

Contextual Authority Tagging : Expertise Location via Social Labeling

Dissertation Proposal

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Contextual Authority Tagging

- Problem
- Background
- Proposed Research
- Methods
- Evaluation
- Pilot Test Data: Example Evaluation

Problem

Locating the topical expert requires topical knowledge.

The one who seeks the expert does not have the knowledge.

- Knowledge management within organizations has focused on expertise location, among other things, usually through the tracking and mining of created documents and artifacts.
- People within organizations use their networks.
- Source selection is critical.
- Need to tap into the *cognitive authority* of those around us (Wilson1983).

Background

Identity & Reputation

Tagging

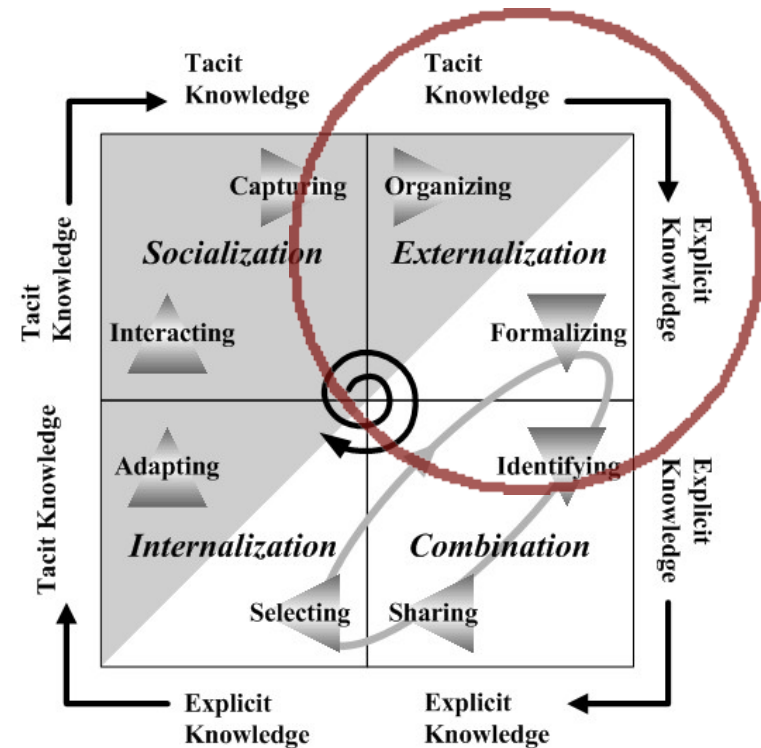
Collective Intelligence

Social Epistemology

Expertise

Tacit and Explicit Knowledge

- **Nonaka1991** – Feedback loop, Bringing the tacit into the open is part of the cycle



Background

Knowledge Management

- **Stein1995** – Organizational memory
 - Knowledge acquisition, retention, maintenance, retrieval
- **Dieng1999** – Corporate memory management
 - Detection of needs, knowledge construction, distribution, use, evolution

Background

Source Selection

- **O'Reilly1982** – Quality sources are relevant, timely, specific, and accurate
- **Nilan1988, Halpern1988** – Authority, expertise, and trust are the most cited criteria for acceptance/rejection of an information source
- **Rieh2002** – Source credibility depends largely on reliability (reputation, prior work, apparent authenticity)

Background

Expertise Location

- **Abecker1997** – requires multiple sources, integration, little overhead, clear presentation, remaining up-to-date
- **Ehrlich2003** – successful systems must be fast, easy to use, engender trust, scale to entire enterprise, and used by management

Proposed Research

This research will explore the ability of a group to identify the areas of expertise of its members.

- Collective intelligence and distributed cognition of humans
- Visibility of relevant information
- Generation of a positive feedback loop

Proposed Research

Inquiry based on the Delphi Method

- Panel of experts
- Anonymous
- Iterated

Tagging using free-text keywords / labels

Asking a focused, direct question:

- “What are this person's areas of expertise?”
- “What does this person know about?”

