NETWORK SCIENCE OF ONLINE INTERACTIONS

Python Refresh
+ Chapter 0 exercises

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BOOK EXERCISES – CHAPTER 0

- Today: all exercises
- Next chapters: mainly exercises with solutions (email me for others)

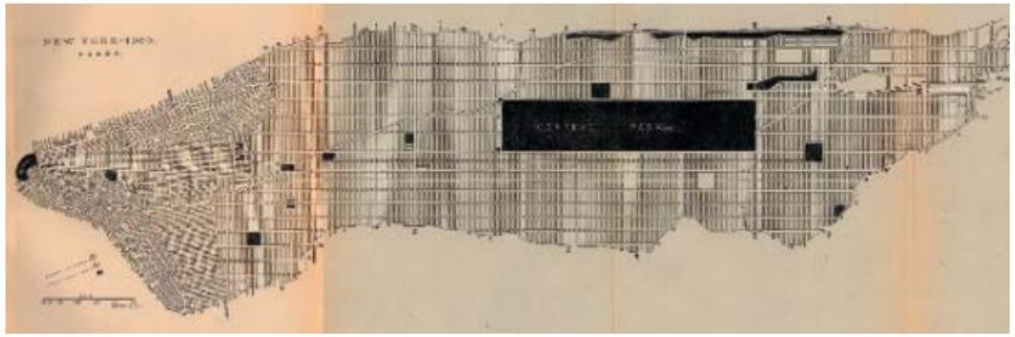
BOOK EXERCISES – CHAPTER 0

0.1 Consider the road map in Figure 0.9. If one were creating a network representation of traffic patterns, which of the following would be the best choice to make up the links of the network? (*Hint*: Your answer to the next question may inform your answer to this question, and vice versa.)

- **a.** Pedestrians traveling along the streets
- **b.** Road segments (e.g. 5th Ave. between 12th and 13th streets)
- **c.** Entire roads (e.g. 5th Ave.)
- **d.** Vehicles traveling on the roads

0.2 Consider the road map in Figure 0.9. In a network representation of traffic patterns, which of the following would be the best choice to make up the nodes of the network? (*Hint*: Your answer to the previous question may inform your answer to this question, and vice versa.)

- **a.** City blocks (e.g. the block between 5th–6th avenues and 12th–13th streets)
- **b.** Street intersections (e.g. 5th Ave. and 12th St.)
- **c.** Pedestrians moving along the streets
- **d.** Vehicles traveling on the roads

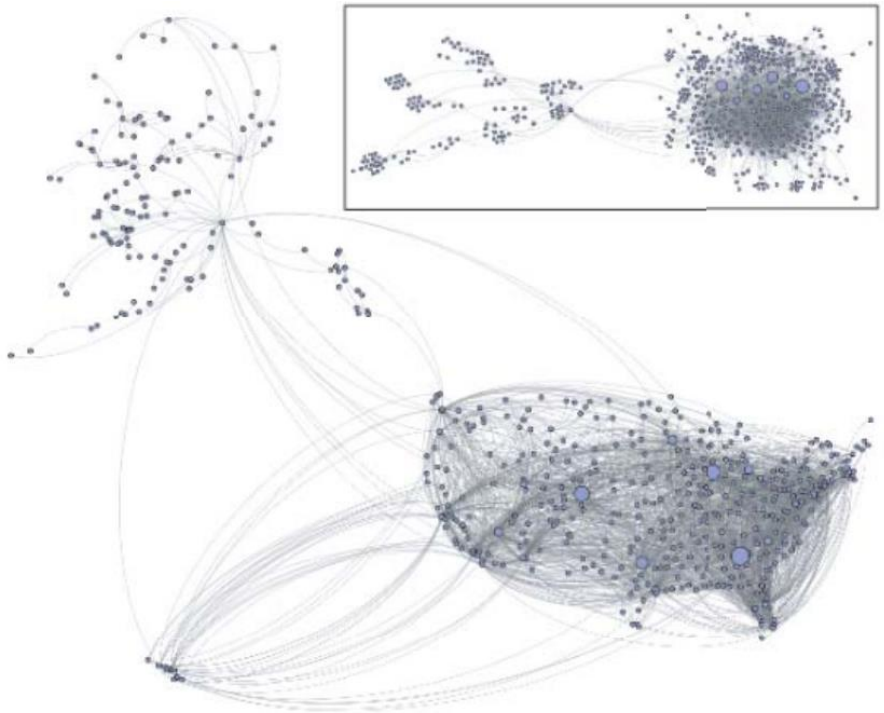


Map of New York in 1880. From Report on the Social Statistics of Cities, Compiled by George E. Waring, Jr., U.S. Census Office, 1886. Image courtesy of University of Texas Libraries.

