COMP4641
Midterm Review

Spring 2015

Coverage

- Introduction
- Social Media
  - Strength of Weak Ties
  - Small World

- Network basics
  - Components of a network
  - Different kinds of networks
  - Properties to characterize a network: (un)directed, connectivity, degrees and distribution, completeness, bipartite graphs, distance, diameter, clustering coefficient
- Graph structure of the Web

- Small World
  - The Milgram experiment
  - Erdos-Renyi Model and its properties, diff. from real world
  - Small World Model (the Watts-Strogatz Model) and its properties, diff. from ER and real world

- Community Structure
  - Strong Triadic Closure
  - Local bridges and weak ties
  - Neighborhood overlap
  - Structural holes
  - Finding network communities
  - Modularity

- Centrality
  - Different measures and their meanings
  - Degrees, betweenness, closeness, etc.
- Power Law
  - Degree distribution and how it looks like
  - Scale-free networks
  - Preferential Attachment Model

- Cascading
  - Decision-based model: payoffs and signals, threshold, monotonic spreading, cascade capacity, cluster of density p, how to run the model
  - Probabilistic model: contagion, SIR, SIS, independent cascade model
- Influence
  - Finding most influential set of k nodes
  - Hill-Climbing algorithm

Example

- From last year's midterm.

T/F Questions

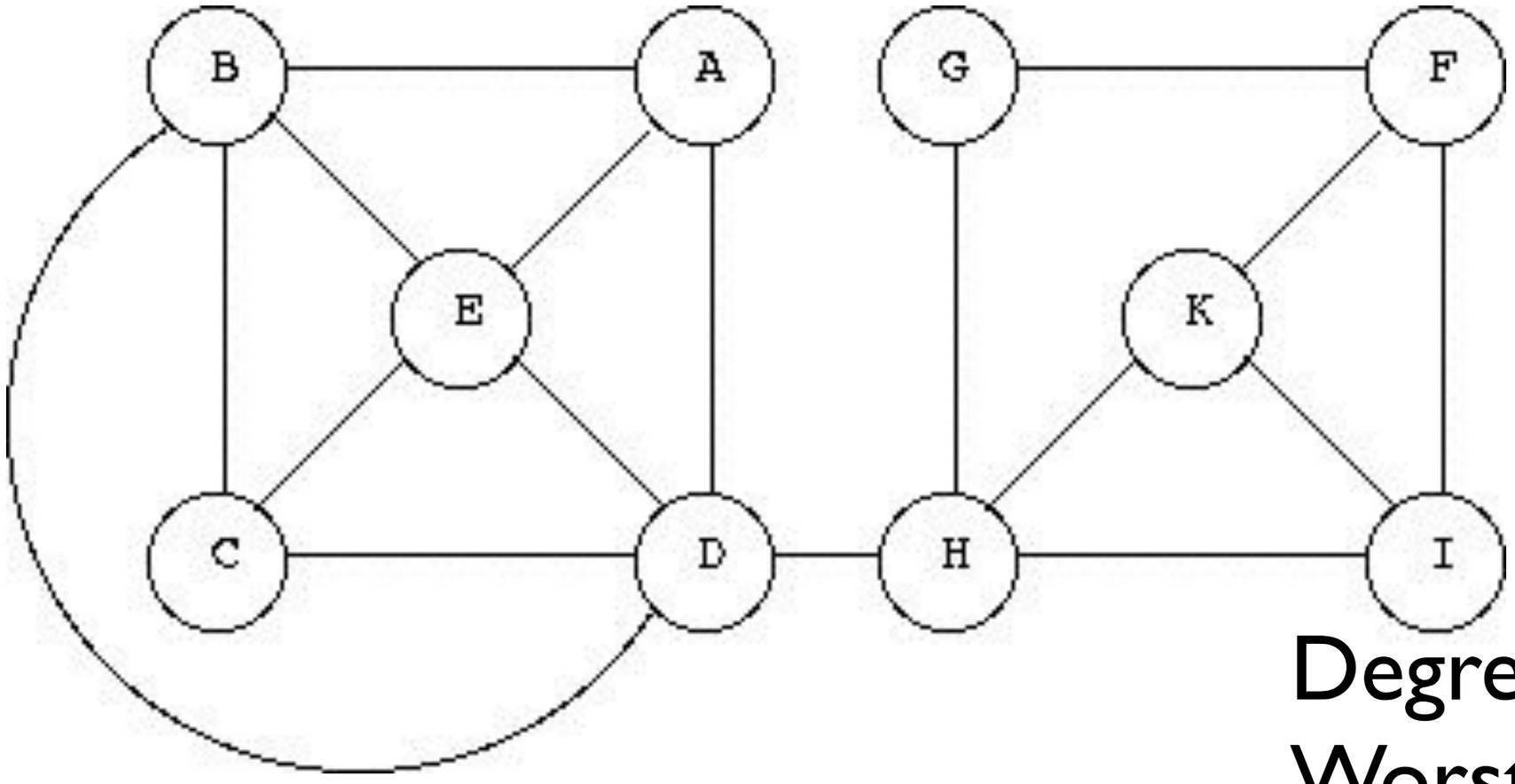
- The maximum number of edges possible in an undirected network of N vertices is N^2
- There exists graph G where cascade capacity > 1/2
- In influential maximization, finding the most influential set is at least as hard as a vertex cover

Concepts

- List and briefly describe 3 approaches in measuring the centrality of the graph
- Briefly describe the definition of the cascade capacity of a graph G

- Brief explanation is enough. If you understand the definition, you should have no problems.

Graph basics



Degrees?
Worst-case Diameter?
Clustering Coefficient?

What if strong/weak ties involved?

Models

- What is Erdos-Renyi (Small world, Pref attach, etc.) ?
- How are they different from each other?
- How to generate graphs using these models?
- What are their properties? (deg distribution, clustering coefficient, diameter etc.)
- How does cascading models work?