Validation through convergence and confidence assessment

Research Question 1

Does CAT work?

- **Similarity** – How similar are a group member's opinion of his/her own areas of expertise and the group's opinion of his/her areas of expertise?
- **Convergence** – How does the similarity behave over time? Do the two opinions converge? If so, how long does it take? If not, is there a persistent gap?

Research Question 2

How acceptable is CAT?

- **Comfort** – How comfortable are group members in participating? What are the main factors influencing their comfort level?
- **Confidence** – How confident are group members in a system like this? What is the quality of the output of this system? Does this system provide a valid credential? Does this system increase users' trust in one another?
- **Usefulness** – What is useful about a system like this? What did participants learn? How would using this system affect participants' decision making?

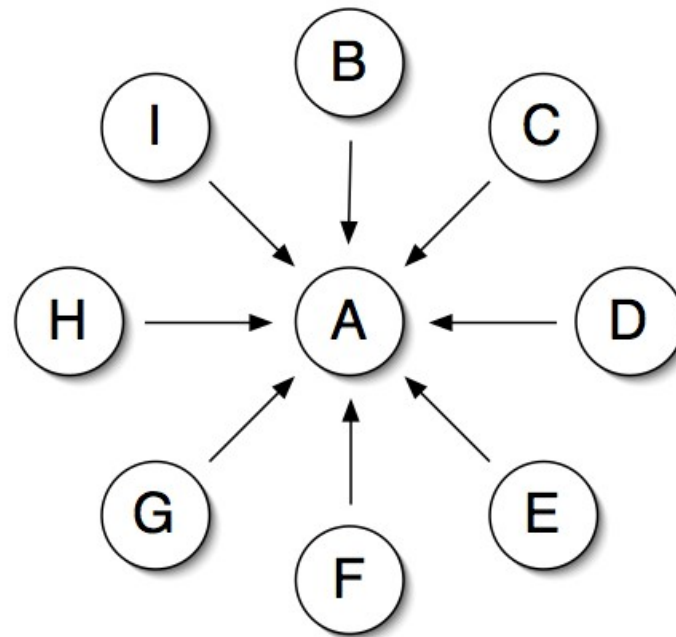
Proposed Research

Recruitment → Experimentation → Evaluation

- 8-10 groups
 - 8-10 people each
- Survey Pre-Test
 - CAT – 5 rounds
 - Survey Post-Test
 - Follow-up Interview
- Similarity
 - Amazon's Mechanical Turk
 - WordNet Algorithm
 - Acceptability
 - Survey
 - Interview



Methods: Contextual Authority Tagging



Methods: Contextual Authority Tagging

Expertise Tagging

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Round 4

1. Review **2. Self Assessment** 3. Group Assessment 4. Round Complete

What are your own areas of expertise?
What do you think you know about?

Add or Remove as many tags as you want (zero or more).
Your self tags will be visible to the others in your group.

Self Tags

apple backups basketball broughton claimid computer_engineering
computer_networking computers creative_commons digital_photography expertise
handball internet iphone irods library_science mac mpact nc nc_state_fair
online_identity open_source openid parc park_scholarships politics racquetball raleigh
social_networking tagging unc

Group Tags

apple cats chapel_hill chris_carter_tv_shows clouds code computers
digital_photography expertise_tagging experts folk_music handball information
information_science internet internets james_brown knowledge library_science
local_area_networks logic macintosh macintosh_computers macs metadata nc_state
ncsu networking networks north_carolina organization park_scholarship_program
park_scholarships people photography politics pressing_7 process
programming rowing science science_fiction silicon_valley social_media
social_networking social_science star_trek systems_research tagging
the_internet travel web web_design

Areas of Expertise

- apple
- backups
- basketball
- broughton
- claimid
- computer_engineering
- computer_networking
- computers
- creative_commons
- digital_photography
- expertise
- handball
- internet
- iphone
- irods
- library_science
- mac
- mpact
- nc
- nc_state_fair
- online_identity
- open_source
- openid
- parc
- park_scholarships
- politics
- racquetball
- raleigh
- social_networking
- tagging
- unc

Methods: Contextual Authority Tagging

Expertise Tagging

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Round 4

1. Review 2. Self Assessment **3. Group Assessment** 4. Round Complete

Todd

What do you think are Todd's areas of expertise?
What do you think Todd knows about?

