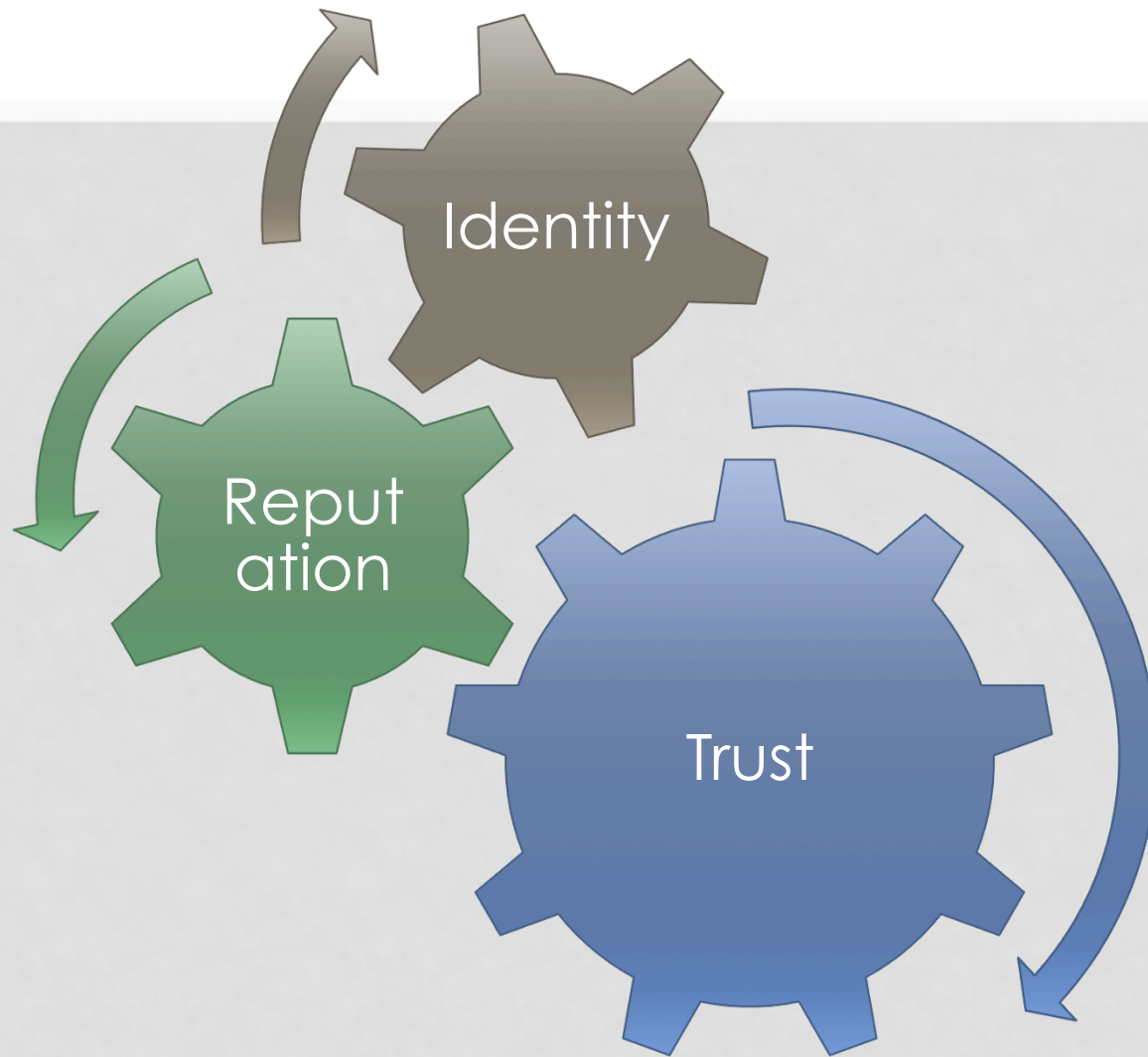


ONLINE REPUTATION SYSTEMS

YUYE WANG

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CPSC 557: Sensitive Information in a Wired World
Professor: Joan Feigenbaum
Date: 12 Nov, 2013



TRUST SYSTEM

- Trust system, guide people's decision on who to transact with.



