Social Networks and Markets

Introduction

Class Info

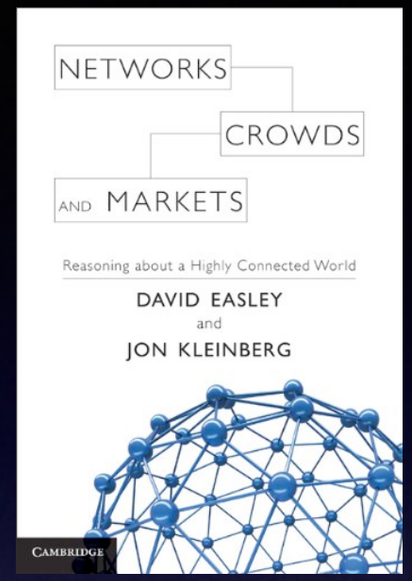
- Instructor: Dr. Vincenzo Bonifaci
- Email: bonifaci@diag.uniroma1.it
- www: www.diag.uniroma1.it/~bonifaci/semcn.html
- Office hours: Fridays 10.30 – 11.00
  - Email appointment required
- Office:
  - DIAG – via Ariosto 25 – Room A217
  - IASI-CNR – via dei Taurini 19 – Room 503

Class Schedule

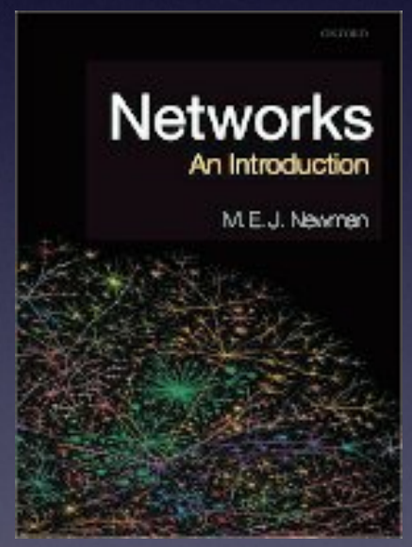
- We can **save** 1 time slot from the following:
- Tuesdays 9.00 - 10.00 & 10.00 - 11.00 (A3)
- Wednesdays 14.00 - 15.00 & 15.00 - 16.00 (A4)
- Fridays 8.00 - 9.00 & 9.00 - 10.00 (A4)

Textbook(s)

- D. Easley, J. Kleinberg:
  Networks, Crowds and Markets
  Cambridge University Press, 2010
  Available online



- M. Newman:
  Networks: An Introduction
  Oxford University Press, 2010



- Lecture notes by the instructor

  - www.diag.uniroma1.it/~bonifaci/semcn.html
    user: **semcn**, password: **equilibrium**

Exam Rules

- Some homework may be released during classes
- Final project:
  - Programming project (1 or 2 persons), *or*
  - Literature review (1 person)
- Exam:
  - If attended >75% of lectures: project discussion
  - If attended <75% of lectures: oral exam + project

