Design and Evaluation of a System to Support Collaborative Search

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Collaborative Search

Recent: Workshop series, IP&M special issue

"the process of more than one person searching in collaboration with others for a shared goal is called collaborative search"

-- Morris and Teevan, Collaborative Web Search, 2010

Dimensions:

- Temporal (sync/async)
- Spatial (co-loc/remote)
- Roles (peers, directed, prospector/miner)
- Mediation (algorithmic or user aware+control)
- Task (planning, collecting, exploratory, ++)
- # collaborators (2, 3-6, ++)

Recent collaborative search systems

Authors (year)	System	Scenario/Tasks
Morris & Horvitz (2007)	SearchTogether	2 people, sync, remote Planning tasks
Shah & Marchionini (2010) Shah & González-Ibáñez (2010)	Coagmento	2 people, sync, remote Recall-oriented task
Pickens et a. (2008)	Algorithmically mediated	2 people (roles), sync, co-located, TRECVID tasks
Paul & Morris (2009)	CoSense	2 sync, then 1 async Sensemaking tasks
Golovchinsky et al. (2011)	Querium	Collaborative awareness displays in SERPs, filters

Not as much research on systems for:
- Asynchronous CIS
- Groups of 3-6 collaborators

Our Motivations

- **How does awareness of collaborators' actions affect an asynchronous search process?**

- **How are specific collaborative features in the interface used to support a collaborative search?**

- Temporal (sync/**async**)
- Spatial (co-loc/**remote**)
- Roles (**peers**, directed, prospector/miner)
- Mediation (algorithmic or **user aware+control**)
- Task (planning, collecting, **exploratory**, ++)
- # collaborators (2, **3-6**, ++)

Our Approach

- To explore these questions, we:
  - Designed a collaborative search system
  - Developed a task scenario
  - Developed a method to study asynchronous collaboration with individual participants
  - Ran an exploratory, observational study

ResultsSpace Interface

ResultsSpace Interface

ResultsSpace Interface

Document Page

China Succeeds in Scaling Down Population Growth

BEIJING, October 11 (Xinhua) -- China successfully scaled down the annual natural growth rate of its population to below one percent by the end of last year, lower than the figures of other developing countries, the National Bureau of Statistics announced here today.

The achievement meets the target set by the UN International Conference on Population and Development years ago, which required member countries to realize the one-percent growth rate goal by the end of the century.

Although China is currently in its third peak of population growth, it has upheld the family planning policy by working hard to meet its goals, the bureau said in a press release today.

According to the bureau's statistics, China's population was one-fifth of the world's total by 1998, instead of one-fourth a decade ago, with each woman giving birth to 1.8 children on average.

China's population reached one billion in 1981, surpassed 1.1 billion in 1988 and exceeded 1.2 billion in 1995. Experts forecast a population of 1.3 billion in 2003.

Because of factors such as the large population, relatively poor resources and an underdeveloped economy, it is necessary for China to continue its family planning policy to control population growth and improve population quality in the coming decades, the bureau reported.

Based on its policy suggestion, the bureau predicted that China will witness a zero population growth rate in 40 years, with its population peaking at about 1.5 billion.

Return to Results

ResultsSpace Interface

ResultsSpace Interface

Asynchronous Task Scenario

- AQUAINT news corpus (850k docs) + TREC HARD 2005
  - Relevance judgments from NIST/TREC
- Population control task (#435):

  What measures have been taken worldwide and what countries have been effective in curbing population growth?

- Collaborative scenario: group project for a class

  For this task, imagine that you are taking an Environmental Studies class. You are in a group with three other people (Luis, Martin, and Betty). Your team agreed that everyone would do some searches on the database to find articles that may be useful in writing your research paper... The <u>group has agreed to meet tomorrow</u> to talk about what everyone found. <u>Your task today is to find and rate articles that will help your group with the assignment</u>.

Async Collaborative Groups

- Problem:
  - Many logistical and methodological issues with recruiting and collecting data from groups of 4 people asynchronously
- Our Approach:
  - "Seed" data was incrementally collected from 3 participants
    - P1 was first
    - P2 saw P1 data
    - P3 saw P1 and P2 data
  - Subsequent participants: unique groups with P1,P2,P3 as collaborators
  - Extension of a technique used by Paul and Morris (2009) to study sensemaking in collaborative search
- Pro: everyone sees the same seed data
- Cons: participants don't know their collaborators

Method

- Exploratory, observational study
- Participants: 14 graduate students at UNC
  - 3 were "seed" participants
  - 11 were "real" participants (included in analysis)
- Collaborative task scenario + simulated group
- Protocol
  - Informed consent, watch video on system features
  - Read aloud task scenario
  - 30 minutes to work on task
    - Think aloud while working + screen recording
    - Server logged interactions with the system
  - Post-task questionnaire and interview