ONLINE TRUST SYSTEM

C2C

- e commerce

The eBay logo, featuring the word "eBay" in a multi-colored font (red, blue, yellow, green) with a trademark symbol.The Amazon logo, featuring the word "amazon" in a black sans-serif font with a curved orange arrow underneath.

P2P

- File sharing
- Movie streaming

The BitTorrent logo, featuring a purple circular icon with a white swirl and the word "BitTorrent" in a purple sans-serif font with a trademark symbol.The PPS logo, featuring a cartoon orange character with a white face and the letters "PPS" in a large, orange, 3D-style font.The Spotify logo, featuring a green circular icon with three white curved lines and the word "Spotify" in a white sans-serif font on a black background.

C2C: FEEDBACK BASED

The screenshot displays the eBay profile of a seller named 'buildingc'. The profile includes a search bar at the top, a navigation menu, and a main section with the seller's name, feedback score (22672), and a 99.5% positive feedback rating. Below this, there are buttons for 'Items for sale', 'Visit store', and 'Contact'. A green '+ Follow' button is also present. The 'Feedback ratings' section lists four categories: 'Item as described' (11,442), 'Communication' (11,793), 'Shipping time' (11,861), and 'Shipping charges' (12,909). A summary of feedback from the last 12 months shows 15,392 positive, 66 neutral, and 75 negative ratings. A specific feedback entry is visible: 'perfect' from Nov 10, 2013. At the bottom, it shows '40 Followers', '5 Collections', '6093 Views', and 'Member since: Nov 28, 2011'. The 'Items for sale' section shows 114,685 items.

ebay Shop by category Search... All Categories Search Advanced

buildingc (22672) 99.5% positive feedback

+ Follow

Items for sale Visit store Contact

Based in United States, buildingc has been an eBay member since Nov 28, 2011

Feedback ratings

Category	Count
Item as described	11,442
Communication	11,793
Shipping time	11,861
Shipping charges	12,909

Feedback from the last 12 months

Rating	Count
Positive	15,392
Neutral	66
Negative	75

perfect Nov 10, 2013

40 Followers | 5 Collections | 6093 Views | Member since: Nov 28, 2011 | United States

Items for sale (114685) See all items

What does the star next to a Feedback score mean?

Feedback stars are located to the right of a member's user ID. Stars are awarded based on a member's Feedback score.

In most cases, members receive:

- +1 point for each positive rating
- 0 points for each neutral rating
- -1 point for each negative rating

The more points you get, the higher the "star" level will go.

Here's what the different stars mean:

Yellow star		10 to 49 ratings
Blue star		50 to 99 ratings
Turquoise star		100 to 499 ratings
Purple star		500 to 999 ratings
Red star		1,000 to 4,999 ratings
Green star		5,000 to 9,999 ratings
Yellow shooting star		10,000 to 24,999 ratings
Turquoise shooting star		25,000 to 49,999 ratings

EBAY FEEDBACK FORUM

building (22672 ★)

Top Rated: Seller with highest buyer ratings ?

Positive Feedback (last 12 months): 99.5%
[\[How is Feedback percentage calculated?\]](#)

Member since: Nov-28-11 in United States

The positive Feedback percentage is calculated based on the total number of positive and negative Feedback ratings for transactions that ended in the last 12 months, excluding repeat Feedback from the same member for purchases done within the same calendar week (eBay time).

Note: This could mean that the number of ratings used for this calculation is different from the same number shown in the recent ratings table on the left.

Feedback ratings (last 12 months) ?

1 month	6 months	12 months
1188	6697	15392
10	30	66
5	25	75

$$\frac{\text{Positives}}{\text{Positives} + \text{negatives}}$$

This member's 12 month Feedback ratings

Positives: 13513 Negatives: 66

This member's positive Feedback percentage

$$\frac{13513}{13513 + 66} = 99.5\%$$

Feedback as a seller

Feedback as a buyer

All Feedback

Feedback left for others

EBAY FEEDBACK FORUM



buildinc (22672 ★)

Top Rated: Seller with highest buyer ratings ?