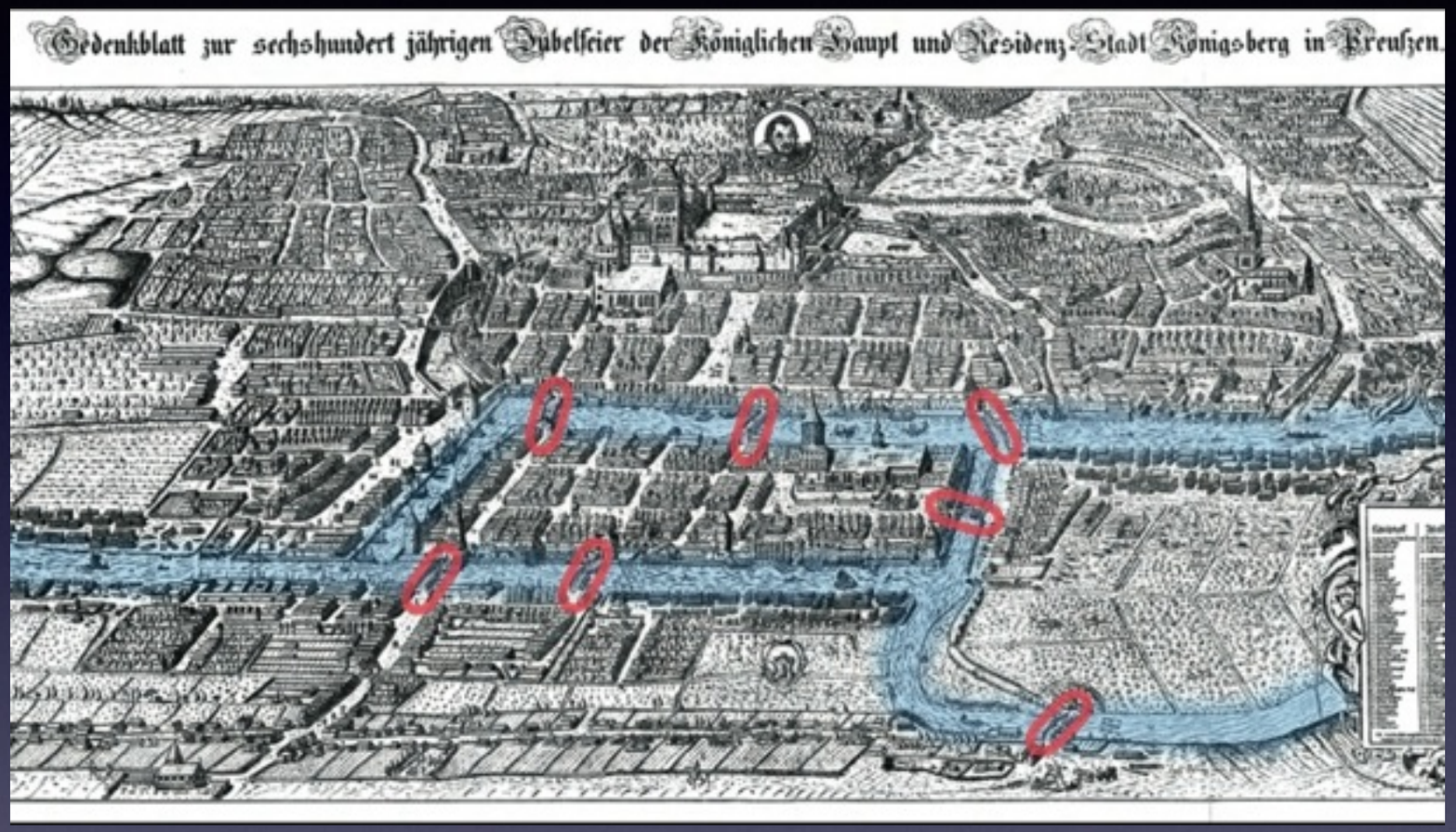
Some Keywords

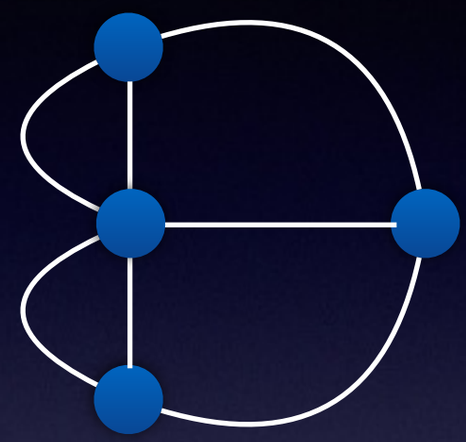
- **Network Statics**
  - Structure
  - Measures
  - Centrality
  - Homophily
  - Communities
- **Network Dynamics**
  - Processes
  - Evolution
  - Influence
  - Cascades
  - Epidemics
- **Interactions**
  - Strategy
  - Incentives
  - Payoffs
  - Mechanisms
  - Decisions

Examples of Networks

- **Social networks**
  - Friendship
  - Online social networks
- **Technological networks**
  - Communication networks
  - Transportation
  - Power grid
- **Information networks**
  - Affiliation networks
  - Citation networks
  - World Wide Web
- **Biological networks**
  - Biochemical
  - Neural
  - Ecological

