Decentralized Search

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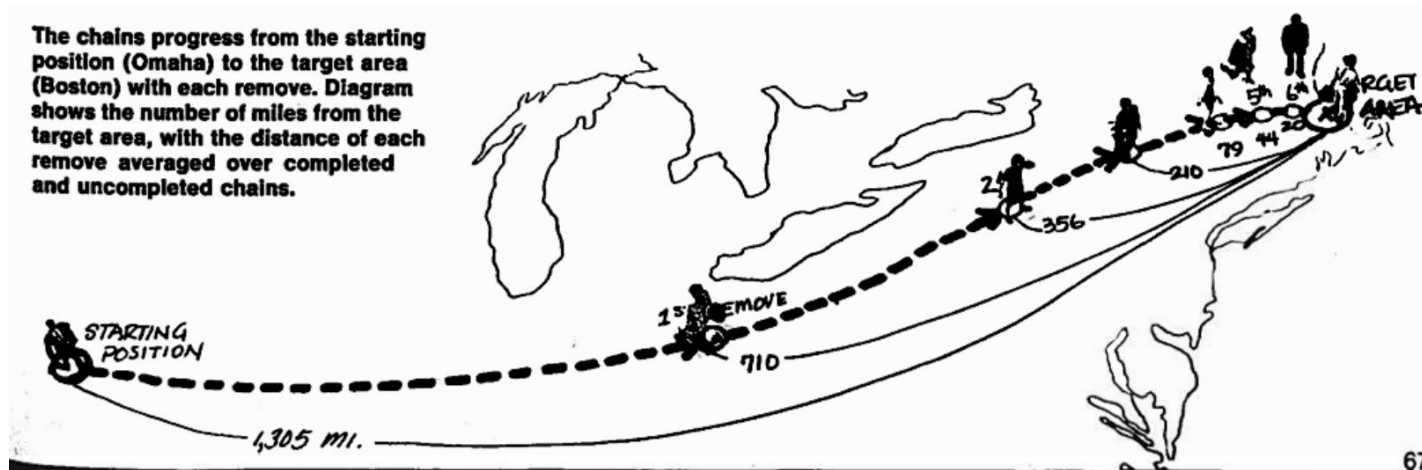
Pre-Requisites

- Strong - weak ties
- Small world
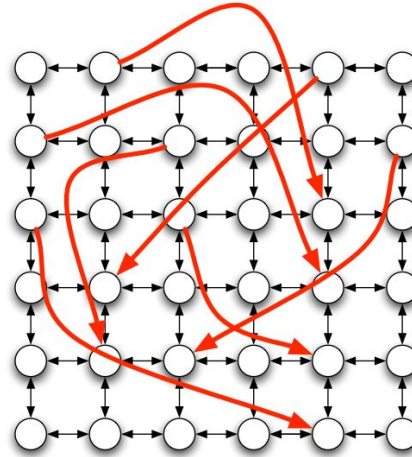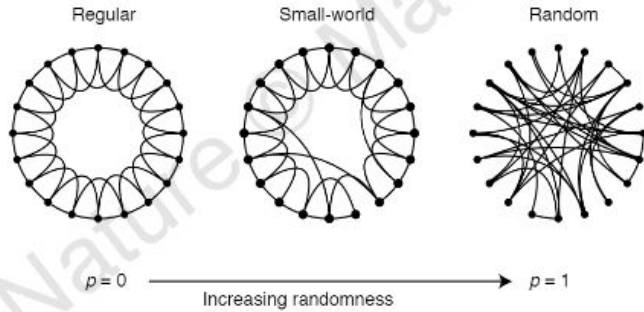- Milgram experiment
- Watt & Strogatz Model

Agenda

- Decentralized Search
  - An example from Milgram's small world experiment
- Modeling the process of decentralized Search
  - Example of movie stars and movies as a small world model
  - Generalizing the network model
  - A rough calculation motivating the inverse square network

Decentralized Search

The chains progress from the starting position (Omaha) to the target area (Boston) with each remove. Diagram shows the number of miles from the target area, with the distance of each remove averaged over completed and uncompleted chains.

STARTING POSITION

1,305 mi.

1st REMOVE

710

356

210
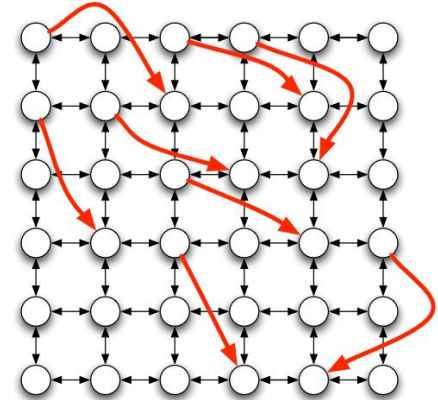
79 44

5th 6th TARGET AREA

67

Demo: Movie stars separation

Generalizing the Network Model

(a) A small clustering exponent

(b) A large clustering exponent

In generating a random edge out of v, we have this edge link to w with probability proportional to $d(v, w)^{-q}$

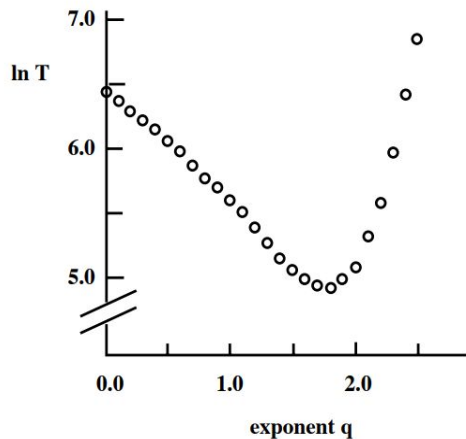# A rough calculation motivating the Inverse Square Network

Figure 20.6: Simulation of <mark>decentralized search</mark> in the grid-based model with clustering exponent q. Each point is the average of 1000 runs on (a slight variant of) a grid with 400 million nodes. The delivery time is best in the vicinity of exponent $q = 2$, as expected; but even with this number of nodes, the delivery time is comparable over the range between 1.5 and 2 [248].

Thank You!