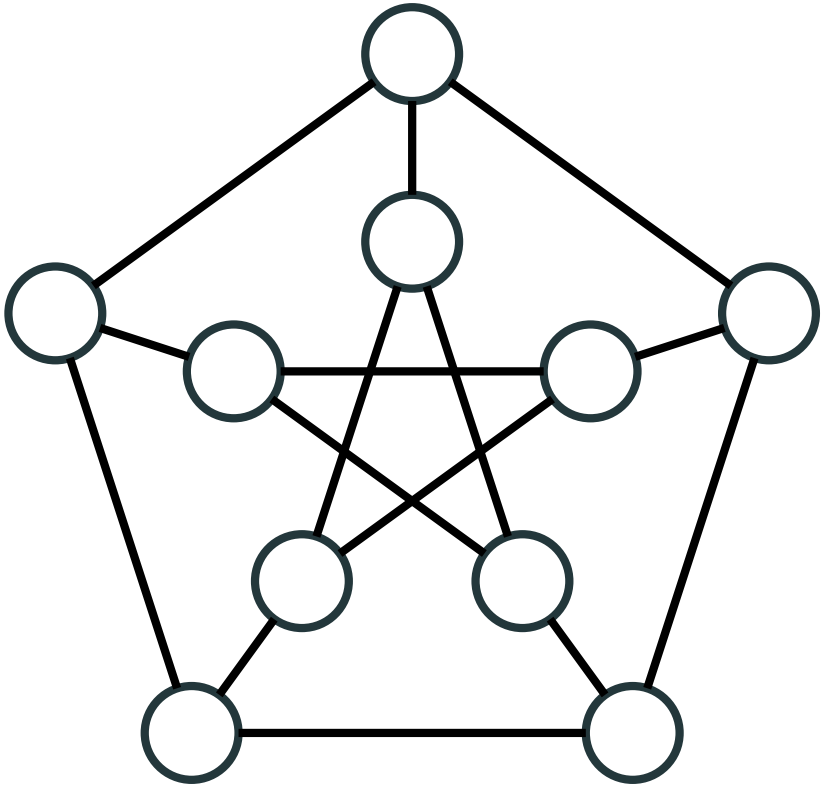
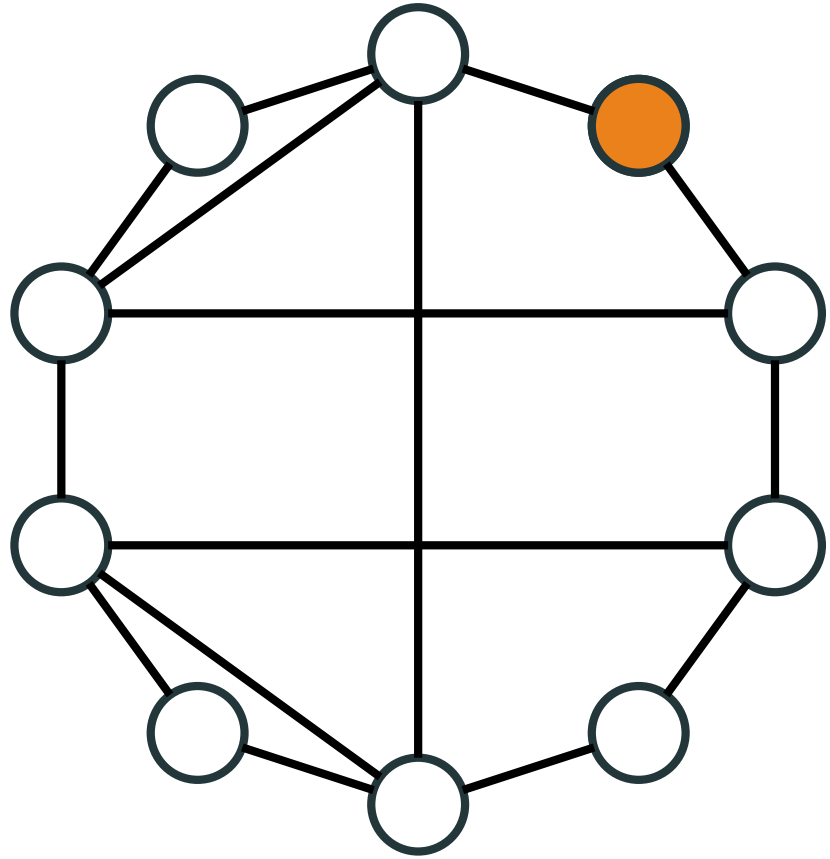




Graph Drawing is Beautiful!

Donald E. Knuth

Graph drawing is the best possible field I can think of: It merges aesthetics, mathematical beauty and wonderful algorithms.
It therefore provides a harmonic balance between the left and right brain parts.

Outline

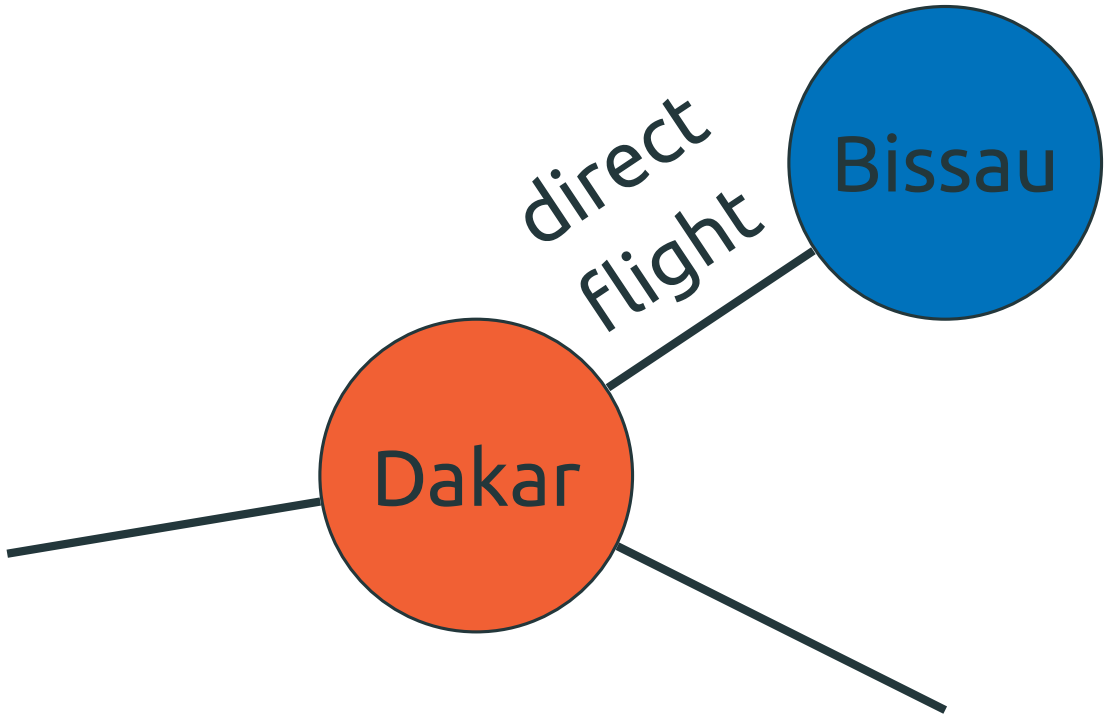
What is a Graph?