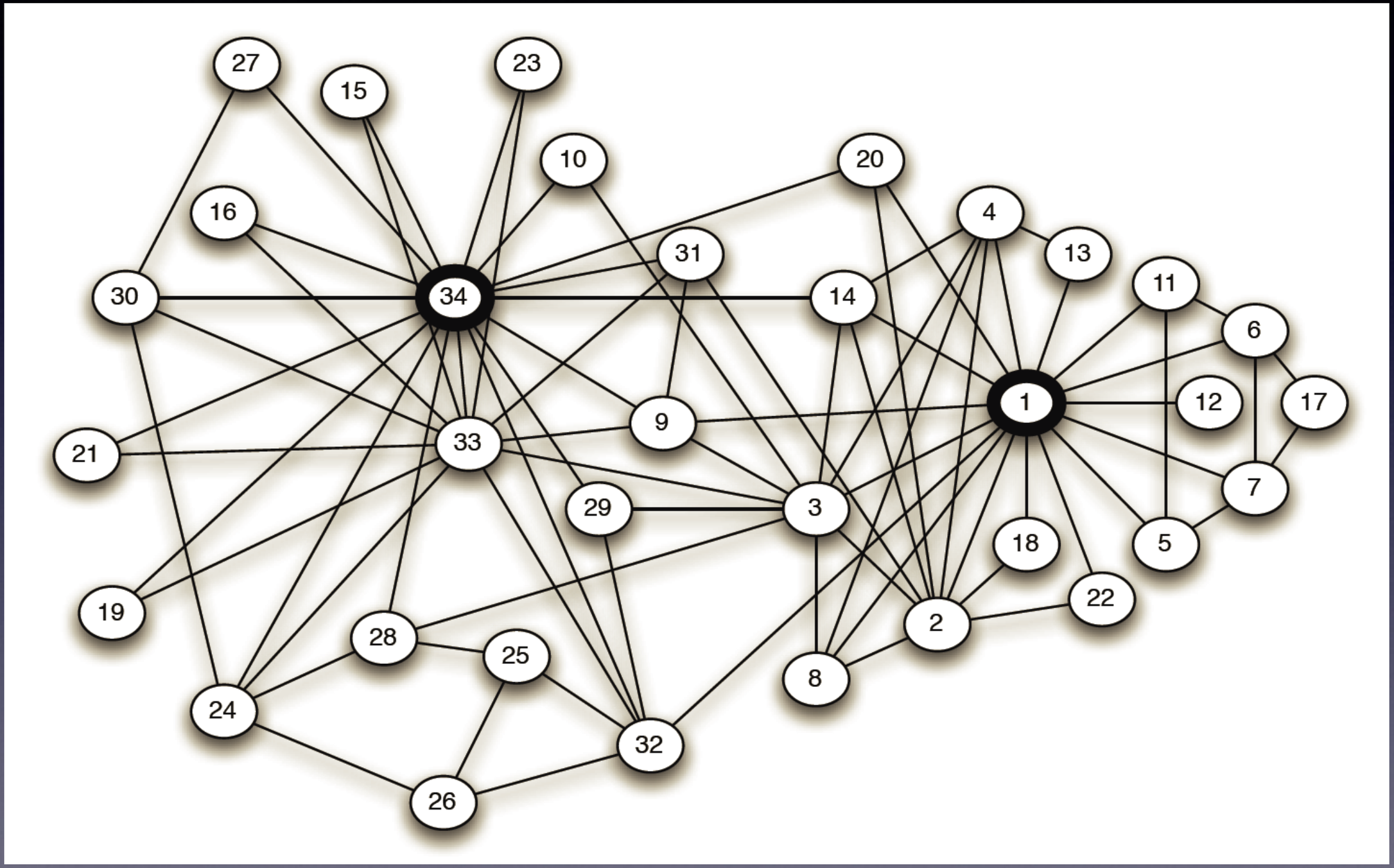
The birth of Graph Theory: the seven bridges of Königsberg