Add or Remove as many tags as you want (zero or more).

There are no right or wrong answers.

Your tags about Todd will be visible to Todd and the others in your group, but they will be listed anonymously and not attributed to you.

Areas of Expertise

- apex
- babies
- cary
- cora
- dieting
- fatwallet
- gemma
- grilling
- linux
- mohawks
- operations
- power_tools
- richmond
- running
- software_development
- trucking
- woodworking

Self Tags

ajax bbq bears c capitalism computers cooking databases economics electricity
finance flyers geospatial libertarian linux php politics programming scuba sql taxes
webservices wolfpack woodworking

Group Tags

apex ayn_rand babies c cary china **computers** conservation cooking
cora databases dieting energy energy_policy fatwallet file_sharing finance fiscal_policy
football gemma **grilling hockey** libertarian linux living_large
local_area_networks macroeconomics mathematics mohawks nc_state
nc_state_football operations philadelphia_flyers phish php **physics** power_tools
punk richmond running scuba scuba_diving software_development sql trucking
wolfpack **woodworking** wrestling

Methods: Contextual Authority Tagging

Expertise Tagging

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Round 4

1. Review 2. Self Assessment **3. Group Assessment** 4. Round Complete

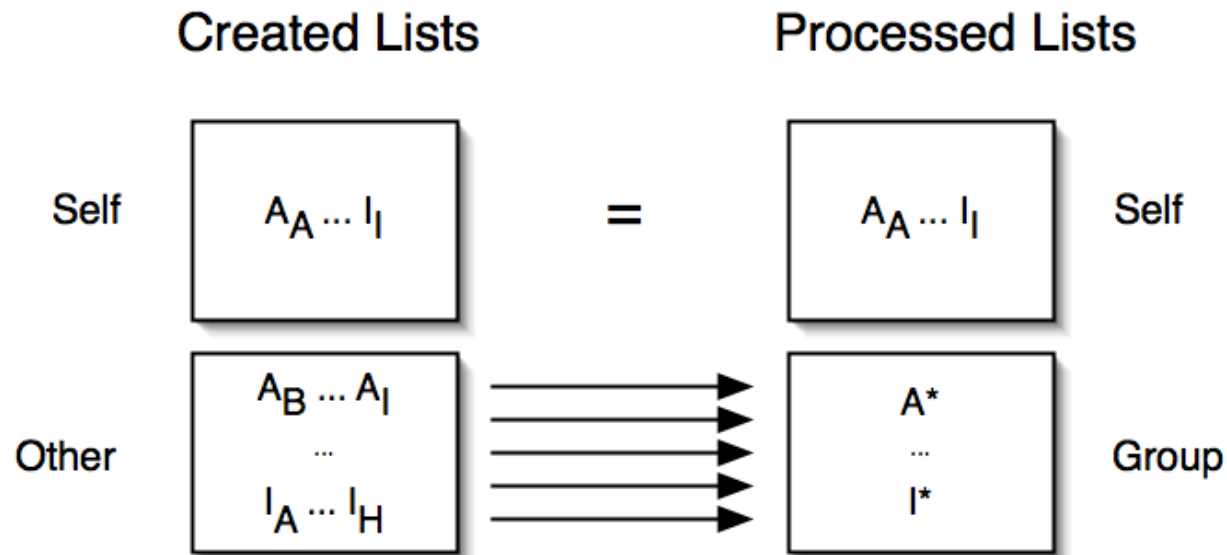
To complete this step, you need to tag each of your group members' areas of expertise.

