Det Informationsvidenskabelige Akademi

Searching for Expertise

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Royal School of Library & Information Science
University of Copenhagen

IVA/CCC seminar
April 24, 2013

Outline

- Introduction
- Expertise databases
- Expertise seeking tasks
- Document-centric expert finding
- Designing a university-wide expert search engine
- Results
- Conclusions

Searching for people

- Knowledge workers spend around **25%** of their time searching for information
  - **99%** report using other **people as information sources**
  - **14.4%** of their time is spent on this (56% depending on your definition)
  - **Why** do people search for other people? (Hertzum & Pejtersen, 2005)
    - Search documents to **find relevant people**
    - Search people to **find relevant documents**

- **Expertise search engines** support this need for people search
  - Searching for **people** instead of **documents**

Expert Search

Navigation
Next

Language
Dutch

"machine learning" "speech recognition"

☐ Show English documents only

Start search

Results **1** - **10** of **35** for **“machine learning” “speech recognition”**

1. **prof.dr. A.P.J. van den Bosch**
FGW:, Faculty Humanities

Detecting problematic turns in human-machine interactions: Rule induction versus memory-based learning approaches *(publication, 2001)*

Improving machine-learned detection of miscommunications in human-machine dialogues through informed data splitting *(publication, 2002)*

Display all documents (46 more)...

2. **prof.dr. E.J. Krahmer**
FGW:, Faculty Humanities

Detecting problematic turns in human-machine interactions: Rule induction versus memory-

Why is expertise search useful?

- **Industry**
  - Enables rapid formation of project teams
  - Easier to respond to market threats or opportunities
  - Helps simulate effects of gain/loss of expertise

- **Academia**
  - Makes experts more findable for our communication advisors and media
  - Facilitates intra- and inter-university research collaboration
  - Supports finding the most appropriate thesis supervisors
  - Matching reviewers to papers & project proposals

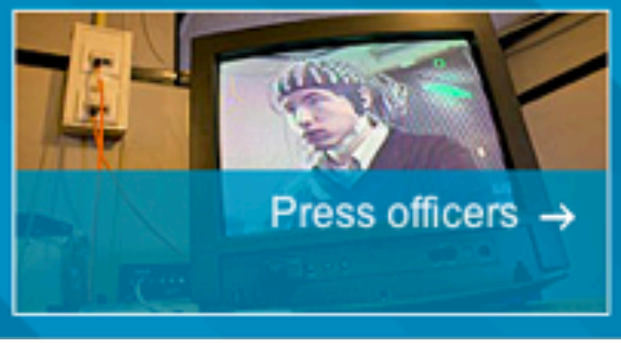
Historical solution: expertise databases

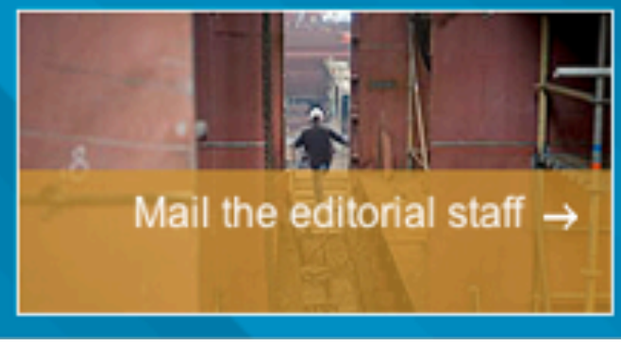
- **Manually** constructing a database of people's expertise
  - Similar to describing books in a library
    - Create a database record for each person
    - Name, contact information, expertise areas

- How to assess expertise?
  - **Top-down** (one person assesses everyone)
  - **Bottom-up** (people assess themselves)
    - Most common approach since the 1980s

Experts & Expertise

Many researchers, scientists and support staff are working at Tilburg University. Search for a certain individual, or within a certain expertise to find the right person.





Experts

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Expertise

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Search experts

Which researcher or scientist are you looking for?

Also search for support staff

Search expertise

In which field are you looking for a researcher or scientist?