Graph Examples

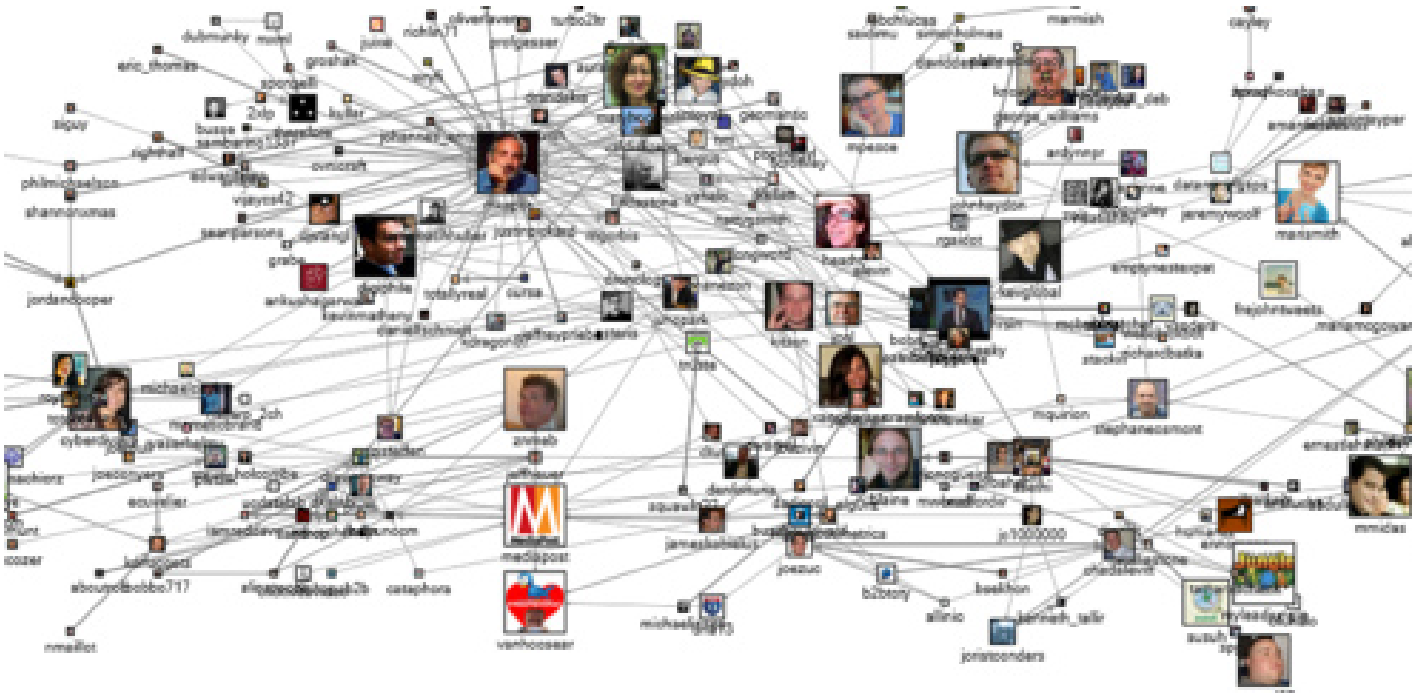
Graph Applications

Airlines Graph

Airlines Graph



Facebook Graph



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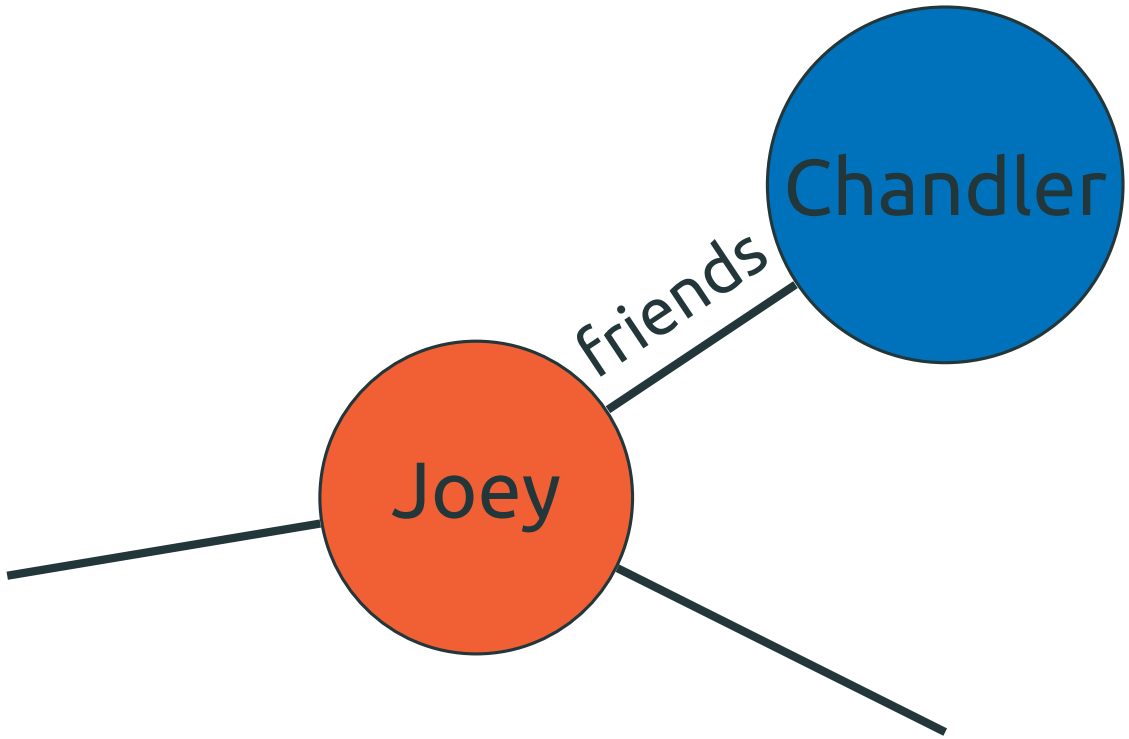
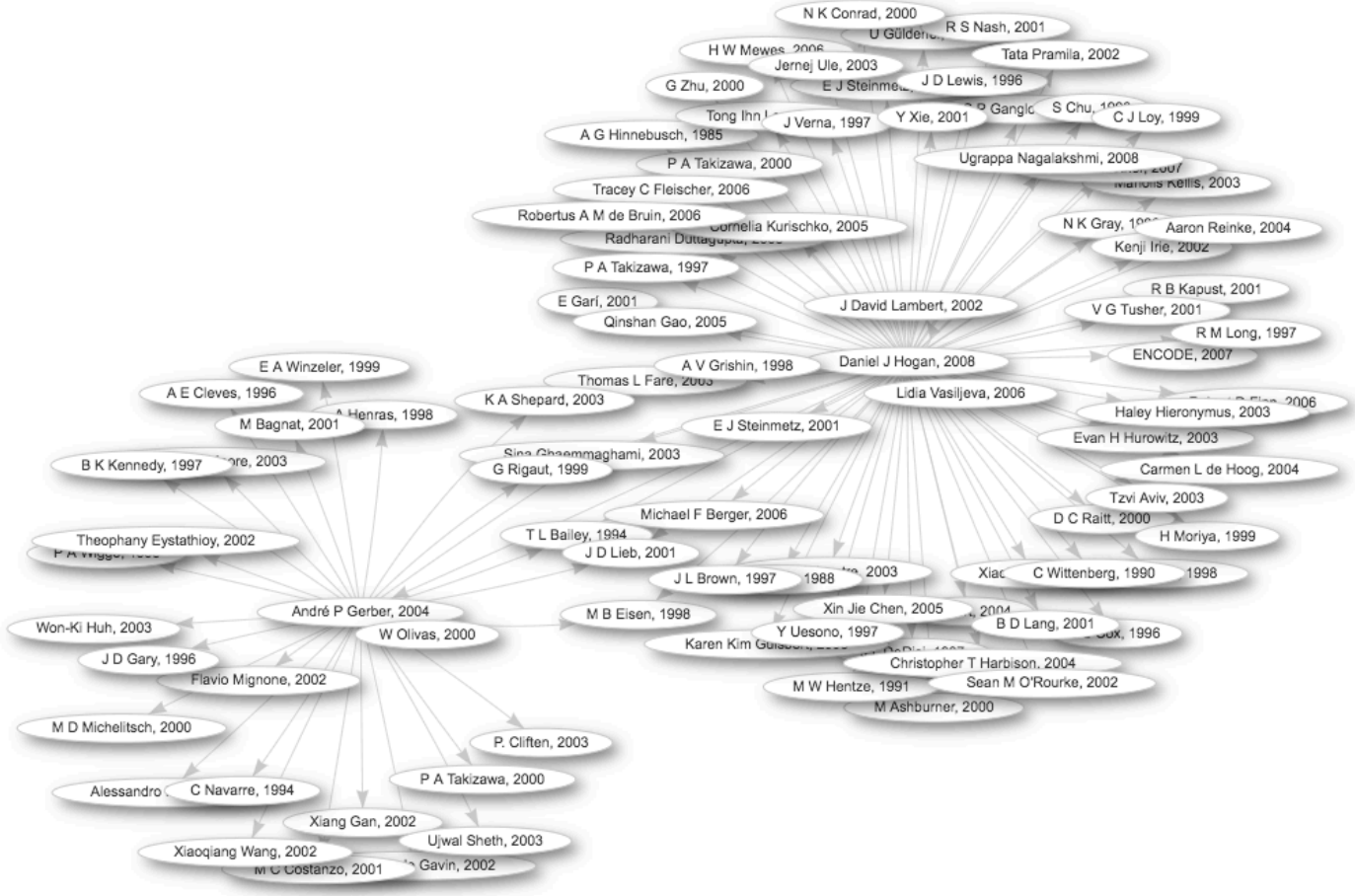