BOOK EXERCISES – CHAPTER 0

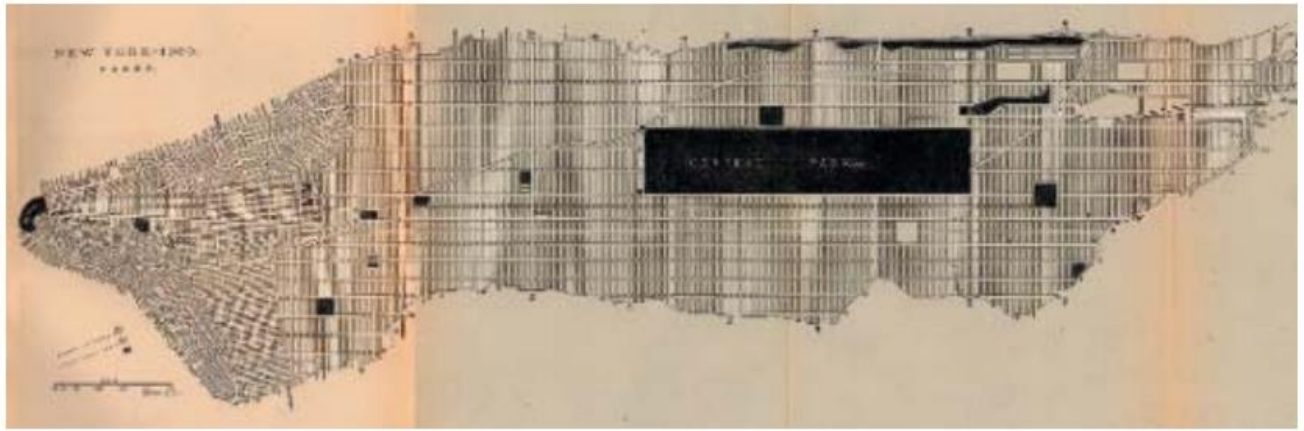
0.3 Consider the US air transportation network shown in Figure 0.7. Nodes in this network represent airports. What could a link between two airports represent?

- A flight/flight routes



0.4 Compare the US air transportation network in Figure 0.7 with the Manhattan road map in Figure 0.9. The air transportation network displays a distinguishing feature that the Manhattan road network lacks. What is this key characteristic?

a. Singleton nodes with no links
b. Multiple routes between nodes
c. Nodes with more than one connected link
d. Hub nodes with many links



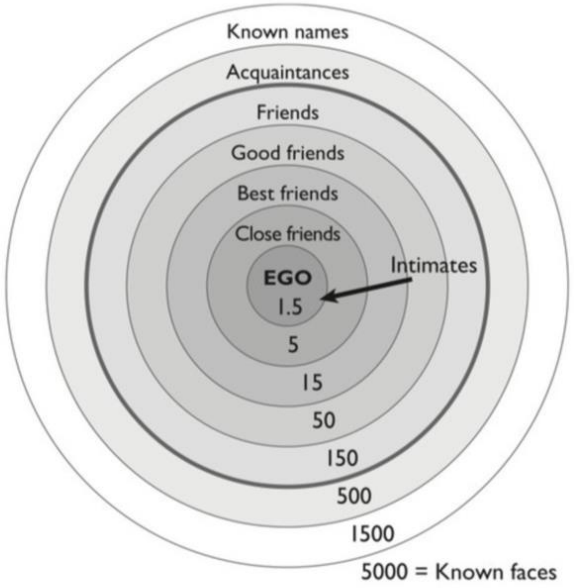
BOOK EXERCISES – CHAPTER 0

0.5 In a social graph from Facebook, which type of link best represents the "friend" relation? Directed or undirected?

- Undirected
- But: are Facebook friends really friends?
  - A better friendship network may be directed/weighted based on other data

0.6 In a social graph from Twitter, which type of link best represents the "follower" relation? Directed or undirected?

- Directed



The circles of friendship (Courtesy of Little, Brown)

BOOK EXERCISES – CHAPTER 0

- Questions?

PYTHON REFRESH

- Online Jupyter environments
  - Google Colab (colab.google.com)
  - Binder (mybinder.org)
  - Kaggle Kernels (www.kaggle.com/kernels)
  - Azure Notebooks (notebooks.azure.com)
  - Datalore (datalore.io)
  - Gryd (gryd.us)
- Installing it
  - Recommended because Github Copilot
  - Installing Python: www.anaconda.com/distribution
  - Installing an IDE: VS Code, Pycharm, etc
  - Using anaconda prompt/terminal to install packages
- Resources
  - Thousands of online courses. Favorite: www.datacamp.com
  - Googling StackOverflow answers
  - Asking chatGPT
  - Github Education Pack:
    - 2 months of Datacamp
    - Github Copilot
    - Other goodies

PYTHON REFRESH

- Python with an IDE
  - A bit overwhelming at first, lots of tools
  - Very customizable (extensions)
  - Comes with a linter (line interpreter)
- Being careful with Python
  - running != working
  - Python loves changing data type: check with environment

```
>>> a = 1; b = 1; c = 1.0
>>> a == b
True
>>> a == c
True
>>> a is b
True
>>> a is c
False
```

older Python

```
>>> a = 1
>>> b = 1
>>> a is b
True
>>> b = 1e8
>>> a = 1e8
>>> a is b
False
```

PYTHON + AI

- Github Copilot
  - Integrates into VS Code
  - Reads your codebase, requires less explanation
  - Offers alternative snippets
  - Free for students

- chatGPT
  - Browser-based
  - Requires explaining what you want
  - **Great** for teaching you code
  - Bad free tier, paid tier $20 with GPT-4

- These tools are great, but they make a lot of mistakes.
  Always verify.