Performance Evaluation of Networks, part II
Giovanni Neglia
1. Common properties to many existing networks
   • Social nets, transportation nets, electrical power grids,
     Internet AS net, P2P nets, gene regulatory net,
2. Important dynamic processes on these networks show the same properties
Our course: an introduction to Network Science

1. Common properties to many existing networks
   - Which ones? Hubs, small world, cluster, heavy tails
   - Why do they arise?

2. Important dynamic processes
   - Contagion
   - Consensus
   - Games
Material

- Slides
- A book covering complex networks and game theory:
- References Contagion
  - Mean Field
    - Mean Field Methods for Computer and Communication Systems: A Tutorial, Jean-Yves Le Boudec
    - A class of mean field interaction models for computer and communication systems, Benaïm, Le Boudec, Jrnl Performance Evaluation, Vol. 65 Issue 11-12, Nov., ‘08
References Contagion

- A survey with pointers to continuous time Markov processes and links to stochastic approximation and propagation of chaos
  - Ch. 2 of Nicolas Gast’s PhD thesis “Optimization and Control of Large Systems, Fighting the Curse of Dimensionality”
- Dynamical Processes on Complex Networks, Barrat, Barthélemy, Vespignani, Cambridge Press
  - Random graphs models, ch.3
  - Methodological approaches, ch. 4
  - Epidemiological models, ch. 9
Material

- References Contagion
  - Routing in DTNs
    - Markovian models
      - Message Delay in Mobile Ad Hoc Networks, R. Groenevelt, G. Koole, and P. Nain, Performance, Juan-les-Pins, October 2005
    - Fluid models
Material

References Games

- Game Theory and Strategy, Straffin, Mathematical Association,
  - Two-person zero-sum games
    - Matrix games
      - Pure strategy equilibria (dominance and saddle points), ch 2
      - Mixed strategy equilibria, ch 3
    - Game trees, ch 7
    - About utility, ch 9
Material

 REFERENCES GAMES

 Game Theory and Strategy, Straffin, Mathematical Association,
  - Two-person non-zero-sum games
    - Nash equilibria and its limits (equivalence, interchangeability, Prisoner’s dilemma), ch. 11 and 12
  - Strategic games, ch. 14
  - Evolutionary games, ch. 15
Evaluation

- 80% final exam
- 20% assignments (every two weeks)
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