Positive Feedback (last 12 months): 99.5%
 [How is Feedback percentage calculated?]

Member since: Nov-28-11 in United States

Member quick links

- [Contact member](#)
- [View items for sale](#)
- [View seller's Store](#)
- [View ID history](#)
- [View eBay My World](#)
- [View reviews & guides](#)

Recent Feedback ratings (last 12 months) ?

	1 month	6 months	12 months
Positive	1188	6697	15392
Neutral	10	30	66
Negative	5	25	75

Detailed seller ratings (last 12 months) ?

Criteria	Average rating	Number of ratings
Item as described	★★★★★	11442
Communication	★★★★★	11793
Shipping time	★★★★★	11861
Shipping and handling charges	★★★★★	12909

eBay Buyer Protection

Covers your purchase price + original shipping

[Learn more](#)

[Feedback as a seller](#)

[Feedback as a buyer](#)

[All Feedback](#)

[Feedback left for others](#)

25,746 Feedback received (viewing 1-25)

Revised Feedback: 1 ?

Period:

Feedback

From/price

Date/time

EFFECTS

Product	pos	neg	pos-neg	price	quantity
<ul style="list-style-type: none">  		↑	↑	—	↑
<ul style="list-style-type: none">  			↑	↑	
<ul style="list-style-type: none">  		↑		—	↓
<ul style="list-style-type: none">  	↑		↑	↑ ↓	↓



ISSUES

- Effective but not sufficient for make decision
- Still take too many human effort
- Gaming the reputation system

[CNET](#) › [News](#) › [News Blogs](#) › [Study: eBay sellers gaming the reputation system?](#)

Study: eBay sellers gaming the reputation system?



by [Elinor Mills](#) | January 11, 2007 12:24 PM PST



0



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1



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[More +](#)

Comments

0

A new study concludes that some eBay users are artificially boosting their reputations on the Internet auction Web site by selling items for practically nothing in exchange for positive

P2P

- Reputation based

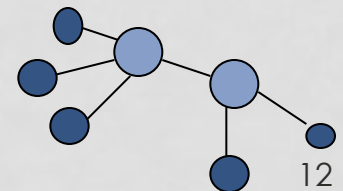
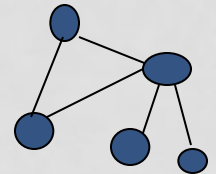
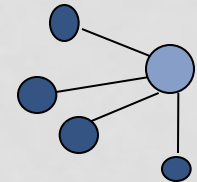
C2C

- Feedback based

PEER-TO-PEER (P2P)

common uses: file sharing, distributed computing, instant messaging

- Centralized (Napster)
- Decentralized (Gnutella)
- Hybrid (KaZaA)



P2P NETWORK

- Highly dynamic



dynamic



Reputation
System



reliable

ADVERSARIES

- Selfish peers
- Malicious peers

- Techniques:
 - Traitors
 - Collusion
 - Front peers
 - Whitewashers
 - Denial of Service (DoS)