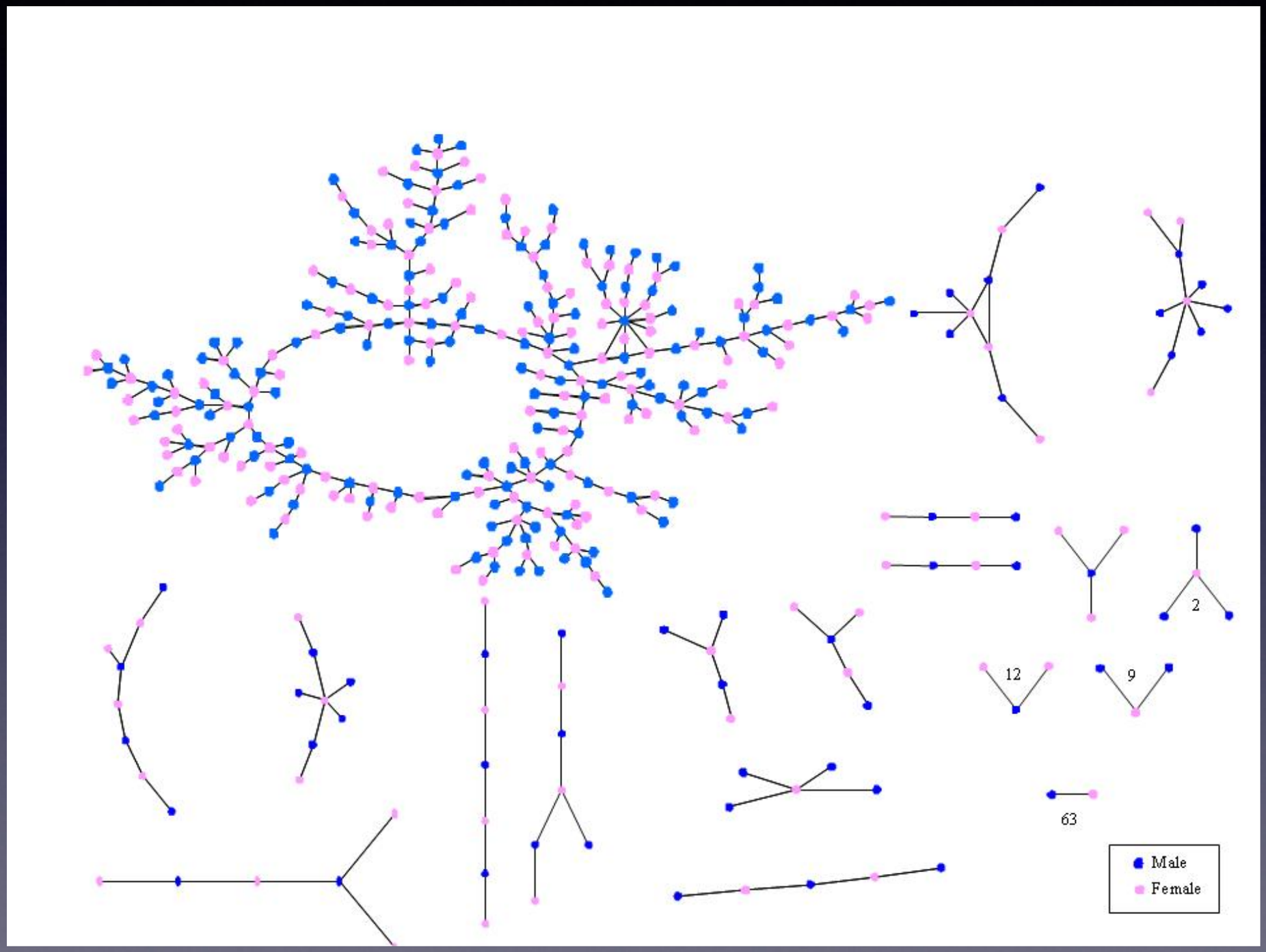


- Leonhard Euler (1707–1783), Swiss mathematician

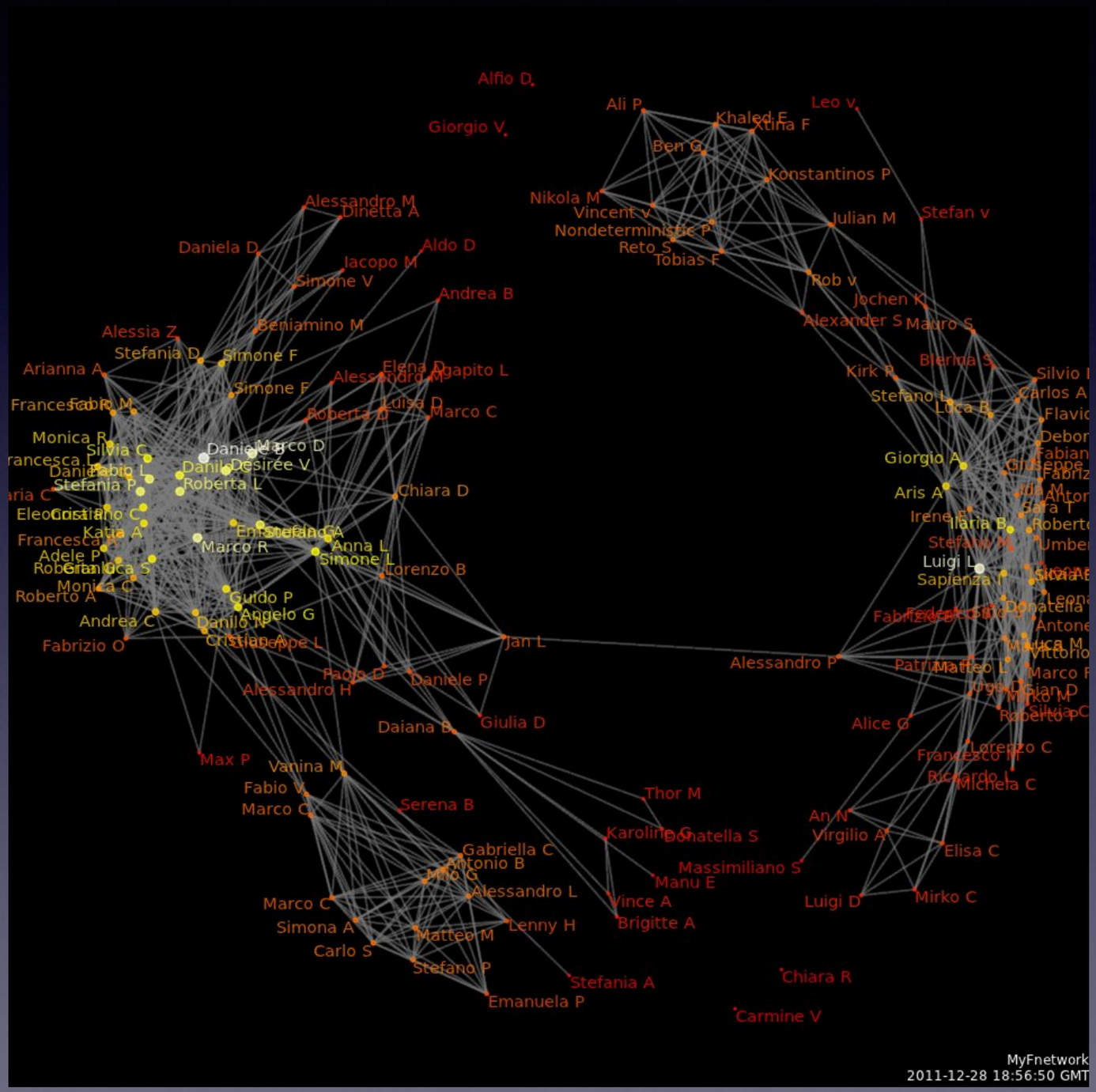