You may work on them in any order you wish:

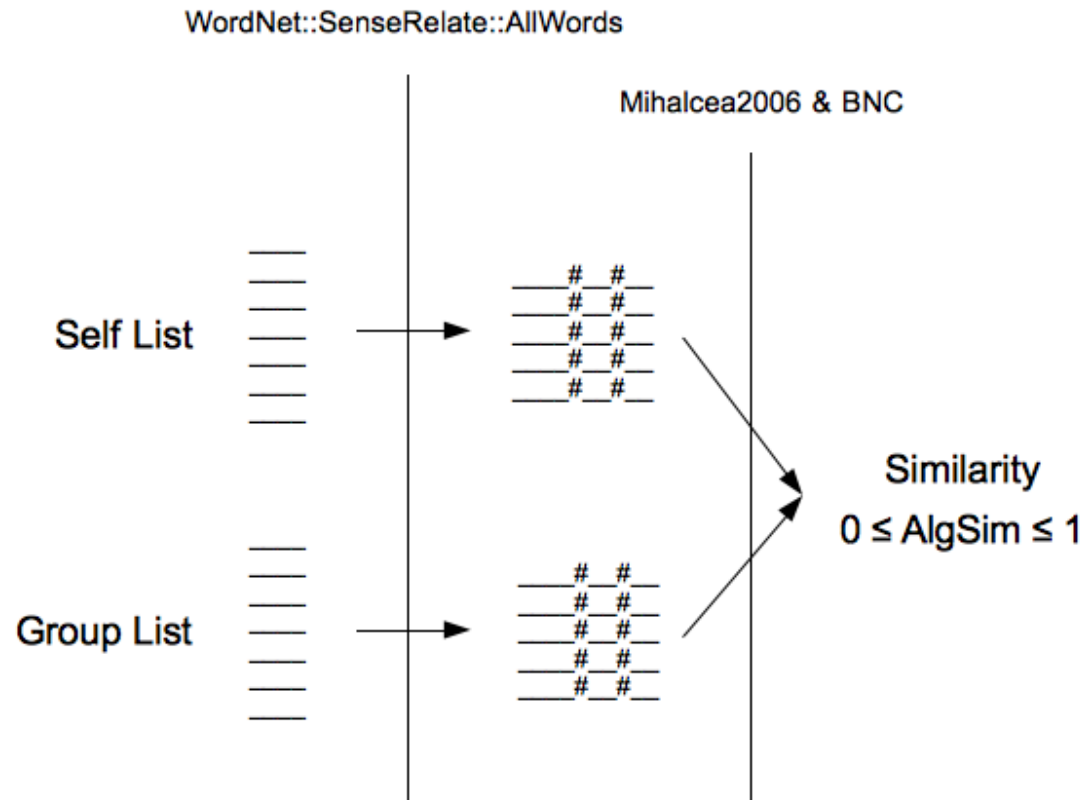
- [Gupton](#) ✓
- [Ian](#) ✓
- [Kelly](#) ✓
- [Simpson](#) ✓
- [Todd](#) ✓
- [Tommy](#) ✓

[I have completed the Group Assessment. Continue to Step 4.](#)

Methods: Contextual Authority Tagging



Evaluation: Similarity – WordNet



Evaluation: Similarity – WordNet

$$\text{AlgSim}(A, B) = \frac{1}{2} \left(\frac{\sum_{w \in \{A\}} (\text{maxSim}(w, B) * \text{idf}(w))}{\sum_{w \in \{A\}} \text{idf}(w)} + \frac{\sum_{w \in \{B\}} (\text{maxSim}(w, A) * \text{idf}(w))}{\sum_{w \in \{B\}} \text{idf}(w)} \right)$$

