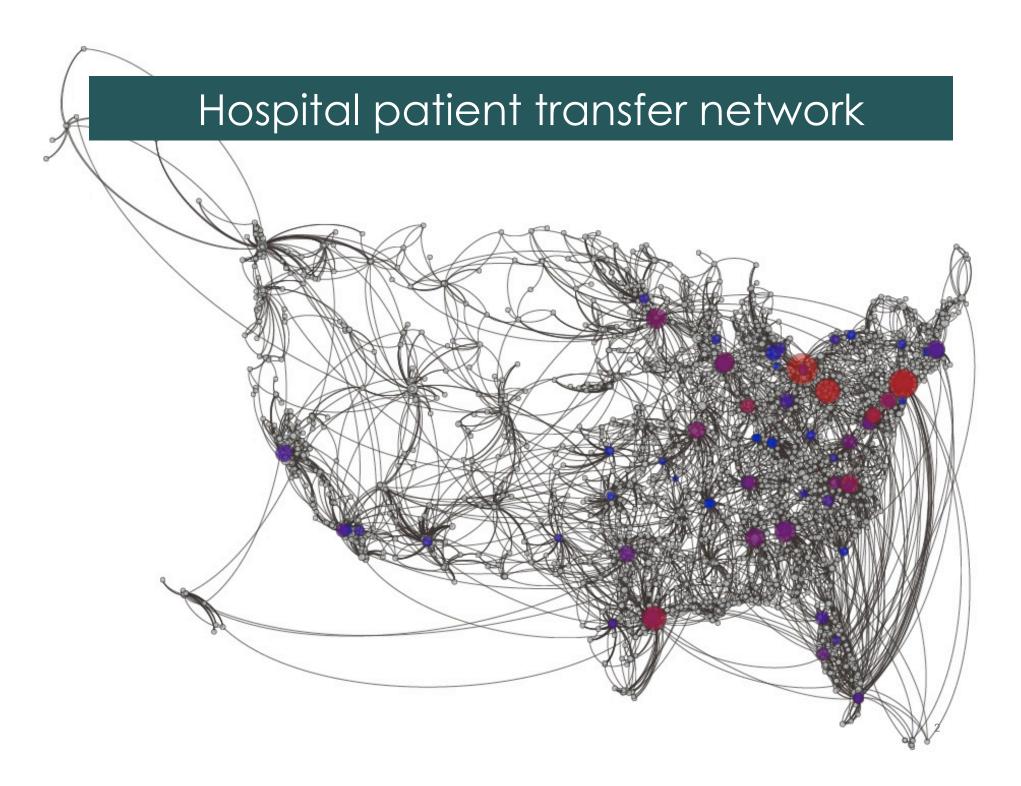
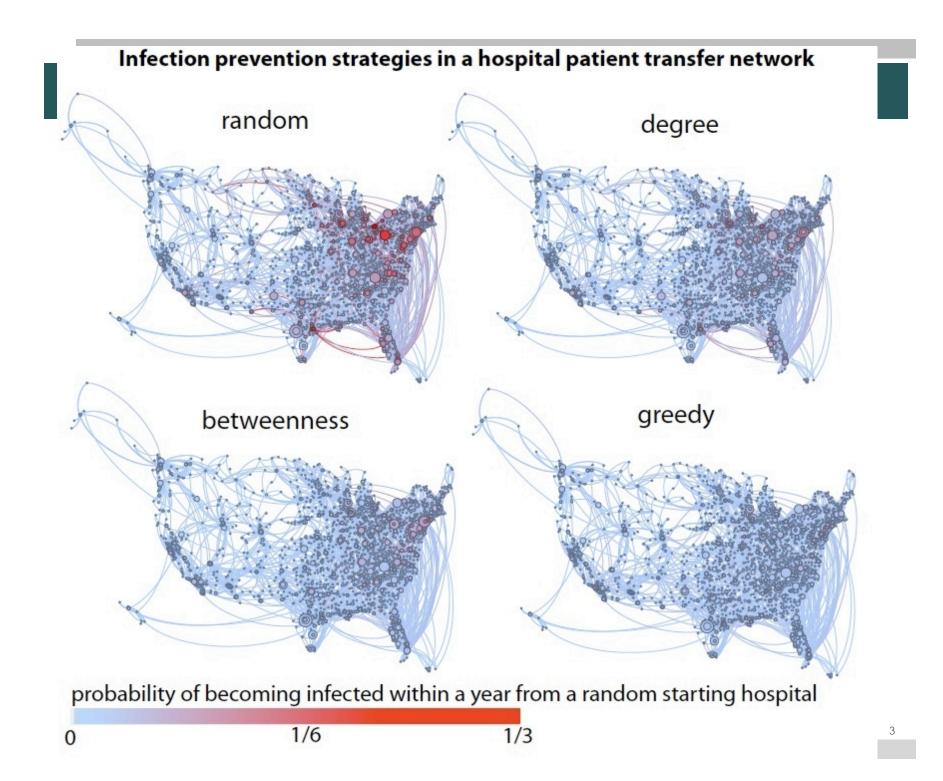