Citation Graph For a Paper



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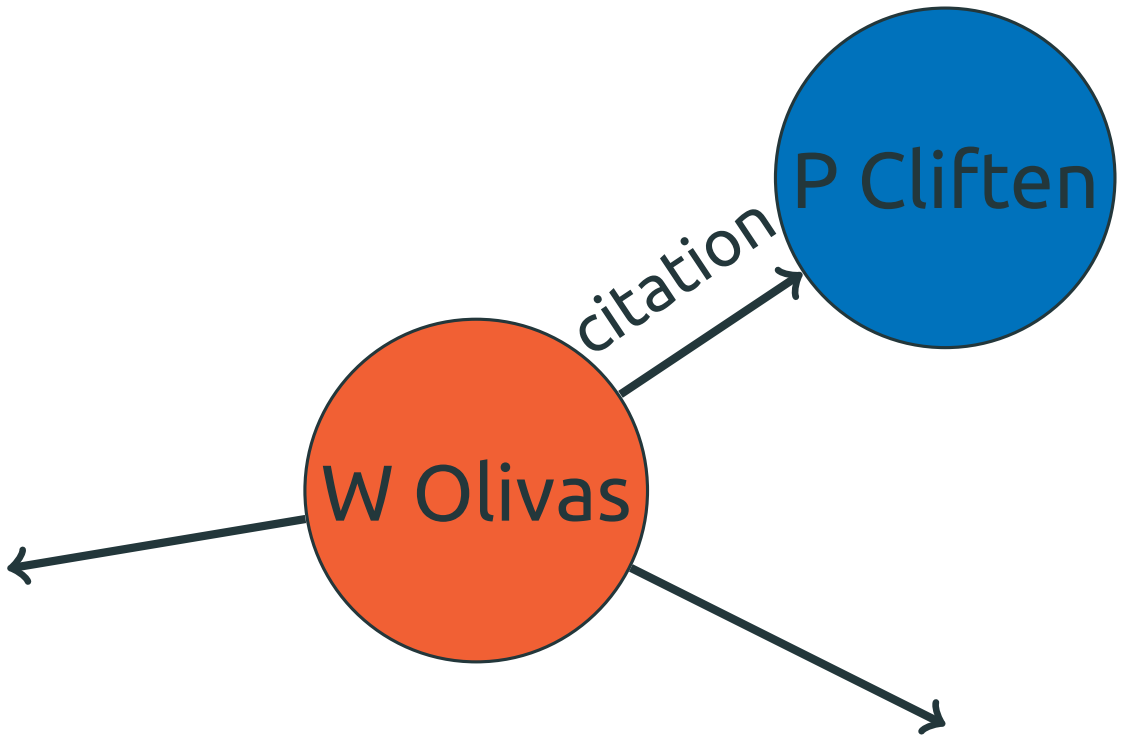
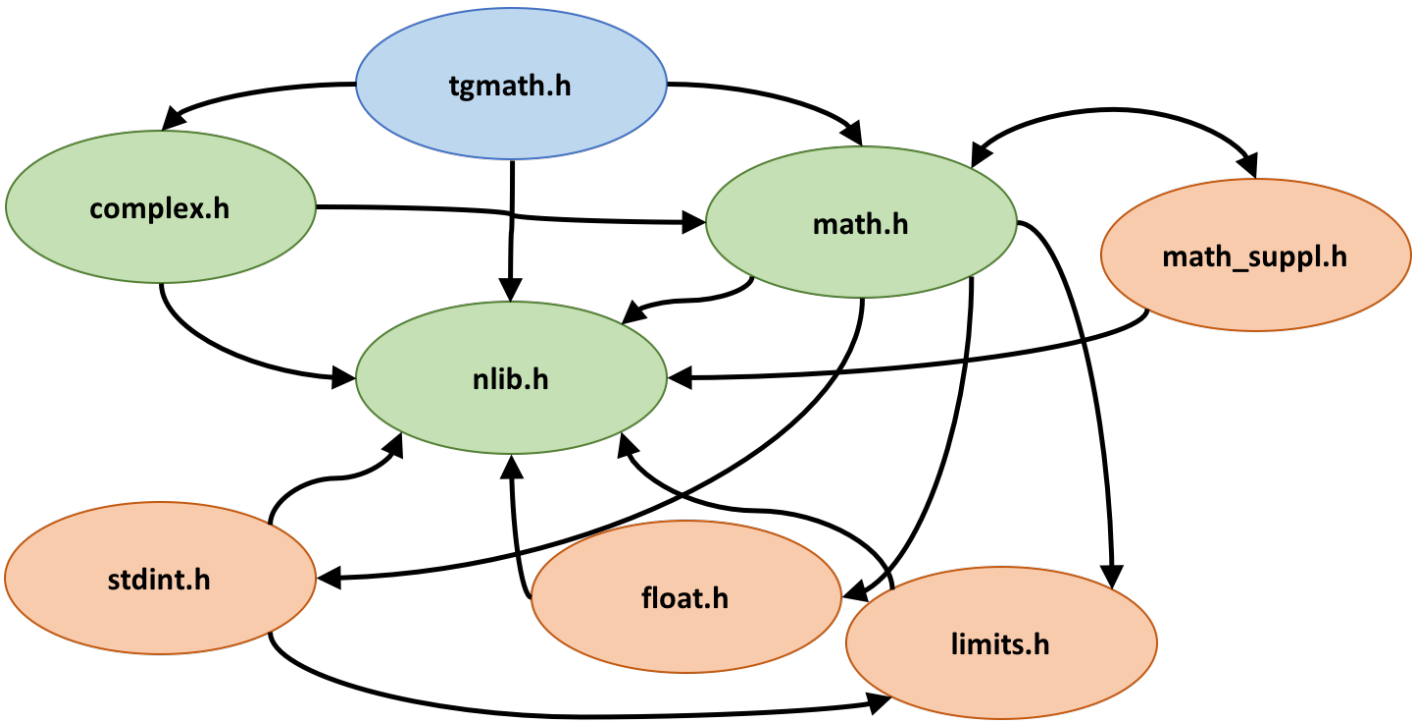