Mihalcea2006

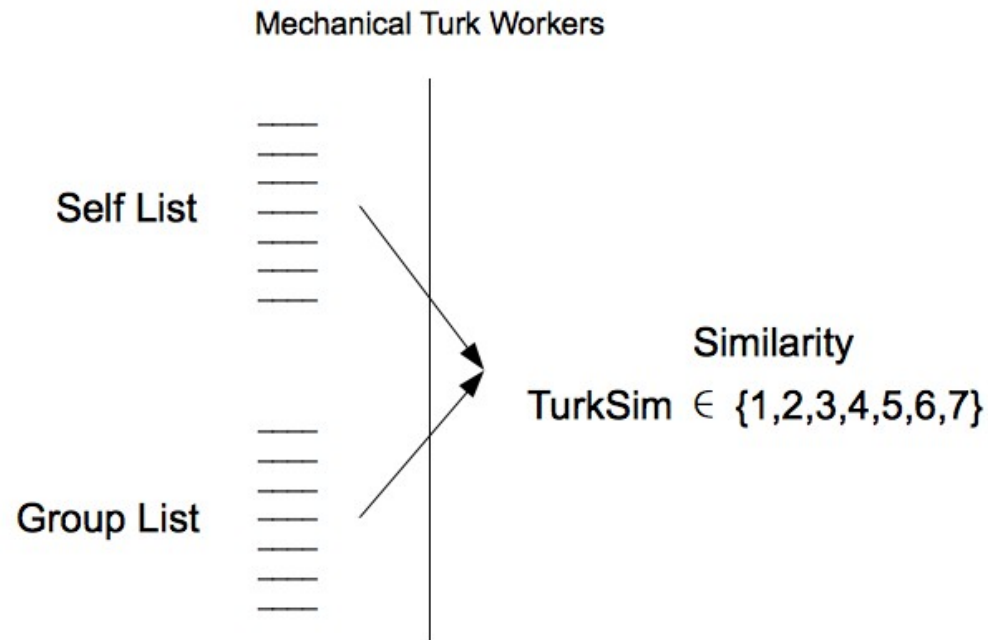
Evaluation: Similarity – WordNet

Comparisons

- self vs group-all
- self vs group-common (2+ occurrences)

Each word exists only once in each list.

Evaluation: Similarity – MTurk



“I think these two lists describe similar concepts and ideas.”

Evaluation: Similarity – MTurk

7-point Likert

- Extremely Disagree ... Extremely Agree

Current Comparisons

- Self-raw vs Group-all-raw
- Self-raw vs Group-common-raw (2+ occurrences)
- Self-matching vs Group-all-matching (WordNet identified)
- Self-matching vs Group-common-matching

Possible Comparisons (involving the weighted terms from a Group listing)

- Self-raw vs Group-all-raw-weighted
- Self-raw vs Group-common-raw-weighted
- Self-matching vs Group-all-matching-weighted
- Self-matching vs Group-common-matching-weighted

Evaluation: Similarity & Convergence

XY Plots

- For each user – Similarity graph over time

Box Plots

- For each group – Aggregated similarity graph over time
- For experiment – Aggregated similarity graph over time

ANOVAs to show change between rounds

- Increasing similarity = Convergence

Can also compare and contrast Human vs. Algorithm

Evaluation: Acceptability

Survey

- Likerts are 7-point
- ANOVAs to show differences in Pre-Test/Post-Test
- Existing validated scales will address Research Question 2