Descriptive Stats – Actions

Action	n	total	avg	sd	min	max
Query (typed)	11	124	11.3	6.6	3	25
Rate@SERP	7	77	11.0	13.0	2	42
Rate@Doc	11	181	16.5	5.1	9	27
ViewDoc	11	263	23.9	10.1	15	45

Participants were active in their 30 minutes of search

Types of Ratings
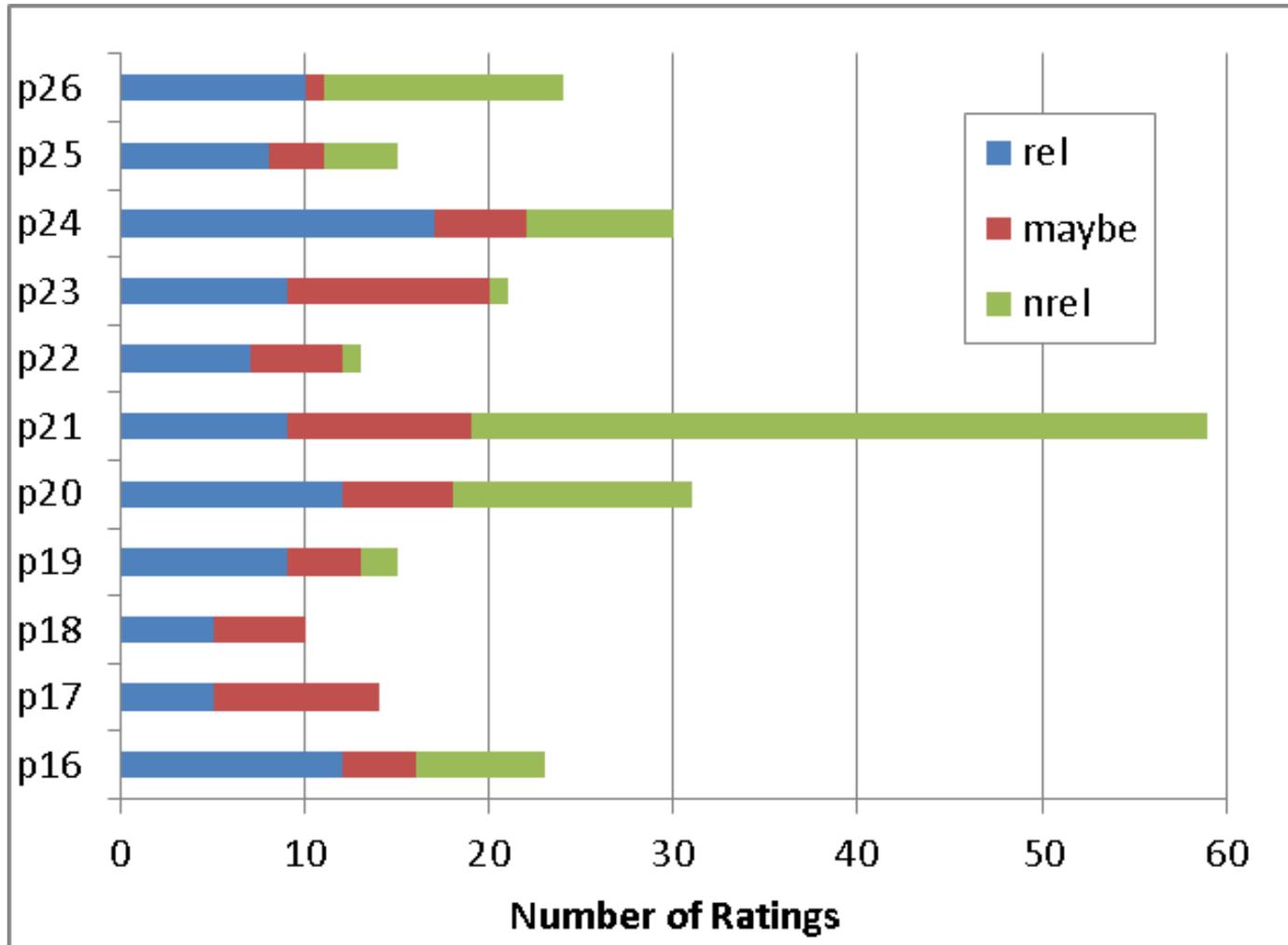
* Participant numbering started at p16

Delta Recall and Precision

- Delta = improvement over seed participants

- Participants adopted different strategies
  - e.g., p22 vs. p24

- Awareness of collaborators' ratings can be used to:
  - maximize recall
    - avoid redundant judgments
  - maximize precision
    - arbitrate previous judgments

Pnum	Delta Precision	Delta Recall
16	2%	33%
17	5%	11%
18	14%	33%
19	5%	11%
20	12%	22%
21	2%	11%
22	9%	11%
23	-2%	11%
24	2%	44%
25	-2%	0%
26	7%	22%