Dependency Graph



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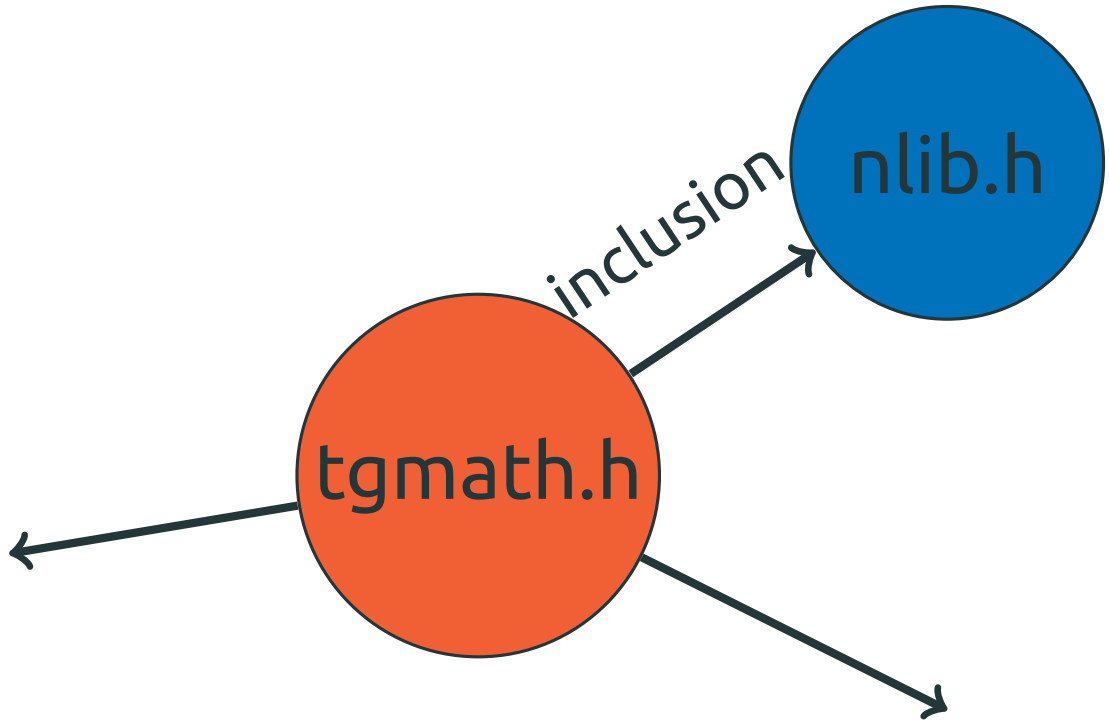
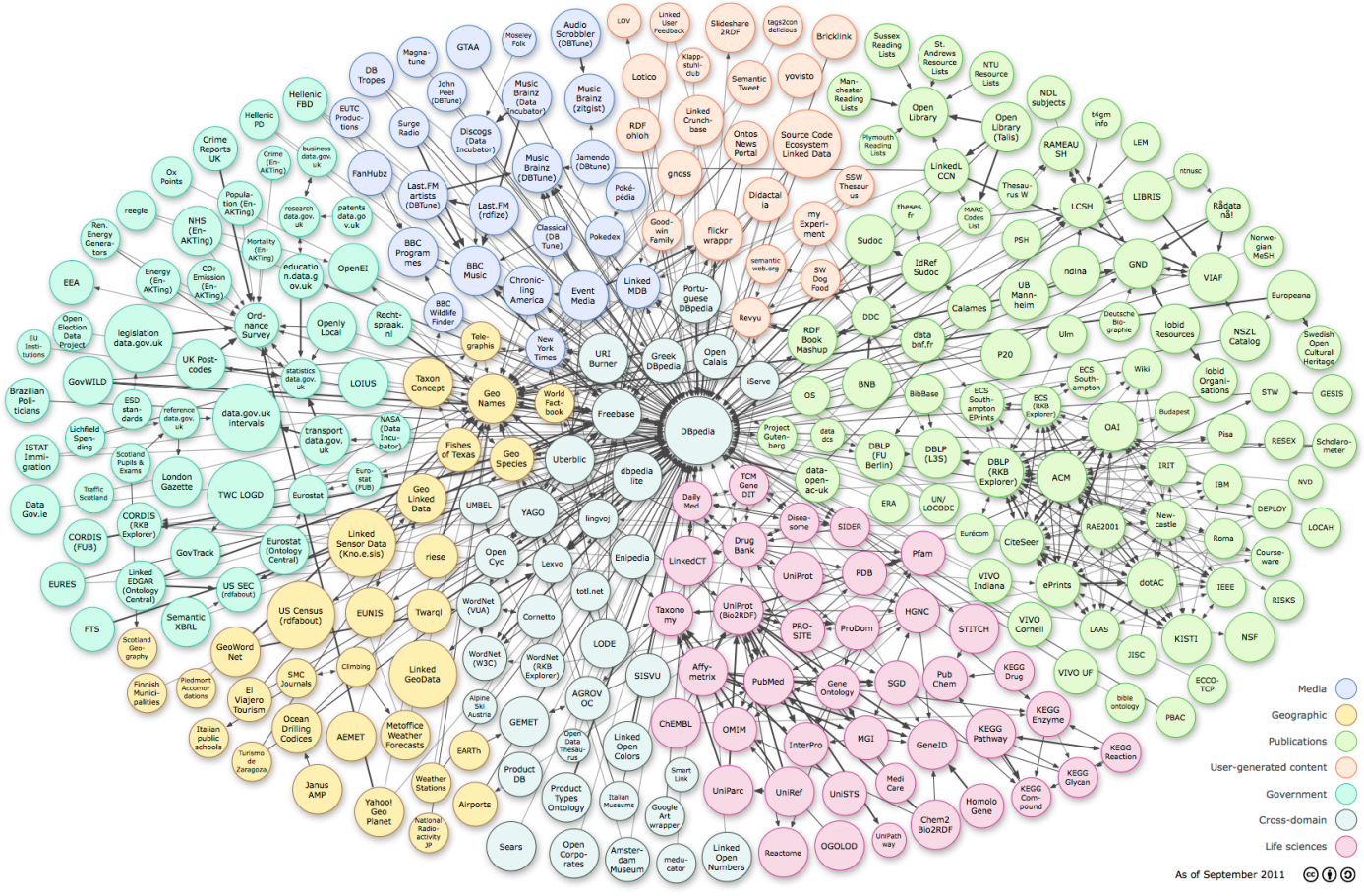