5 BASIC TRUST STRATEGIES



REPUTATION SYSTEM

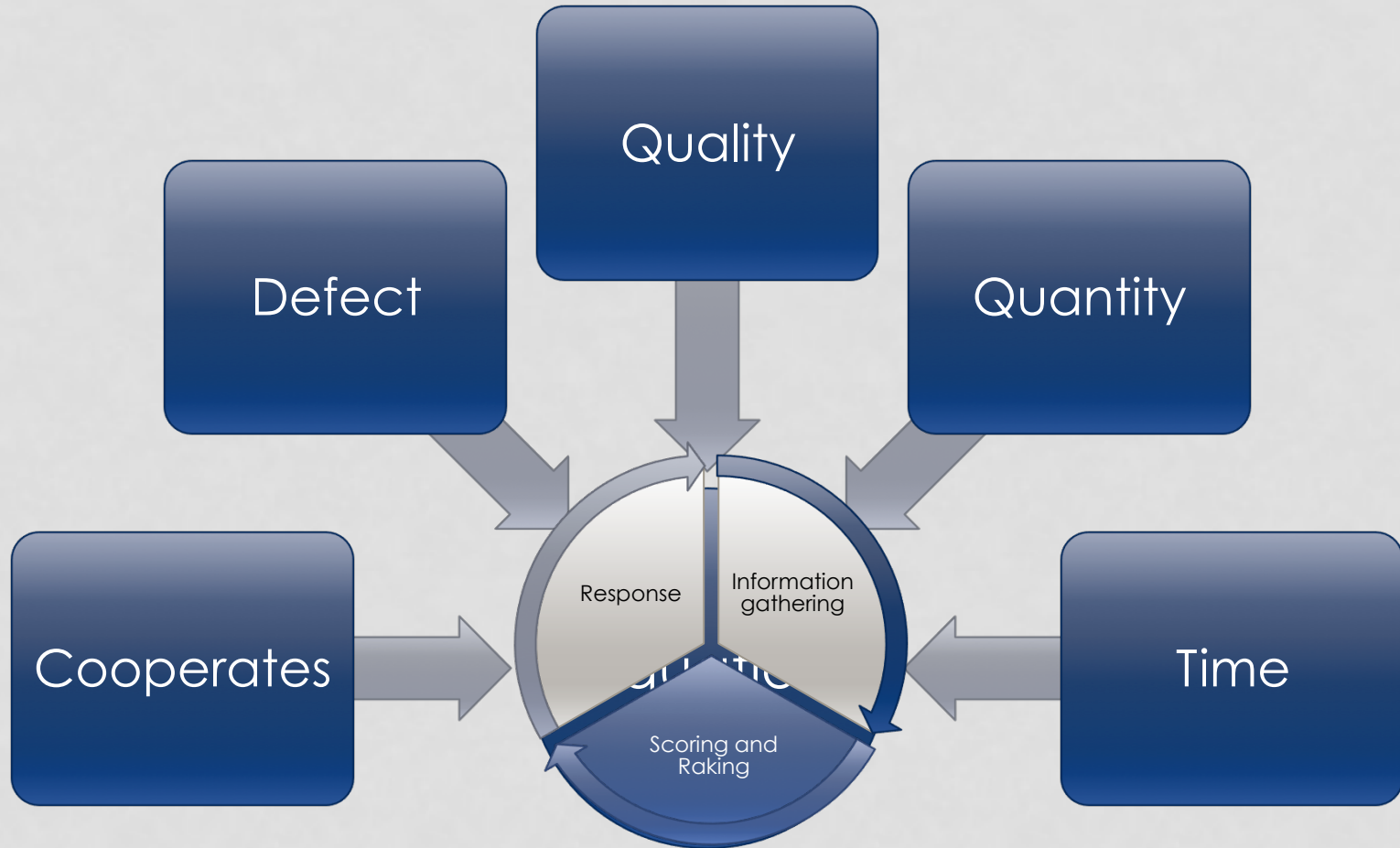


PROBLEM OF INFORMATION INTEGRITY

- impossible to enforce honest, accurate **reporting**
- **assume** the majority of users are honest

