



Graphs in Machine Learning

Submodularity: Applications

Product Placement and Influence Maximization

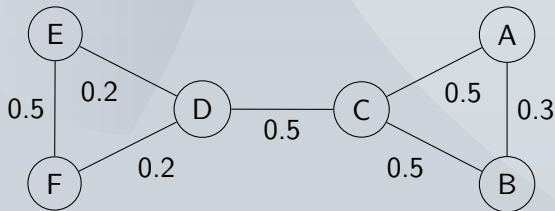
Michal Valko

Inria & ENS Paris-Saclay, MVA

Partially based on material by: Andreas Krause,
Branislav Kveton, Michael Kearns



Success story #1 Product placement - solution



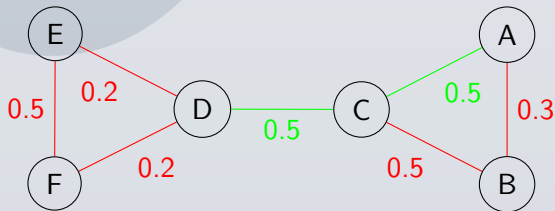
Key idea: Flip coins c in advance $\rightarrow$ “live” edges

MIA: http://hanj.cs.illinois.edu/pdf/dmkd12_cwang.pdf/

Tutorial: cf. Andreas Krause <http://submodularity.org/>

Course: Jeff Billmes at UW

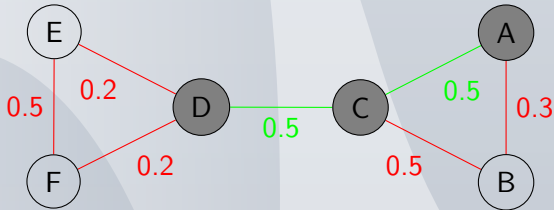
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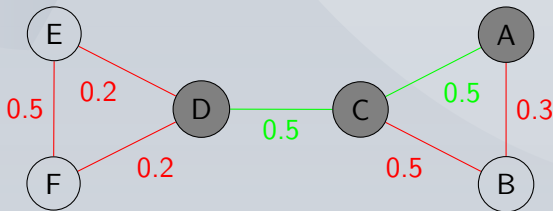
Success story #1 Product placement - solution



Key idea: Flip coins c in advance $\rightarrow$ “live” edges
 $F_c(V)$ = People influenced under outcome c (set cover!)

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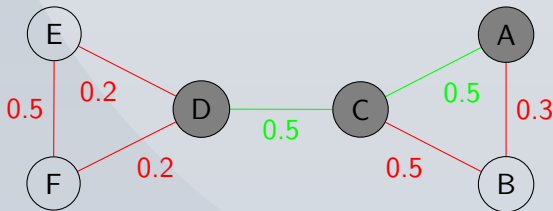
$F(V) = \sum_c P(c)F_c(V)$ is submodular as well!

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Computational issues?

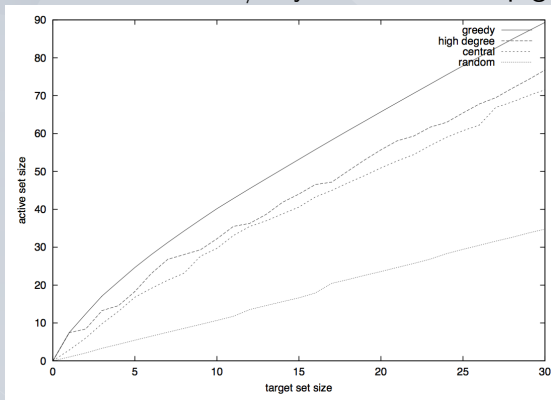
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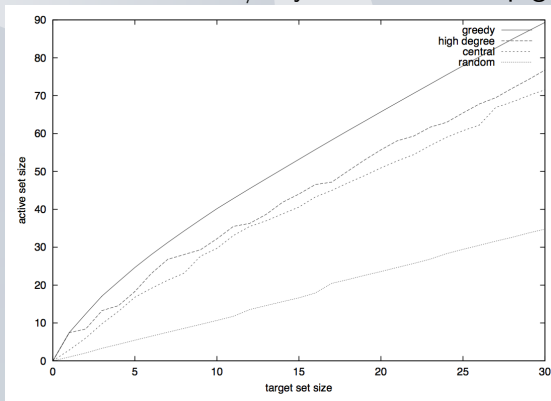
Success story #1 Product placement - comparison

influence on the ArXiv/Physics co-authorship graph



Success story #1 Product placement - comparison

influence on the ArXiv/Physics co-authorship graph



greedy approximation does better than the centrality measures



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`https://misovalko.github.io/mva-ml-graphs.html`