Linked Open Data Diagram



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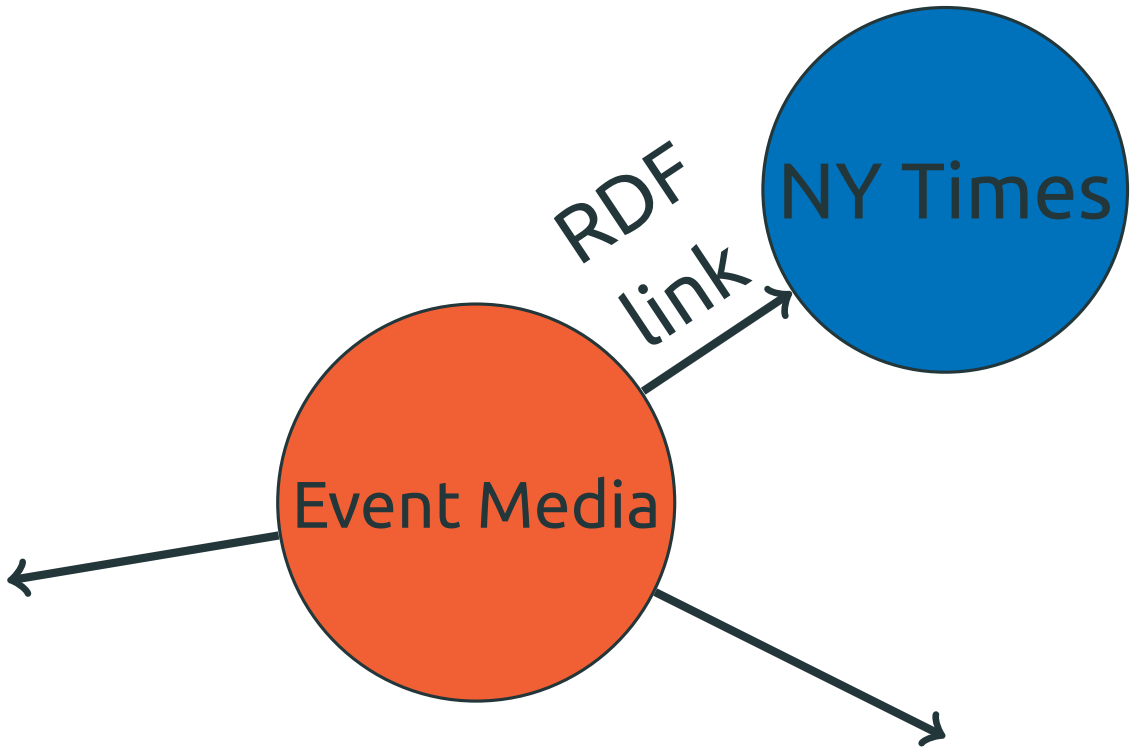
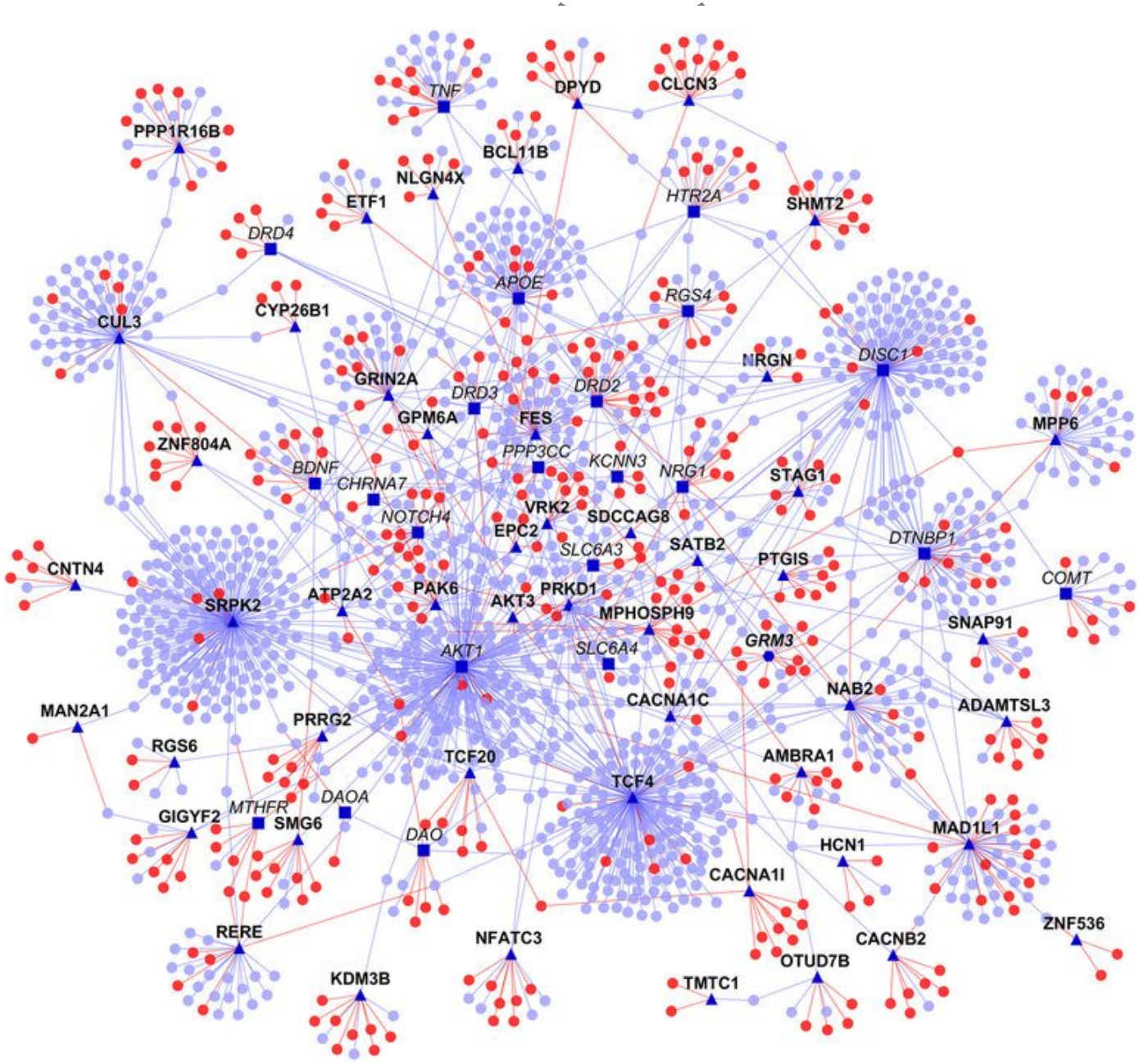
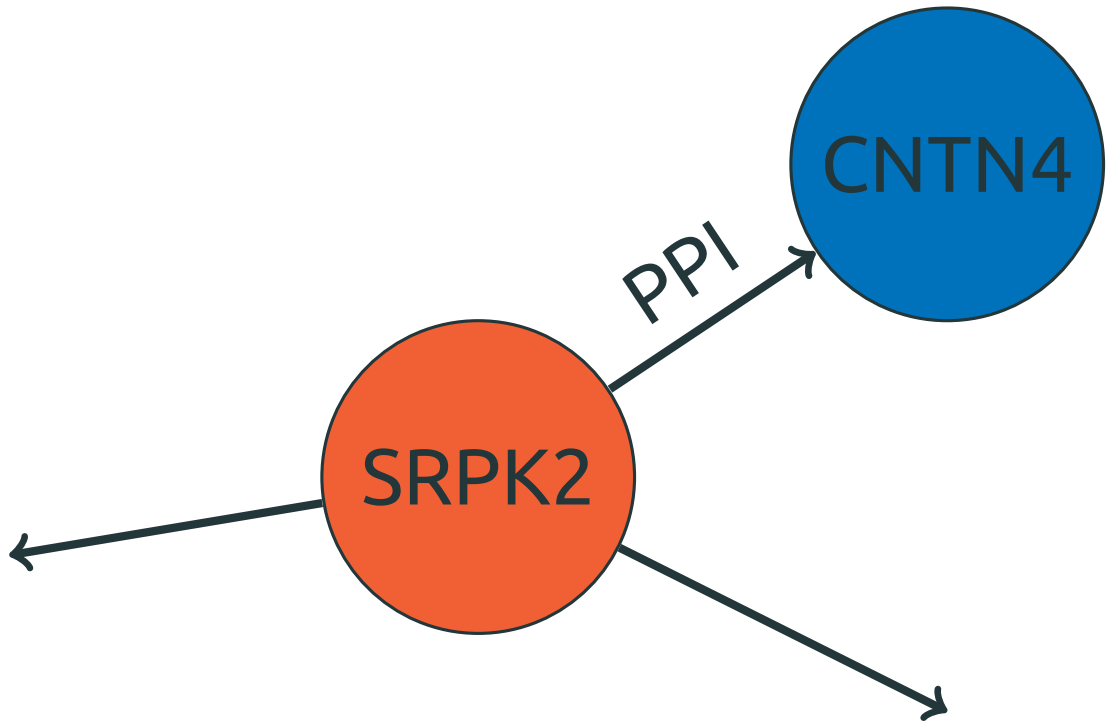