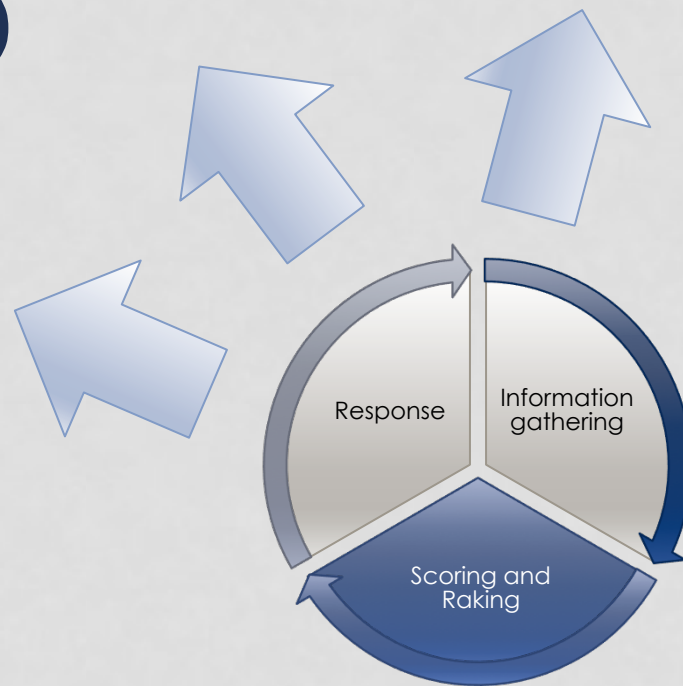


INPUTS



OUTPUT

- binary value (trusted or untrusted)
- scaled integer (1 to 10)
- **continuous scale ([0,1])**



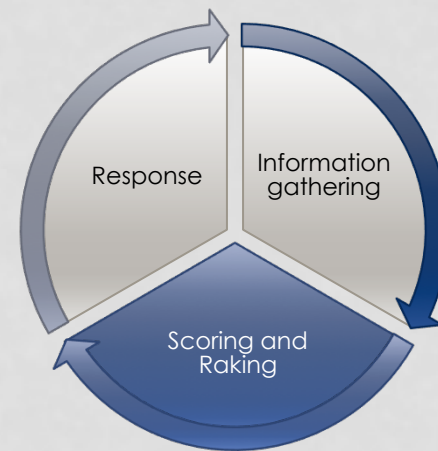
MULTIPLE COMPONENT

Reliability

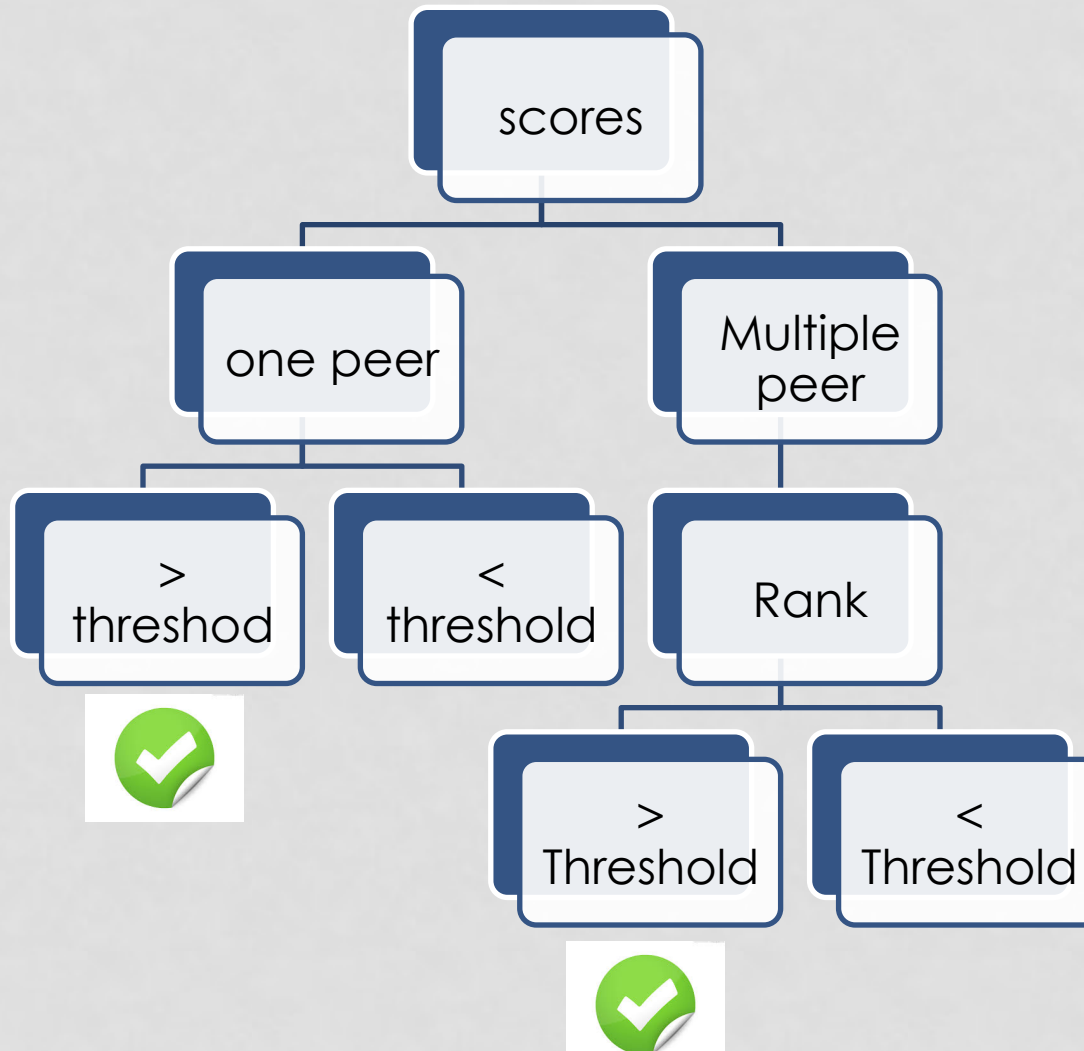
- If transacting with P is worth the risk of defection