SNA 3C: Applications of network centrality

Lada Adamic

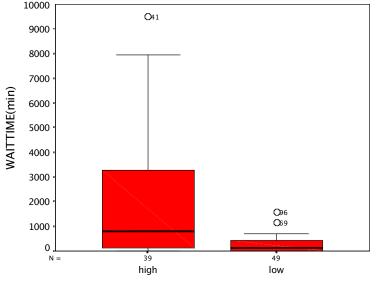






Identifying expertise

The Response Time Gap



ExpertiseRating

- The Expertise Gap
- Difficult to infer reliability of answers

Automatically ranking expertise may be helpful.

Java Forum

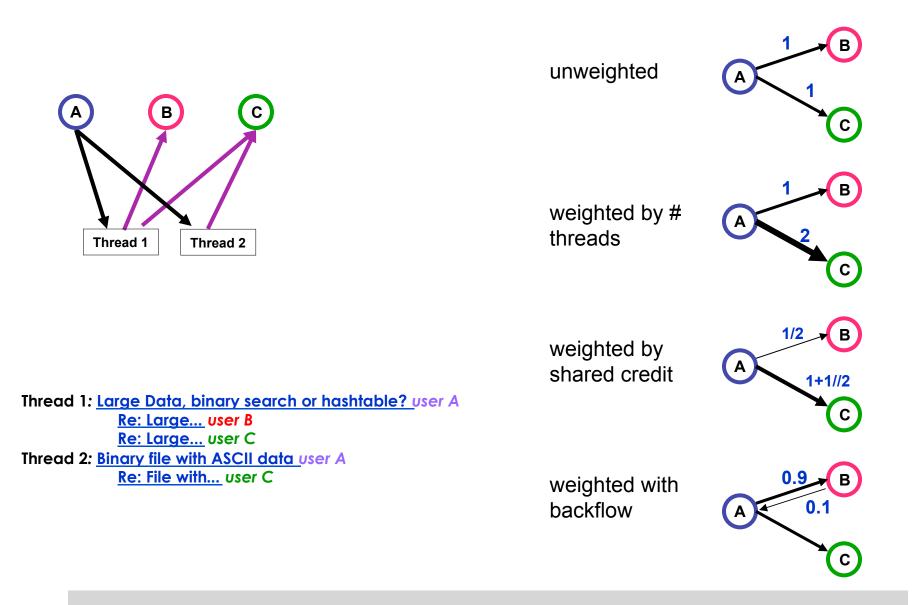
87 sub-forums

□ 1,438,053 messages

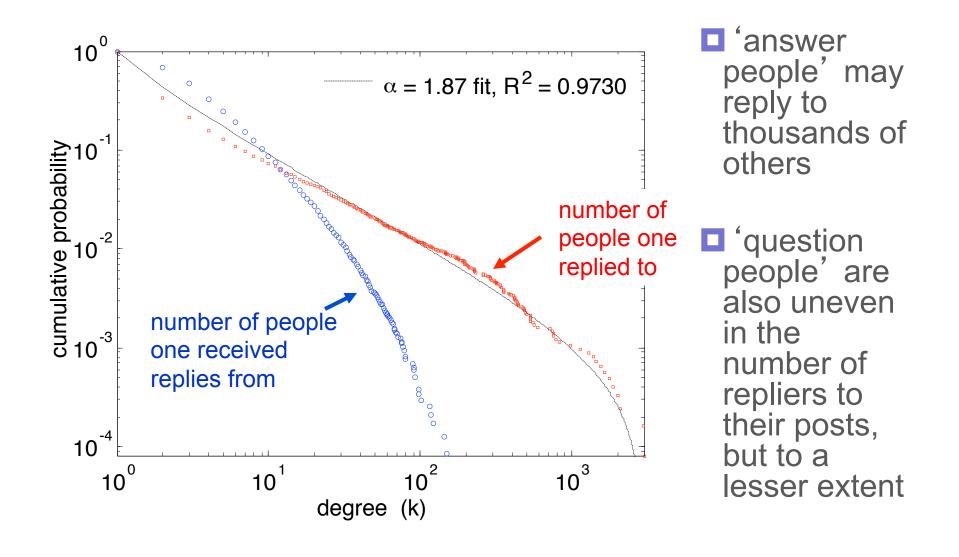
 community expertise network constructed:
 196,191 users
 796,270 edges

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Sun Dev Java APIs Downle Developers Hone > Developer Forum		* S Sun.com	earch tips <mark>Search (</mark>)	
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Sun Forums Welcome to Sun Developers Online Community! You can browse the forums as a guest or login and post your own questions. • Login Wey participate in Duke Stars? Incent forum members to help you find solutions to your problems. Answer ouestions with Duke Stars and you can help the community while being recognized as an active participant in the exchange of technical knowledge. Learn more about Duke Stars today. • Watch