Schizophrenia Protein–Protein Interaction



Schizophrenia Protein–Protein Interaction (PPI)



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What is a Graph?

Graph Examples

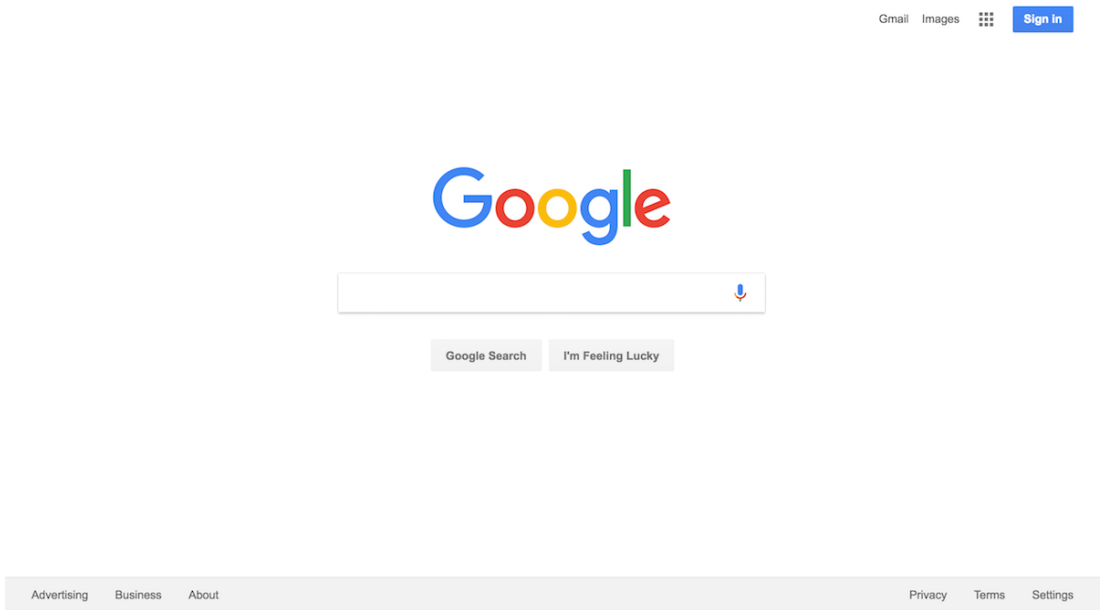
Graph Applications

Navigation

Navigation


A
Central Park W
B
Penn Plz, 4
Central Park
E 79th
E 66th St
E 59th St
E 57th St
1st Ave
FDR Dr
Grand Central Terminal
Pennsylvania
Station-New York
Broadway

PageRank


Gmail
Images
Sign in
Google
Google Search
I'm Feeling Lucky
Advertising
Business
About
Privacy
Terms
Settings

PageRank


graph
All
Images
News
Books
Videos
More
Settings
Tools
About 333,000,000 results (1.94 seconds)
graph[1]
/graf/
noun
1. a diagram showing the relation between variable quantities, typically of two variables, each measured along one of a pair of axes at right angles.
synonyms: chart, diagram; More
verb
1. plot or trace on a graph.
synonyms: plot, trace, draw up, delineate
"we graphed the new prices"
Translations, word origin, and more definitions
Feedback
Graph - Wikipedia
https://en.wikipedia.org/wiki/Graph
Graph (topology), a topological space resembling a graph in the sense of discrete mathematics. Graph of a function. Chart, a means of representing data (also called a graph).
Graph of a function - Wikipedia
https://en.wikipedia.org/wiki/Graph_of_a_function

PageRank


Graph TV
graphtv.kevinformatics.com/
Graph Ratings of Your Favorite TV Shows. Visualize IMDb ratings and trends of TV shows by episode.
Have you seen Mad Men, Breaking Bad, or Battlestar ...
Previous
1 2 3 4 5 6 7 8 9 10
Next