Credibility

- Estimate how likely they are to provide accurate report



PEER SELECTION



TAKE ACTION

Incentives

- Speed
- Quality
- Quantity
- Money

Punishment

- Kick out
- Fine



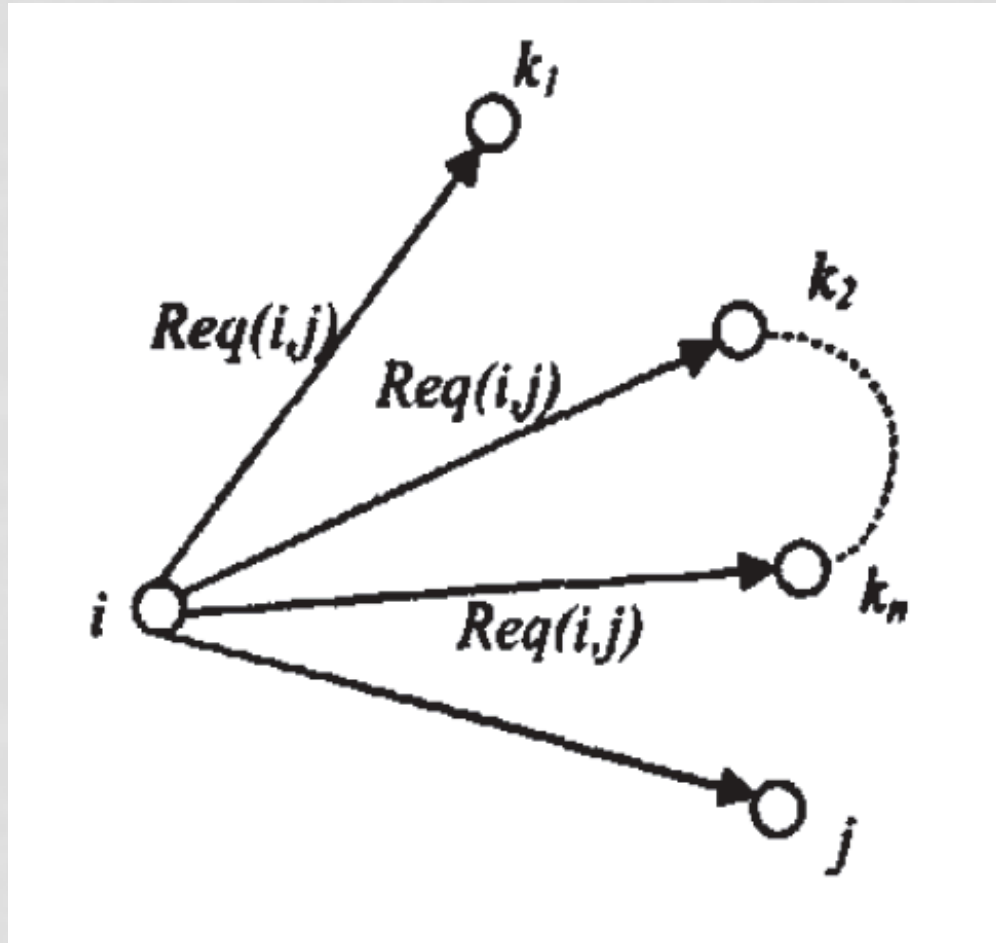


BASIC TRUST MODEL

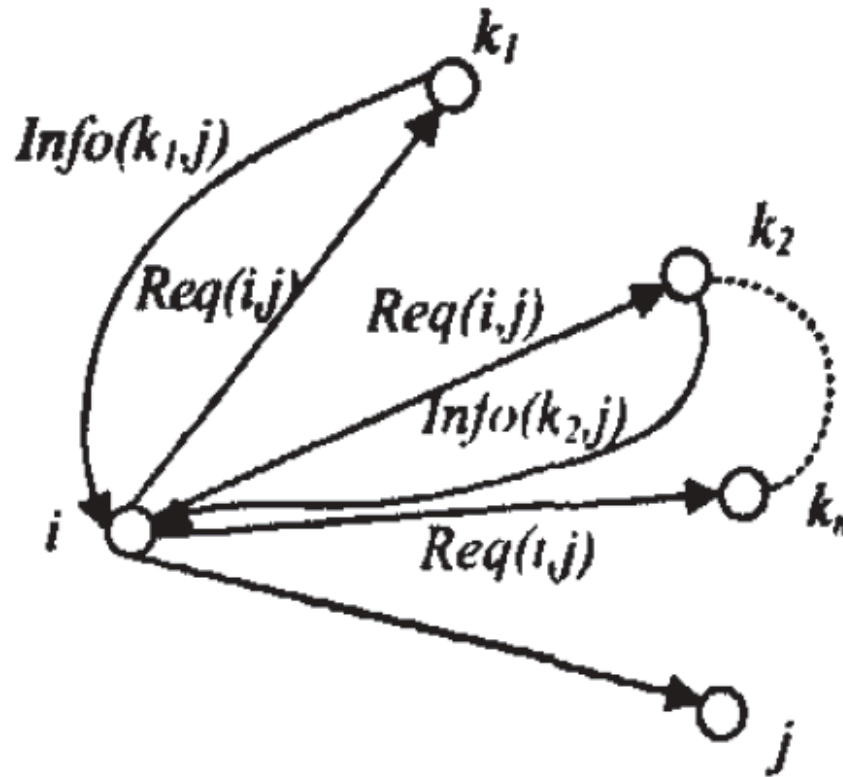
MOST IMPORTANT PART



STEP 1 BROADCAST REQUEST



STEP 2 RECEIVE REQUEST



STEP 3 COMPUTE REPUTATION

Trust score

Previous info on j

$$\rightarrow T(i, j) = \alpha * Info(i, j) + \beta * R(i, j)$$

$$R(i, j) = \frac{\sum_{k \in K} Info(k, j) * C(i, k)}{|K|}, \alpha + \beta = 1.$$

Reputation score of j to i

Information collected
from k about j

Credibility of k to i

STEP 4: UPDATE AND MODIFY

- After transaction with j
- Peer I update Info(i, j)
- Modify C(i, k)
- Save latest T(i, j) to the system

$$T(i, j) = \alpha * Info(i, j) + \beta * R(i, j)$$

$$R(i, j) = \frac{\sum_{k \in K} Info(k, j) * C(i, k)}{|K|}, \alpha + \beta = 1.$$

ALGORITHMS FOR REPUTATION SCORE

- EigenTrust
- PeerTrust
- Beth's model
- Josang's model
- Yao Wang's model (Bayesian)
- PowerTrust

