

Applications of PageRank

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World Wide Web

- ▶ World Wide Web is still fundamentally a system of documents linked together (built on the Internet).
- ▶ A question that arose on the early web was how to find information.
- ▶ If there are enough webpages, it becomes laborious to manually keep track of what information exists.
- ▶ Enter: search engines!

PageRank

- ▶ The PageRank algorithm was invented by Larry Page and Sergey Brin (it's named after Larry).
- ▶ It uses the idea that the value of a web page is derived from pages that link to it.
 - ▶ If I want to write about eigenvectors, maybe I'll link to an authoritative source on eigenvectors.
 - ▶ Maybe I'll link to a piece of junk about eigenvectors, but probably on balance across the web people are more likely to link to good sources.
- ▶ This is our voting system where everyone gets a vote.

Reality of web search

- ▶ There are obvious flaws in using PageRank for web search.
- ▶ For example, if I can get a lot of pages to link to me, my search ranking will go up.
- ▶ For example, if I generate a lot of webpages, or pay some people to link to me.
- ▶ So what search engines really do is more complicated, but based on the ideas we have been studying.

Other applications

- ▶ Who to follow on social media.
- ▶ Various information analysis purposes, such as quality of researchers, performance of sports people, movement of traffic or people through a network, text analysis, semantic meaning, etc.
- ▶ You could use it for voting for people, but with care!

For example: social media

- ▶ In a network where users follow each other, we can create a directed graph like our voting examples.
- ▶ We could create a huge graph of all followers; but may develop information about users' interests.
- ▶ Then if a new user indicates an interest, we might extract just those users who share that interest and examine their follower relationships, producing a ranking for this interest using PageRank.
- ▶ As a user develops on the network, following and posting messages, it becomes possible to analyse users with similar profiles.
- ▶ These are the principles behind Twitter's 'Who To Follow' user recommendation system.