PageRank


graph
All
Images
News
Books
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noun
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Graph - Wikipedia
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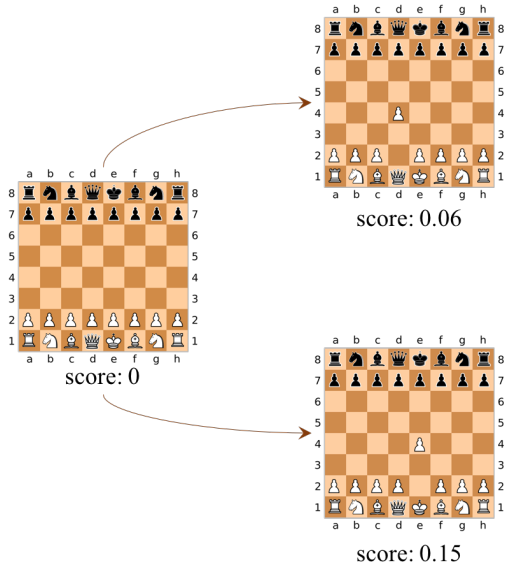
Graph of a function - Wikipedia
https://en.wikipedia.org/wiki/Graph_of_a_function

Game Strategies

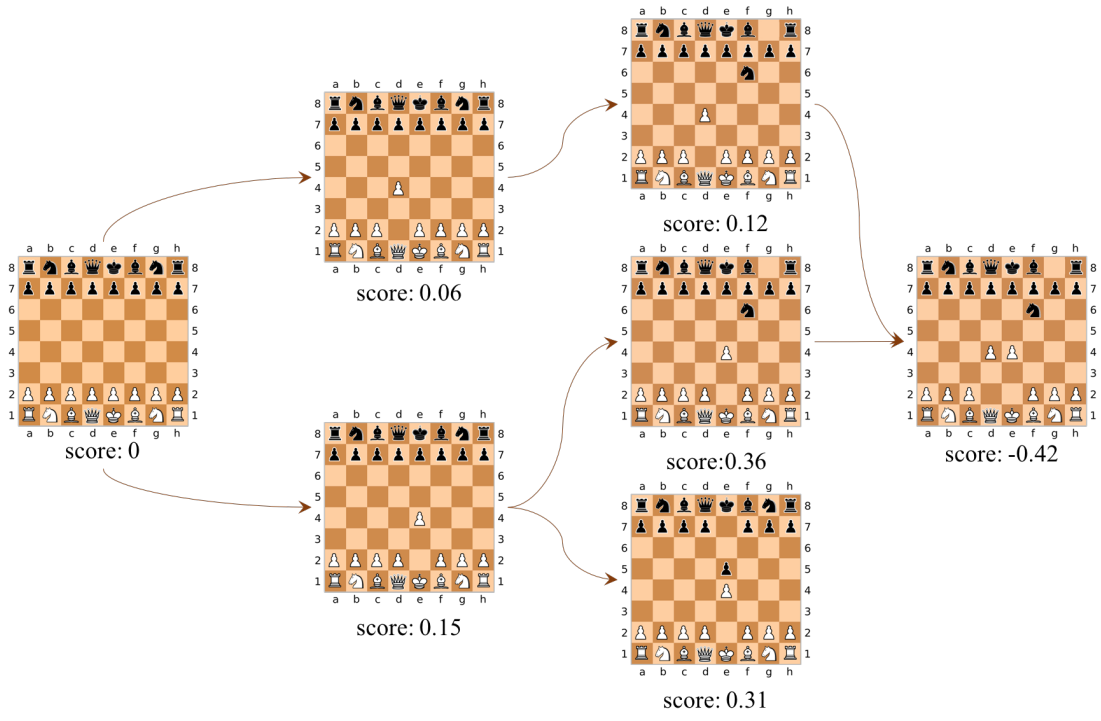
Game Strategies

score: 0