Friendship network: karate club



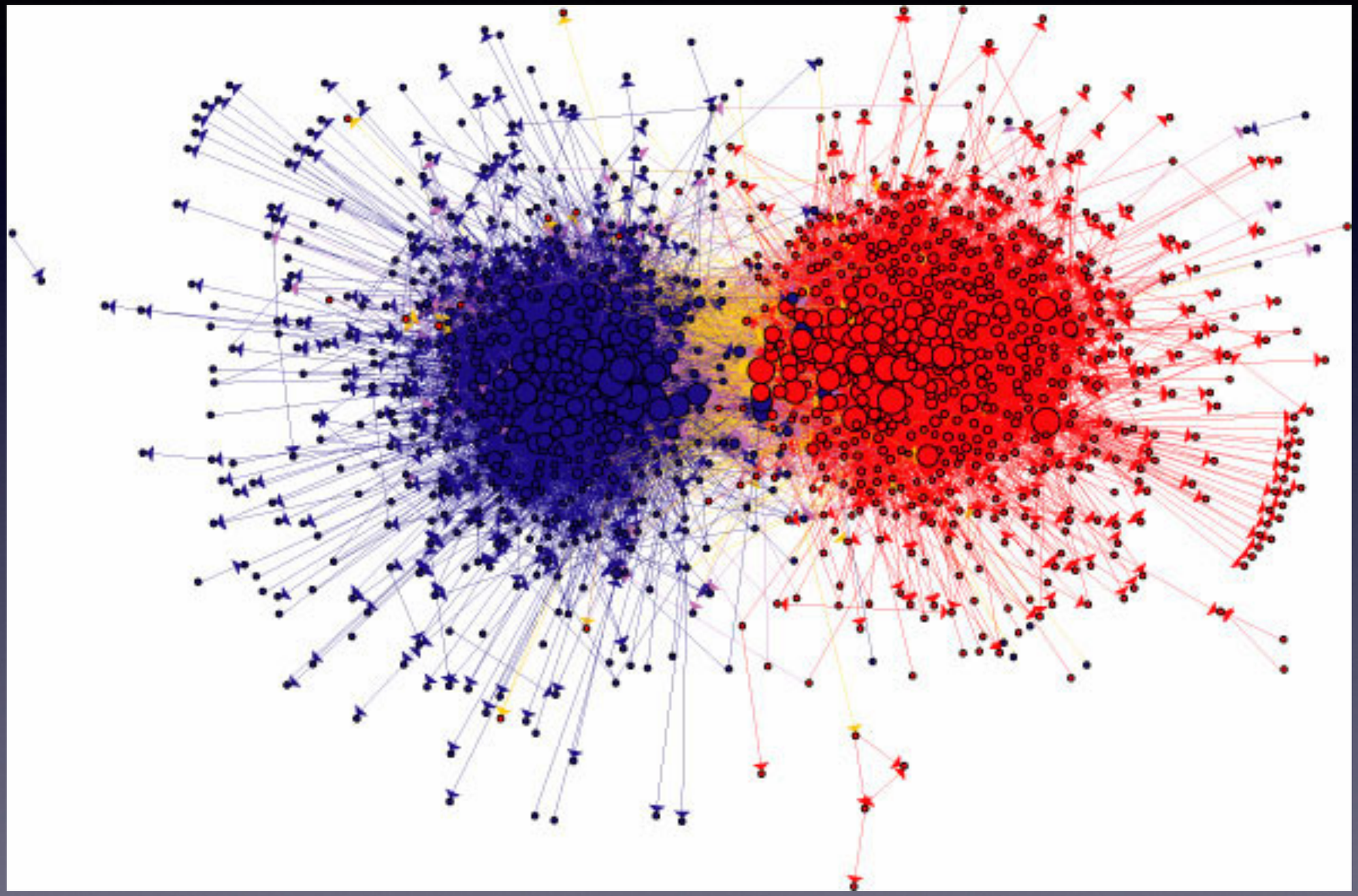
Social network:
romantic relationships at Jefferson High School



