The Enemy of an Enemy is a Friend
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Balance in Signed Networks
Unbalanced networks can be made balanced by removing the frustrated edges.
- positive edges with different endpoint colours
- negative edges with the same endpoint colours

Political Networks
Nodes: senators
Edges: supporting or opposing bills

Unbalanced networks can be made balanced by removing the frustrated edges.

Social Networks
Nodes: people
Edges: positive or negative ties

Ising Models (Physics)
Nodes: spins
Edges: aligned or unaligned couplings

Biological Networks
Nodes: biological molecules
Edges: activation or inhibition relations

Large-scale Social Networks
Nodes: Wikipedia authors
Edges: approval or disapproval for promotion to administrator

Financial Networks
Nodes: securities (investments)
Edges: positive or negative correlations (of returns)

International Relations Networks
Nodes: countries
Edges: international relations

Fullerenes (Chemistry)
Nodes: carbon atoms
Edges: atomic bonds

Nodes: New Guinean tribes
Edges: alliance or enmity

Nodes: White blood cell (macrophage)

Nodes: E.coli bacterium

Nodes: Baker’s yeast

Nodes: EGFR protein

Nodes: 3D spin glass

Nodes: Hypercube spin glass

Nodes: C240 fullerene

Nodes: C240 fullerene balanced subgraph

Nodes: Ultimate Buy & Hold portfolio

Nodes: 108th US senate

16 node 2nd cases

18 nodes 2nd cases

239 cases