List Customize your navigation by adding your favor be Forums to MyForums. Click here for details • Wy Forums Customize your navigation by adding your favor be Forums to MyForums. Click here for details • Users Online : 75 Guests : 1,193 Place a watch on the Forum Maintenance area, so you'l know about Forums news, features and issues.				
Search Forums	Java Developer Tools Java ES Soleris Forum	Administration Haroware Desidoo My Fo Topics / Messages	last Post	
Popular Forums X New To Java X Java Programming X Swing X JavaBerver Pages (JSF)	New To Java Java Programming Training (Learning (Certification Core	w to Java) and advanced users (Java Programmin 27,420 / 189,572 76,594 / 482,710 299 / 1,460	igi May 22, 2007 3:13 Aut May 22, 2007 4:25 Aut May 22, 2007 4:23 Aut	
and JSTL Related Links * Expert Assistance for Developers Done	Discussions of the core APIs in the Java SE, in Core APIs Concurrency Conventional & Interruptable ID Networking Coale/basics	548 (2,704 435 (1,813 1,582) 6,548 1,457 (6,648	Key 21, 2007 9:52 Aut Key 22, 2007 4:25 Aut Key 22, 2007 4:13 Aut Key 22, 2007 4:13 Aut Key 20, 2007 4:13 Aut Autook	