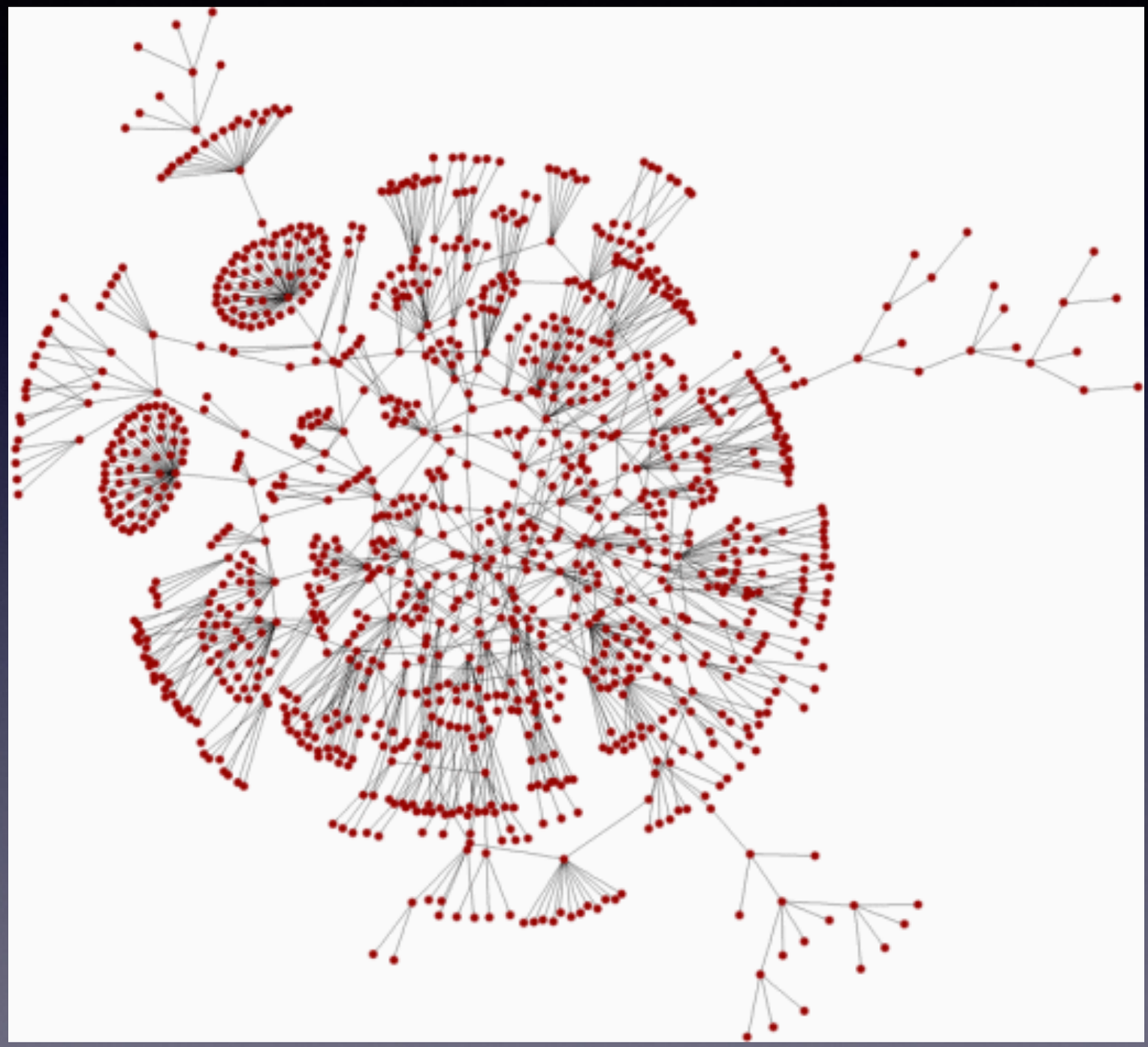
Online social network:
a user's Facebook network