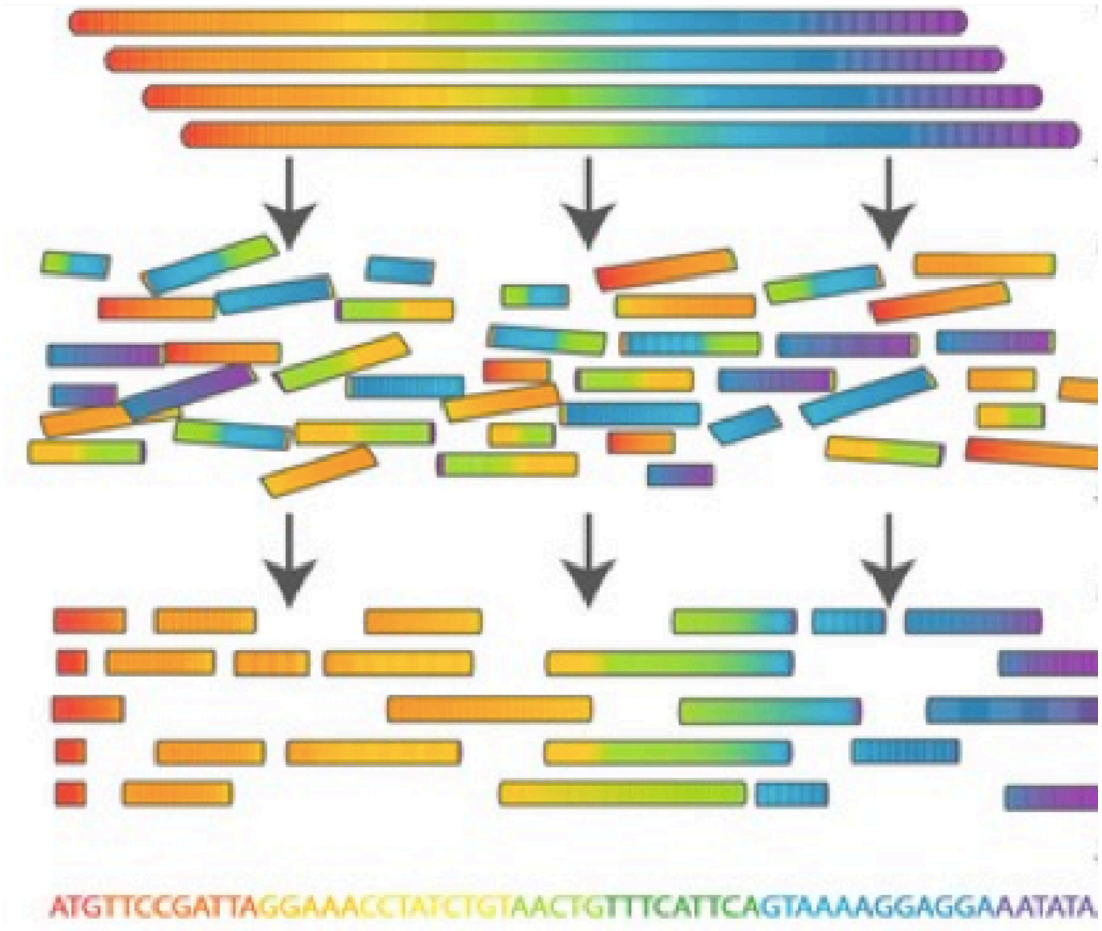
Game Strategies



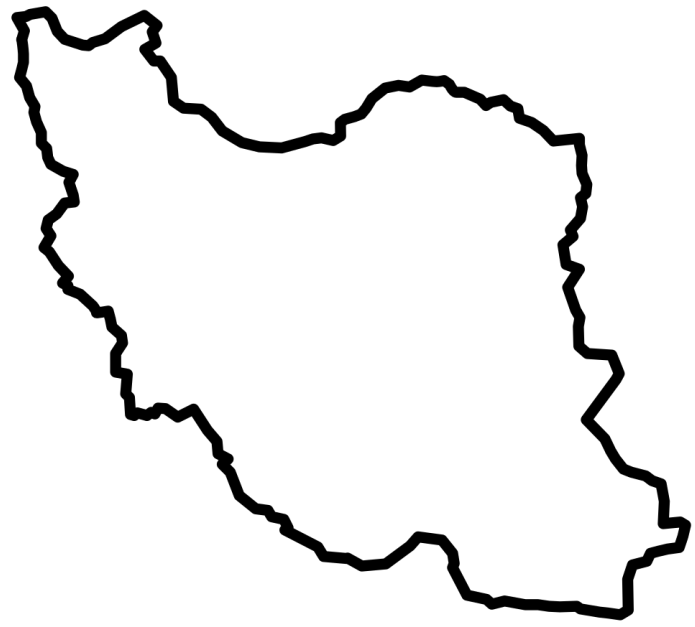
Game Strategies



Genome Assembly



GSM



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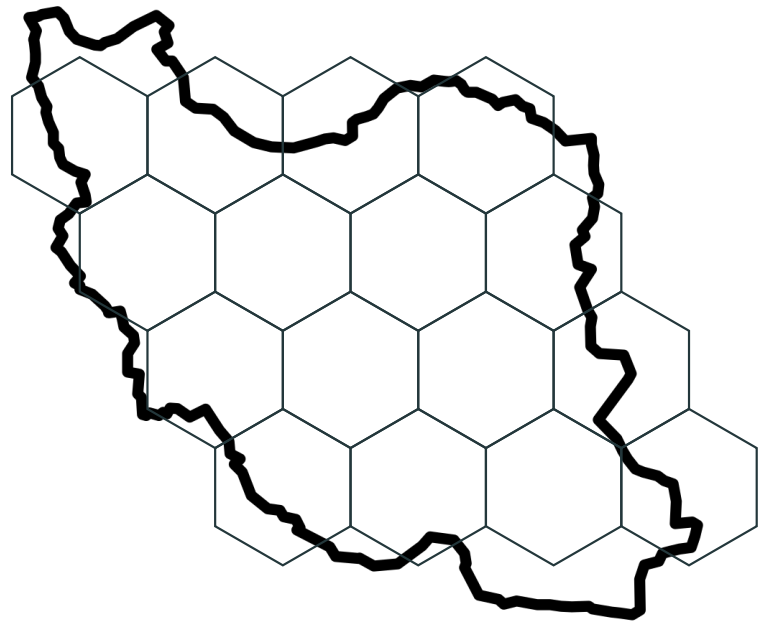
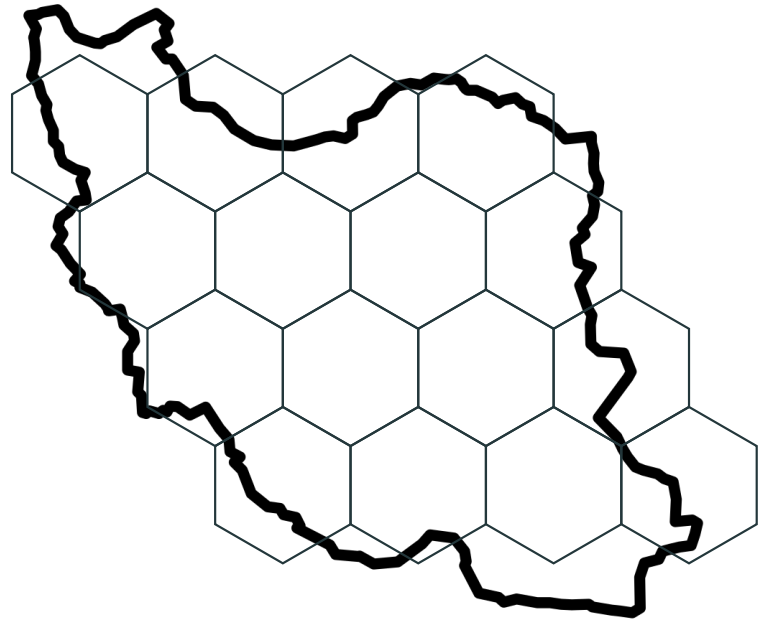


GSM

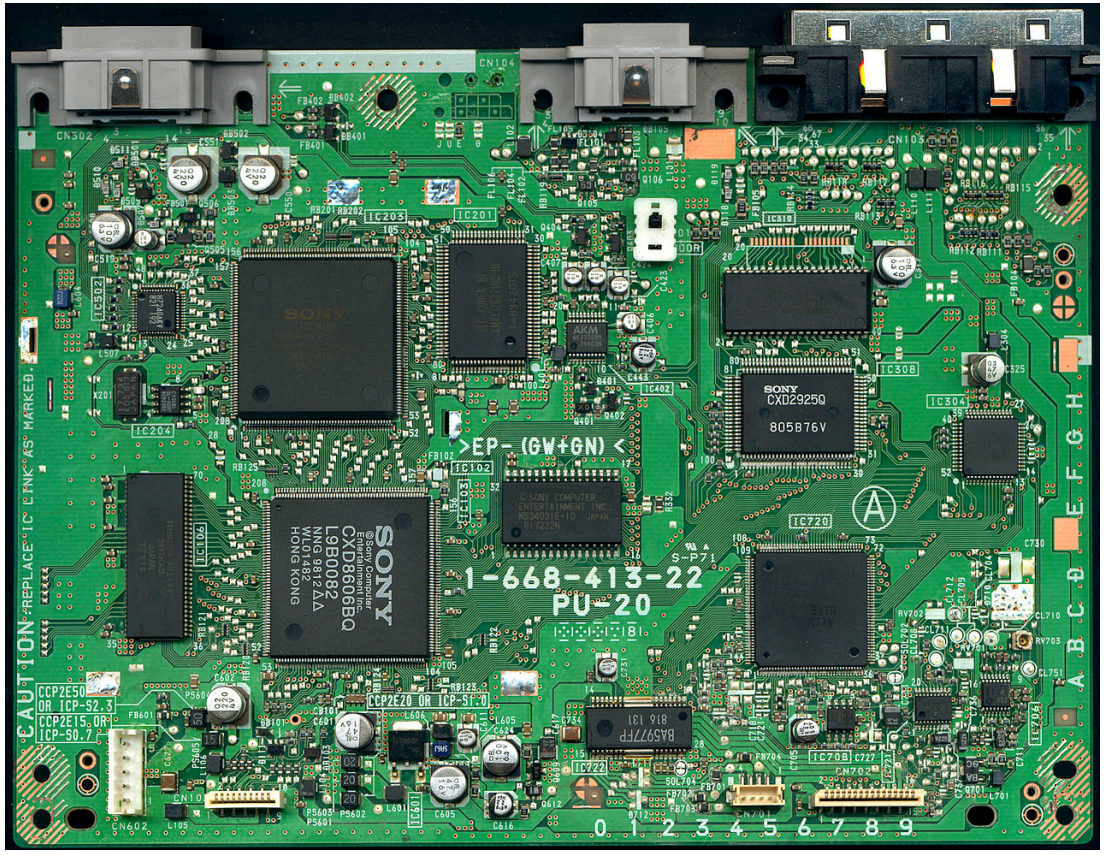
4 Frequency Ranges



GSM

4 Frequency Ranges

Computer Chips



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