Influence of Collaborators' Actions

- Collaborators' ratings
  - Participants tended to follow the groups' existing ratings
    - IF existing rating positive, THEN tended to rate positive

      (χ^2=22.35, 1 d.f., p<0.001)
    - IF existing rating negative, THEN tended to rate negative

      (χ^2=6.90, 1 d.f., p<0.01)
  - Some evidence that participants were more likely to rate items that were already rated
    - However, this could be due to rating the "easy to find" documents

- Collaborators' prior queries

  Discuss in the post-session interviews, next…

Post-Session Interviews

- Verbal interview conducted after the session

  Did you…

    - make use of your teammates' queries?

    - make use of your teammates' ratings?

    - trust your teammates' ratings?

  Asked as yes/no with follow-up, why or why not?

Collaborators' Previous Queries

- 4 participants clicked on CPQs
- 10 of 11 reported looking at and using

- Motivations reported:
  - To write distinct/different queries (2)
  - To get a sense of collaborators' work:
    - without an end goal (3)
    - to help decide where to start their search (4)
  - To get new ideas after their own search (4)
    - Inspiration after frustration

Your collaborators' previous 10 queries

Martin: population growth strategies

Betty:

Luis: "sex education" pakistan

Luis: "sex education" nigeria

Luis: sex education nigeria

Luis: population growth india

Betty: family planning egypt

Martin: "family planning" china

Martin: family planning united states

Martin: population growth developed world

Use of Collaborators' Ratings

- All 11 reported using collaborators' ratings

  - To help select which documents to view (9)
    - Sensemaking
    - Need to be "up to speed" for group meeting mentioned in scenario

  - To focus on documents with disparate ratings, with intention to resolve the disagreement (4)
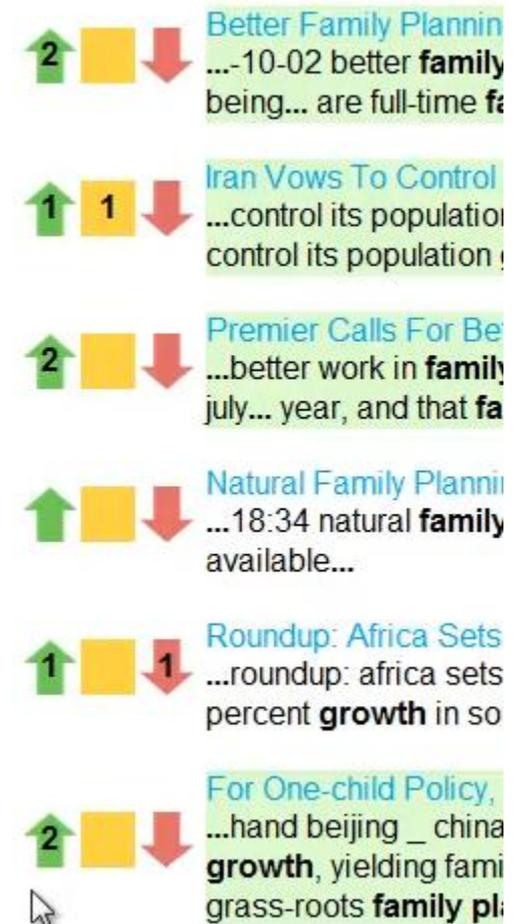
Trust in Collaborators' Ratings

- 10 of 11 said they trusted teammate's ratings
  - 5 noted that they "mostly" trusted
    - but saw exceptions where they disagreed
  - 2 commented about not wanting to disagree
    - to avoid conflicts or to avoid having to resolve ratings

- Avoiding conflicts is a known dynamic of group work
  - Implications for quality of collaborative searches
    - especially on precision
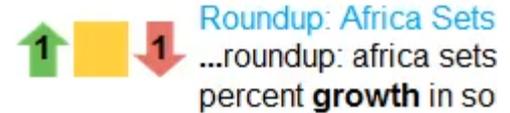
Observations

- Participants engaged in a variety of collaborative behaviors
  - Teamwork to go deeper into results of collaborators
  - Resolving rating conflicts
  - Making ratings to save future collaborators' effort
  - Intentionally extending into new areas based on where collaborators' had been
  - Awareness used for sensemaking
  - Independent work

- Participants fluidly moved between these behaviors

Future Work + Summary

- ## Future work
  - Extend models of ISP to collaborative-ISP
  - Look at differences between awareness vs. independent

- ## Summary
  - Showed ResultsSpace features and design rationale
  - Described development of a task scenario and method for studying asynchronous collaborative search
  - Reported preliminary results from an observational study

Questions?

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Collaborative Info Seeking Workshop at CSCW 2013
collab.inforseeking.org
Position papers due: Nov 14