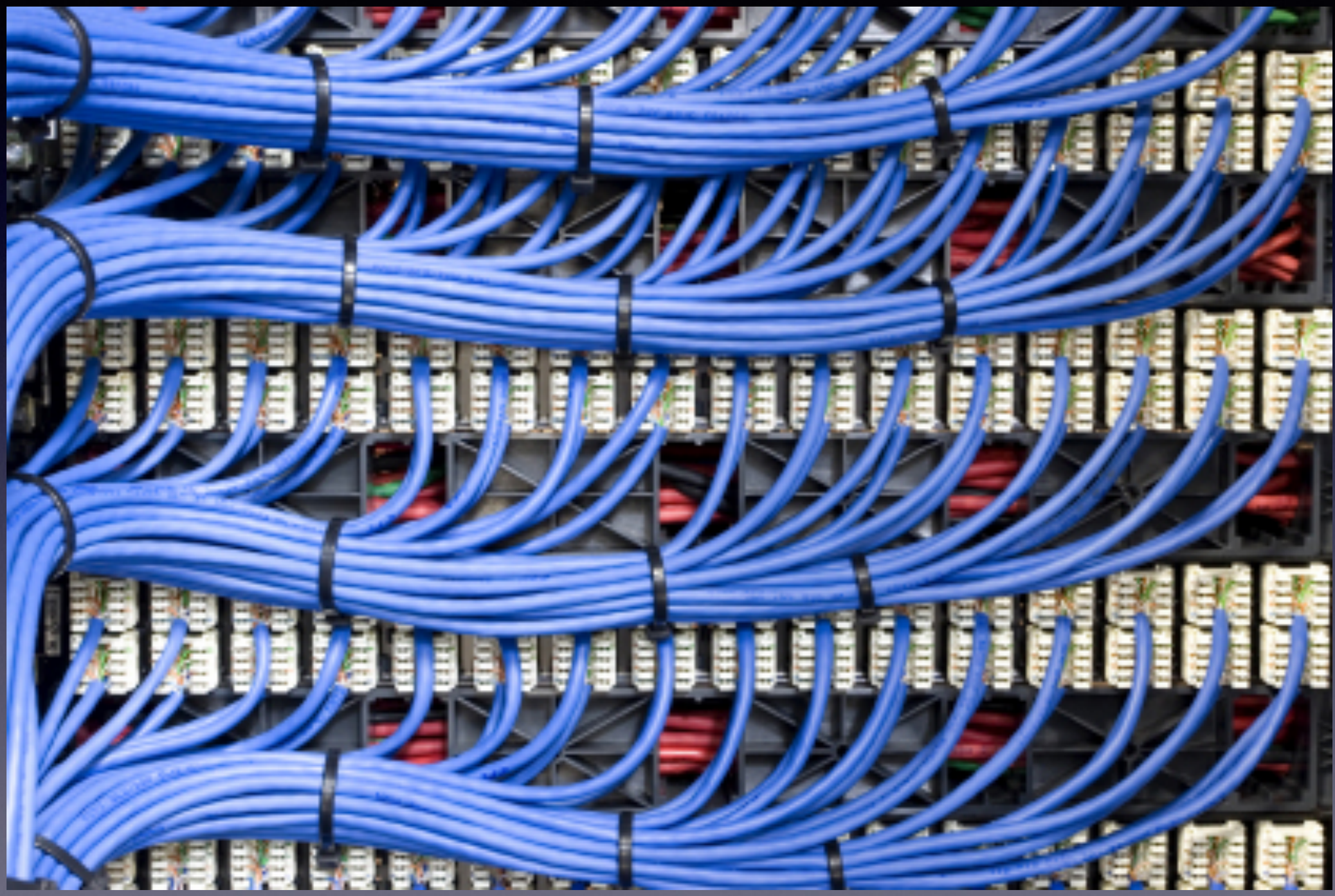
World Wide Web:
political blogs in the US, 2004