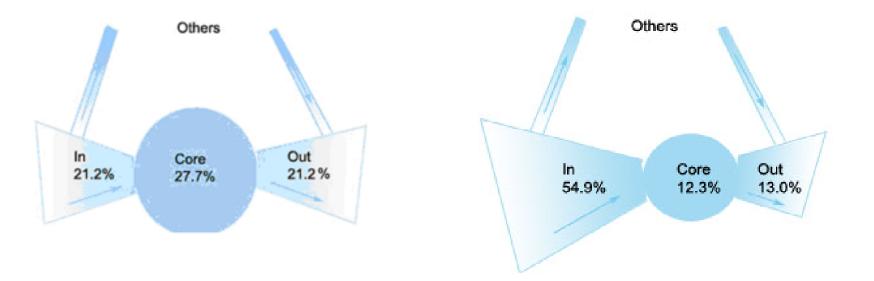
Constructing an expertise network



Uneven participation



Not Everyone Asks/Replies

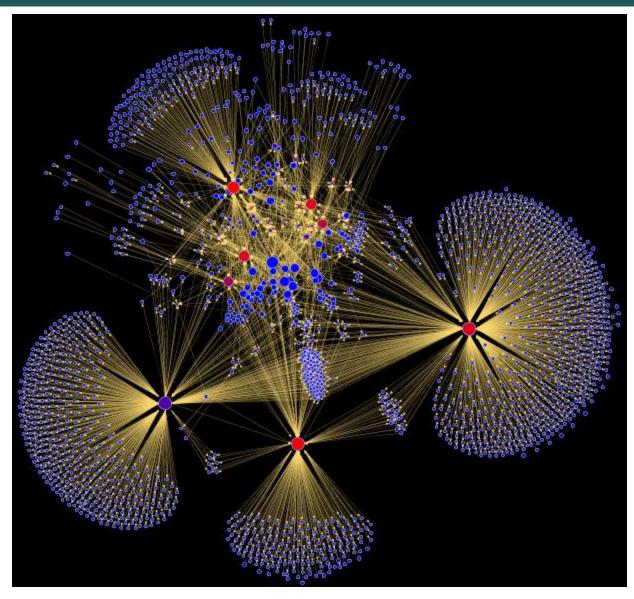


The Web is a bow tie

The Java Forum network is an uneven bow tie

- Core: A strongly connected component, in which everyone asks and answers
- IN: Mostly askers.
- OUT: Mostly Helpers

fragment of the Java Forum



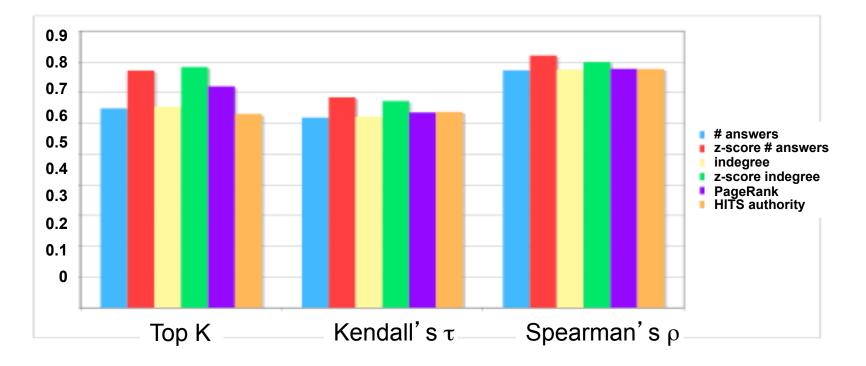
Relating network structure to expertise

Human-rated expertise levels

- 2 raters
- 135 JavaForum users with >= 10 posts
- **I** inter-rater agreement (τ = 0.74, ρ = 0.83)
- for evaluation of algorithms, omit users where raters disagreed by more than 1 level (τ = 0.80, ρ = 0.83)

L	Category	Description
5	Top Java expert	Knows the core Java theory and related advanced topics deeply.
4	Java professional	Can answer all or most of Java concept questions. Also knows one or some sub topics very well,
3	Java user	Knows advanced Java concepts. Can program relatively well.
2	Java learner	Knows basic concepts and can program, but is not good at advanced topics of Java.
1	Newbie	Just starting to learn java.

Algorithm Rankings vs. Human Ratings



simple local measures do as well (and better) than measures incorporating the wider network topology

automated vs. human ratings

C.

5 6 7

5 6 7 8 9 10

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 indegree

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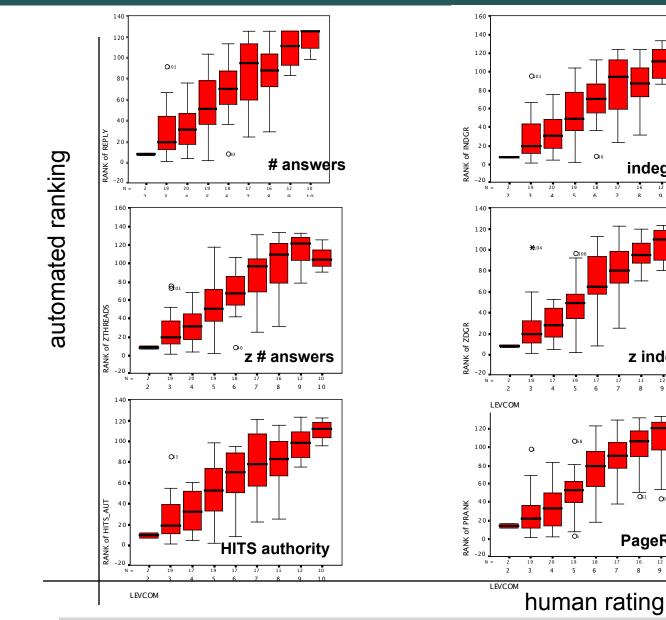
O92