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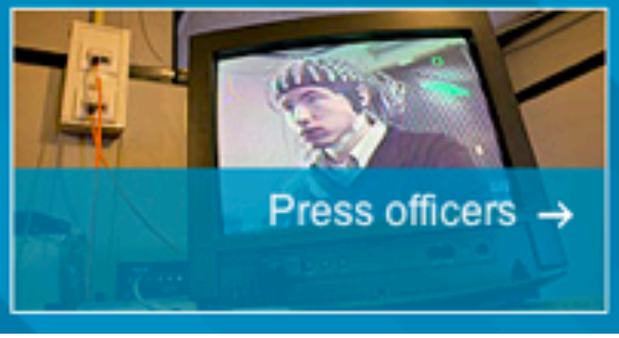


B

Scientists

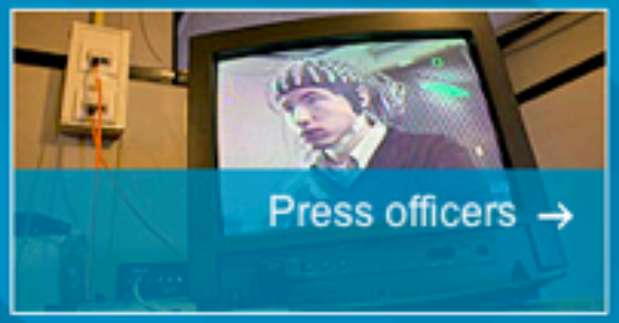
Baaijens, J.
Baars, M.A.A.H. (Mirjam)
Baart, A.J.
Bac, A.D. (Aad)
Backus, A.M.
Baele, L.T.M.
Baert MSc, H.J.P. (Hilde)
van Baest, L.J.A.M. (Luc)
Bahtiyar, Z.
van Bakel, H.J.A. (Hedwig)
Bakk, Z. (Zsuzsa)
de Bakker, D.H.
de Bakker, W.J.C.
Bakker, R.M.
Bakker LLM, E.G. (Esther)
Balsters, M.J.H. (Martijn)
Baltaretu MA, A.A. (Adriana)
Barendrecht, J.M.
Barendregt, C.S.
Bargeman, A.
Barkó, T. (Tamas)
Barlage MSc, M. (Melody)
Barten, T. (Tessa)
Bastings MSc, LLM, C.P.A.M. (Charlotte)
Bastmeijer, C.J.
Baudet, T.H.P.
Bax, P.A. (Sander)
Becheri, I.G.
Beck, H.L.
Beck, T.H.L.
Becking MPA, K.M. (Koen)
van der Beek, N.T. (Nienke)
van der Beek MA, S.E.

Support staff

van Baal, R.L.J. (Reinier)
van Baal, J.E. (Joost)
van Baal, S.
van Baalen BSc, S.
Baars, J.
Baart, M.
Baas BA, D.R. (Dennis)
Baccianti, C.
de Backer, D.T.A.C.M.
Baddi, K.
Baenen, D.H.A.
Baert, S.A.M. (Shirley)
Baert, L.
Baeten, W.J.G.
Baggerman, A.
van Bakel, M.M.F.J.
Bakermans LLB, T.J. (Tessa)
Bakker, A.H.M.
Bakkes, S.C.J.
van Balen, P.M. (Peter)
van Balen, M.A.I.
Balk, R.P.
van Ballegoy, E.M. (Erna)
Balvers, M.P.J.M.
Bardoel, F.A.M. (Francine)
Barelds MSc, A.
van Baren, L.C.
Bartels, G.C. (Gerard)
Bartels BA, K.
Barten, L.
Bassie, M. (Marjan)
van Basten Batenburg, R.J.M. (Remko)
Bastiaans, M.R. (Martijn)

Experts & Expertise

Many researchers, scientists and support staff are working at Tilburg University. Search for a certain individual, or within a certain expertise to find the right person.



A.P.J. van den Bosch

Tilburg School of Humanities

Expertise

My research is positioned in the intersection between artificial intelligence and linguistics. I am specialized in machine learning and language technology / computational linguistics. I develop computer systems that learn to pronounce text, parse, or translate, based on examples of these tasks, autonomously. As for applications, I have professional experience with speech synthesis, the automatic syntactic and semantic analysis of text, text mining, dialogue systems, machine translation, and spelling correction.

Key words

- Artificial intelligence
- Computer linguistics
- Language technology
- Recommender system
- Speech technology
- Syntax
- Talking computer

Publications

Search experts

Which researcher or scientist are you looking for?

Also search for support staff

Search expertise

In which field are you looking for a researcher or scientist?