CONCLUSION

Feedback

- Structure:
 - Input:
 - Output:
 - Selection:
 - Adversary:
 - Credibility of reporter:
- Centralized
 - [-1, 0, 1]
 - 1 scale value
 - Human
 - Some
 - None

Reputation

- Distributed
- Combination of 5 factors
- Multiple values
- System
- Many
- Yes

CONCLUSION

Feedback

- Cooperate • Yes
- Defect • Yes
- Quality • No
- Quantity • Yes
- Time • No

Reputation

- Yes
- Not as good
- Yes
- Yes
- Yes

DISCUSSION

- Compare feedback based and reputation based trust system. Can either of the model being improved by the idea of the other one?
- If to build an automatic seller selection for buyers in online shopping system, what factors do you think need to take into account?
- What other application you can think of that a trust system can be used?

THANKS

REFERENCE:

- Piatek, M., Isdal, T., Krishnamurthy, A., & Anderson, T. E. (2008, April). One Hop Reputations for Peer to Peer File Sharing Workloads. In *NSDI* (Vol. 8, pp. 1-14).
- Marti, S., & Garcia-Molina, H. (2006). Taxonomy of trust: Categorizing P2P reputation systems. *Computer Networks*, 50(4), 472-484.
- Sarjaz, B. S., & Abbaspour, M. (2013). Securing BitTorrent using a new reputation-based trust management system. *Peer-to-Peer Networking and Applications*, 6(1), 86-100.
- Kamvar, S. D., Schlosser, M. T., & Garcia-Molina, H. (2003, May). The eigentrust algorithm for reputation management in p2p networks. In *Proceedings of the 12th international conference on World Wide Web* (pp. 640-651). ACM.
- Molavi Kakhki, A., Kliman-Silver, C., & Mislove, A. (2013, May). lolaus: securing online content rating systems. In *Proceedings of the 22nd international conference on World Wide Web* (pp. 919-930). International World Wide Web Conferences Steering Committee.
- Li, Y., & Gruenbacher, D. (2010, April). Analysis of P2P file sharing network's credit system for fairness management. In *Network Operations and Management Symposium (NOMS), 2010 IEEE* (pp. 88-95). IEEE.
- Jian-li, H. U., & Bin, W. Q. Y. Z. (2009). Research on Reputation Based Trust Model for P2P Environment. *Computer Science*, 9, 003.
- Lakshmi, B. V. S. N., & Rao, C. P. (2012). Managing P2P Reputation System Using Decentralized Approach.

- Xiong, L., & Liu, L. (2003, June). A reputation-based trust model for peer-to-peer e-commerce communities. In *E-Commerce, 2003. CEC 2003. IEEE International Conference on* (pp. 275-284). IEEE.
- Kamvar, S. D., Schlosser, M. T., & Garcia-Molina, H. (2003, May). The eigentrust algorithm for reputation management in p2p networks. In *Proceedings of the 12th international conference on World Wide Web* (pp. 640-651). ACM.
- Gupta, M., Judge, P., & Ammar, M. (2003, June). A reputation system for peer-to-peer networks. In *Proceedings of the 13th international workshop on Network and operating systems support for digital audio and video* (pp. 144-152). ACM.
- Selcuk, A. A., Uzun, E., & Pariente, M. R. (2004, April). A reputation-based trust management system for P2P networks. In *Cluster Computing and the Grid, 2004. CCGrid 2004. IEEE International Symposium on* (pp. 251-258). IEEE.
- Buchegger, S., & Le Boudec, J. Y. (2004, June). A robust reputation system for peer-to-peer and mobile ad-hoc networks. In *Proceedings of P2PEcon* (Vol. 2004).
- Robinson, S. D. (1976). Recent Antitrust Developments: 1975. *Columbia Law Review*, 76(2), 191-235.
- Dewan, P., & Dasgupta, P. (2010). P2p reputation management using distributed identities and decentralized recommendation chains. *Knowledge and Data Engineering, IEEE Transactions on*, 22(7), 1000-1013.

TERMS AND DEFINITIONS

- Reputation / Trust
- Transactions
- Cooperate / Defect
- Strangers
- Adversary