7

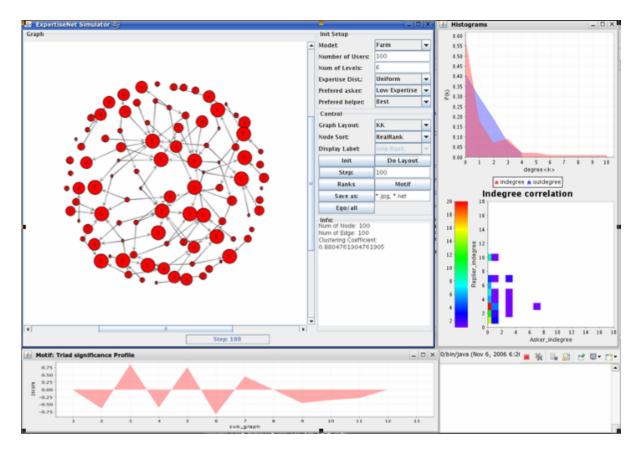
PageRank

9 10

8



Modeling expertise network formation



Control Parameters:

Distribution of expertise

- Who asks questions most often?
- Who answers questions most often?
 - best expert most likely

someone a bit more

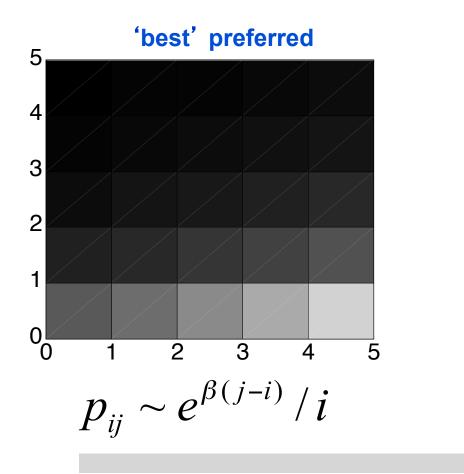
expert

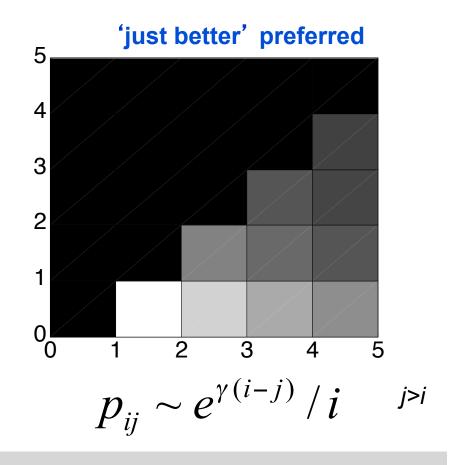
ExpertiseNet Simulator

Simulating probability of expertise pairing

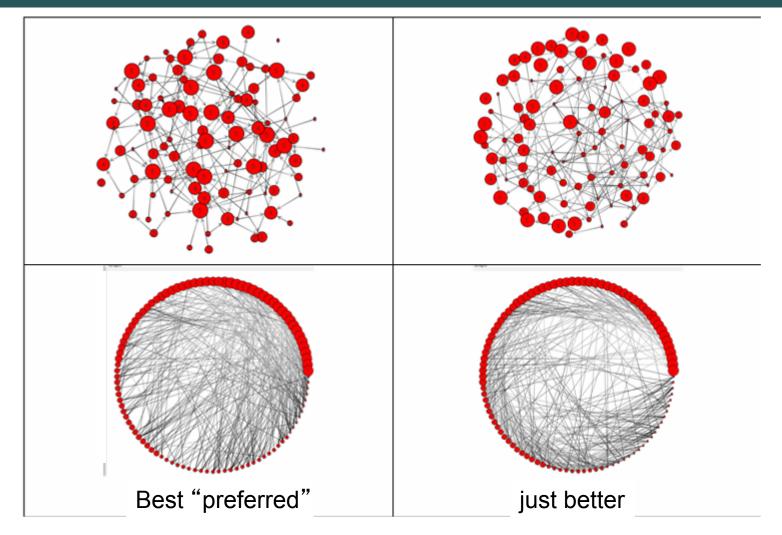
suppose:

expertise is uniformly distributed probability of posing a question is inversely proportional to expertise p_{ij} = probability a user with expertise *j* replies to a user with expertise *i* 2 models:

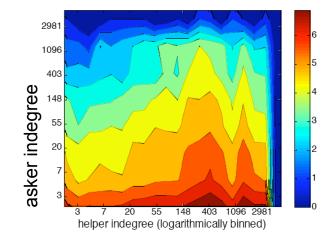




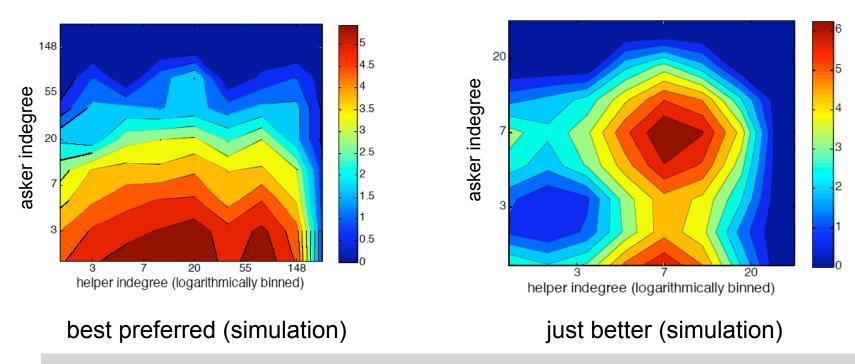
Visualization



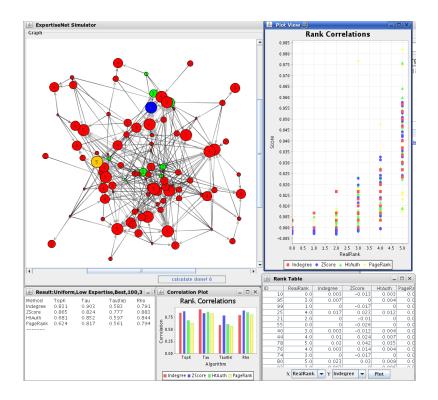
Degree correlation profiles

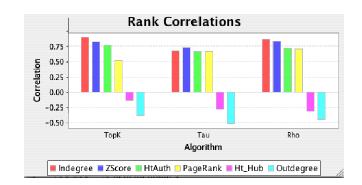


Java Forum Network

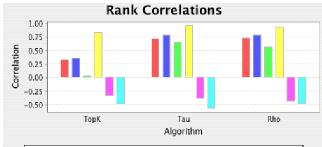


Algorithm selection





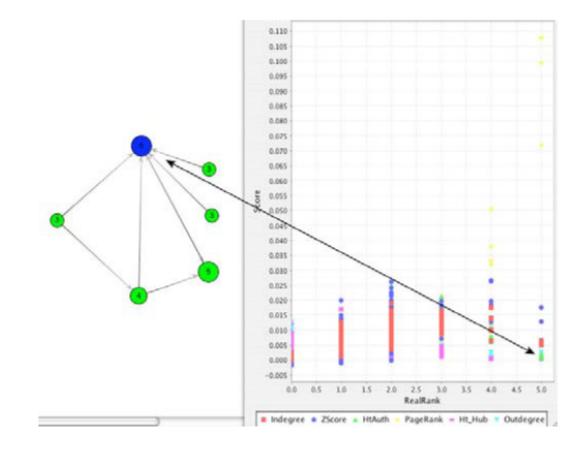
Preferred Helper: 'best available'



Indegree ZScore HtAuth PageRank Ht_Hub Outdegree

Preferred Helper: 'just better'

Algorithm evaluation



In the 'just better' model, a node is correctly ranked by PageRank but not by HITS