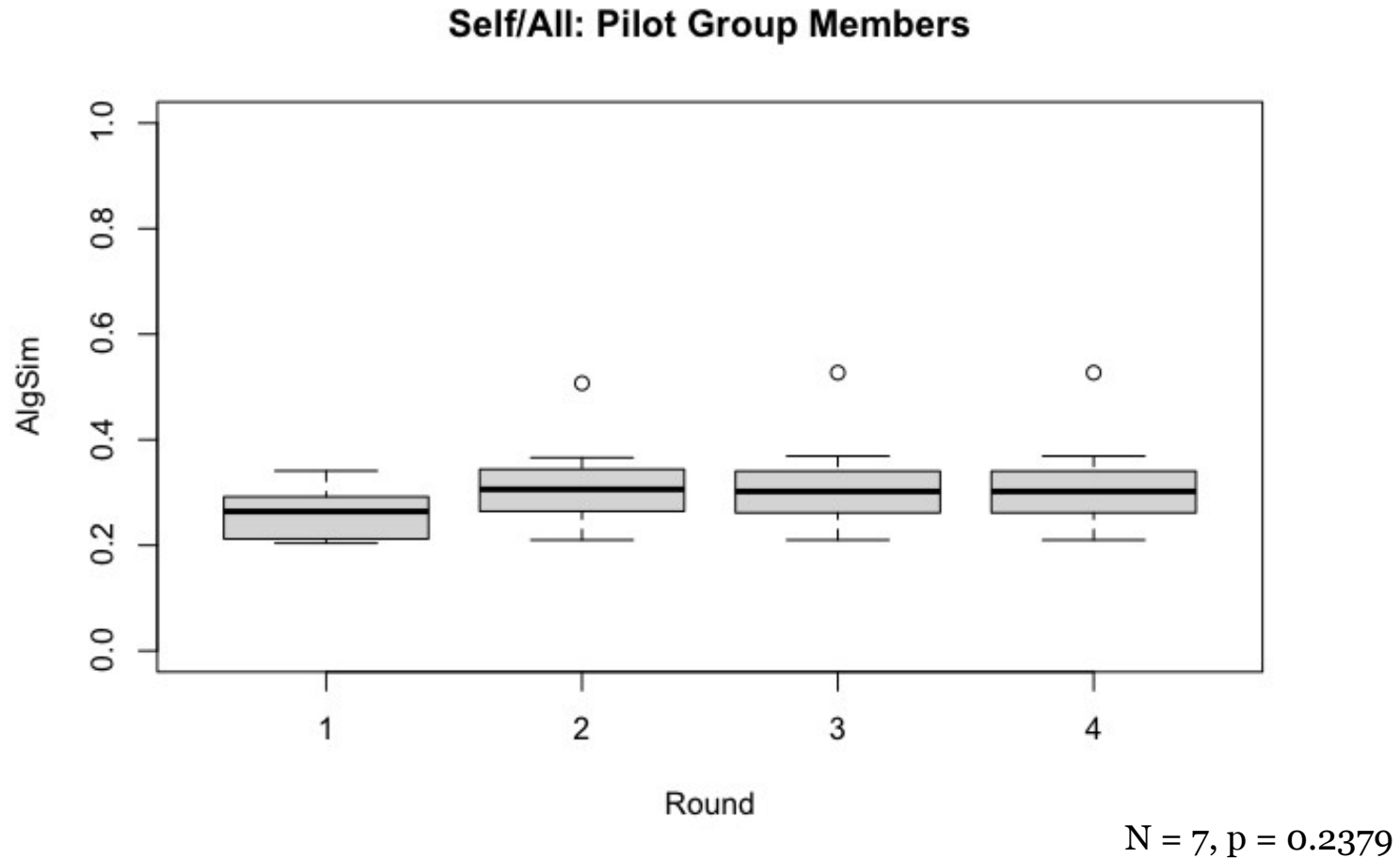
Interviews

- Selected participants, probably liaisons and others
- Definitely any dropouts, if possible
- Grounded Theory, Open Coding, Inductive
- Will largely address Research Question 2a - Comfort