Technological network:
a peer-to-peer network



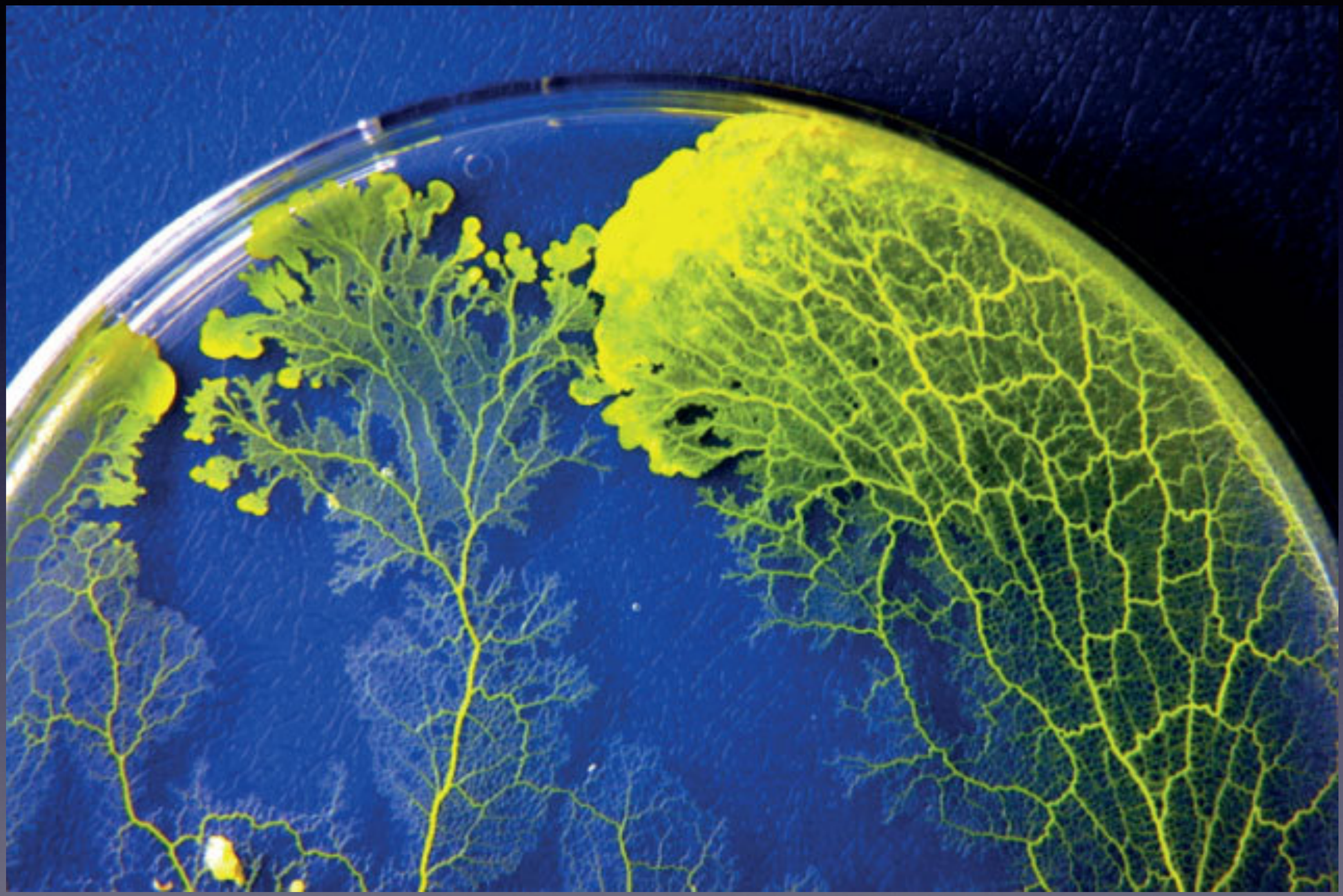
Technological network:
Internet access network



Technological network: subway transportation network

Physical networks:
bridge structural network

Biological networks:
Physarum polycephalum tubular network



Puzzle

- At a dance event, there are some boys and girls
- *Every* girl dances *with at least one* boy
- *No* boy dances *with all* girls

- Prove that there must be boys b, b’ and girls g, g’ such that: (b,g) dance, (b’,g’) dance, but (b,g’), (b’,g) don’t!