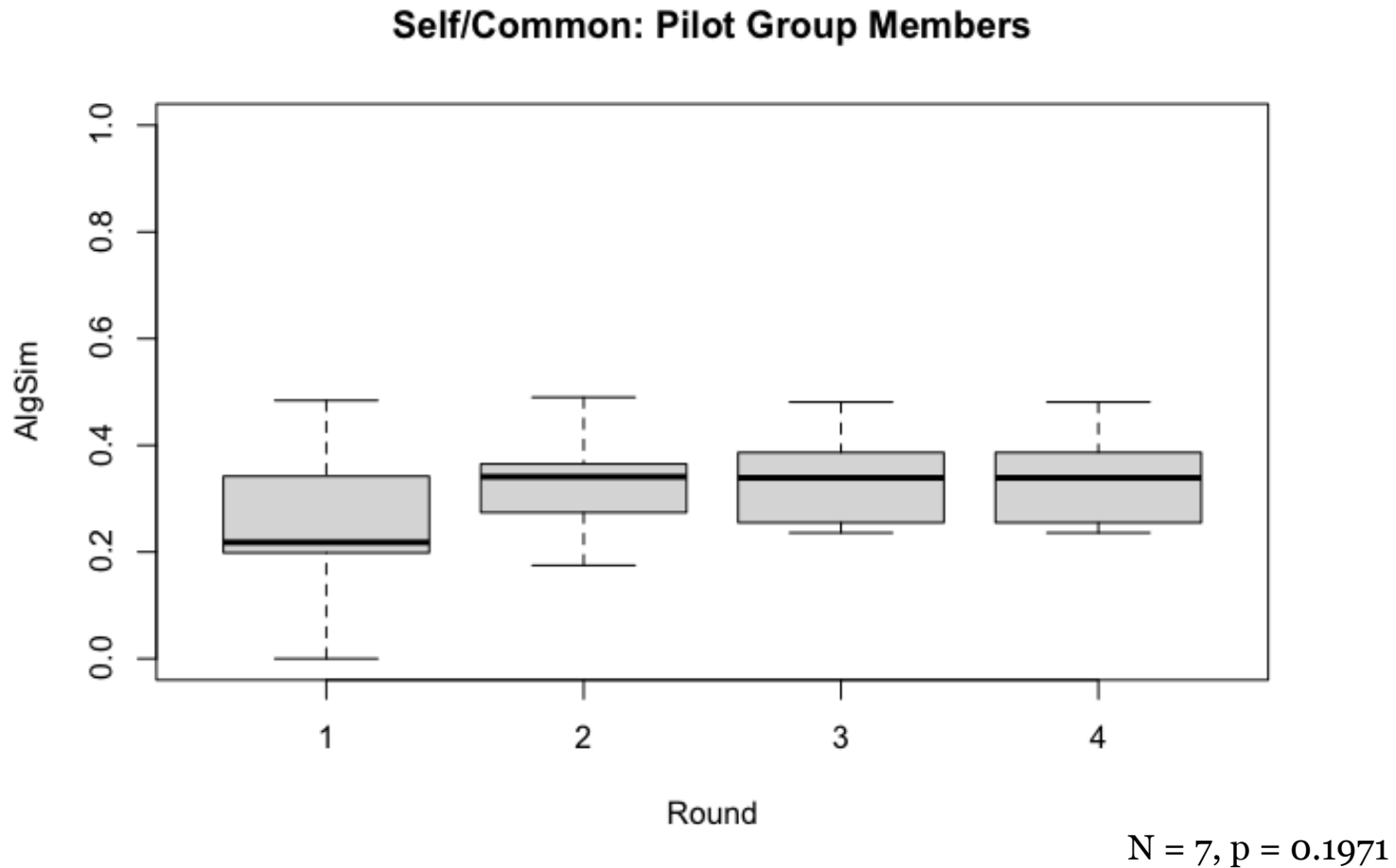
Pilot Test Data: Example Evaluation

- Friends Dataset
 - 7 friends, 4 rounds
 - Used CAT prototype software
- Evaluation
 - Ran AlgSim
 - Ran TurkSim – Data not complete
 - No Survey or Interviews

Pilot Test Data: AlgSim



Pilot Test Data: AlgSim



Contextual Authority Tagging : Expertise Location via Social Labeling

New Technique

Loose Credentialing

Tacit Expertise Location

- Visible
- Up-to-date
- Trusted Collective Opinion

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