Press officers

Press officers at Tilburg University

Editorial staff

website@tilburguniversity.edu

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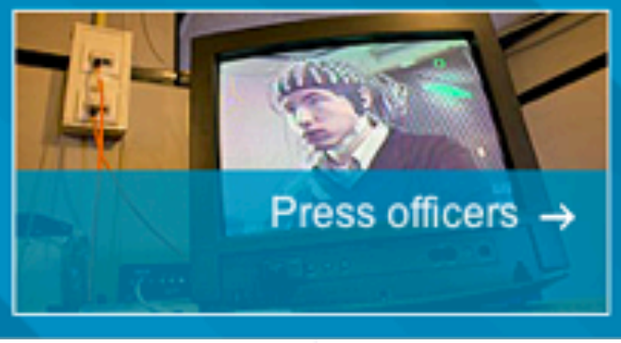

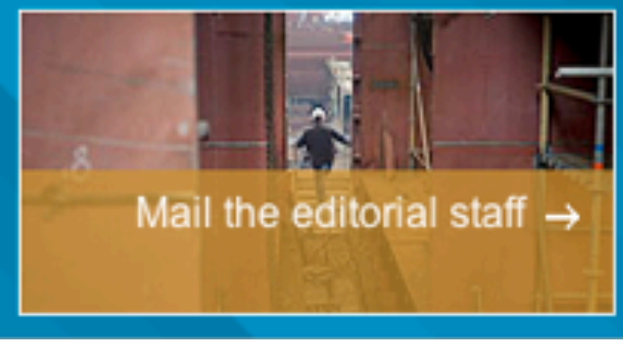

Language technology

- S. Wubben MA
- P.J.F.J. Broeder
- M.W.C. (Martin) Reynaert
- A.P.J. van den Bosch

See also:

- Computer linguistics
- Language technology and computers

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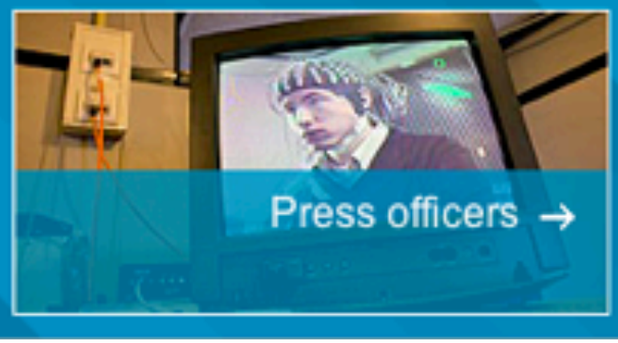

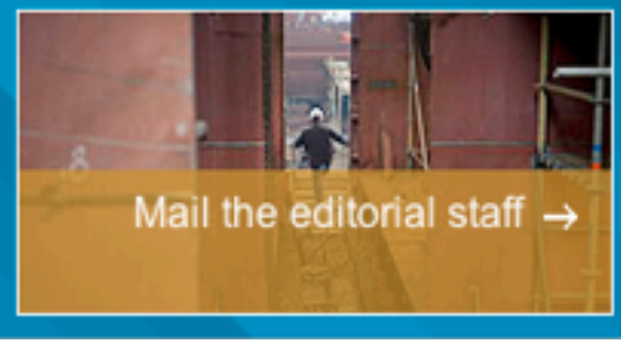

Profile | CV | Research | Other activities | Contact

A.P.J. van den Bosch

Tilburg School of Humanities

Exact-match search only!

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Problems with expertise databases

- Vocabulary problem
- Requires explicit effort from experts
- Rapidly outdated
- Over/underestimation of expertise

Solution: expertise search engines

- Expertise search engines can support different tasks

- **Expert finding** (“*Who is the expert on X?*”)
  - Find the experts on a specific topic

- **Expert profiling** (“*What is the expertise of X?*”)
  - Find out what one expert knows about different topics

Expert finding

- Most promising approach mirrors human search behavior
  - Search for relevant documents to find people (Hertzum & Pejtersen, 2005)
  - Also known as **document-centric expert finding**

- Three steps
  1. **Locate** relevant **expertise evidence** (e.g., articles, reports, etc.)
  2. **Associate** candidate experts with the expertise evidence
  3. **Rank** experts by their associated evidence

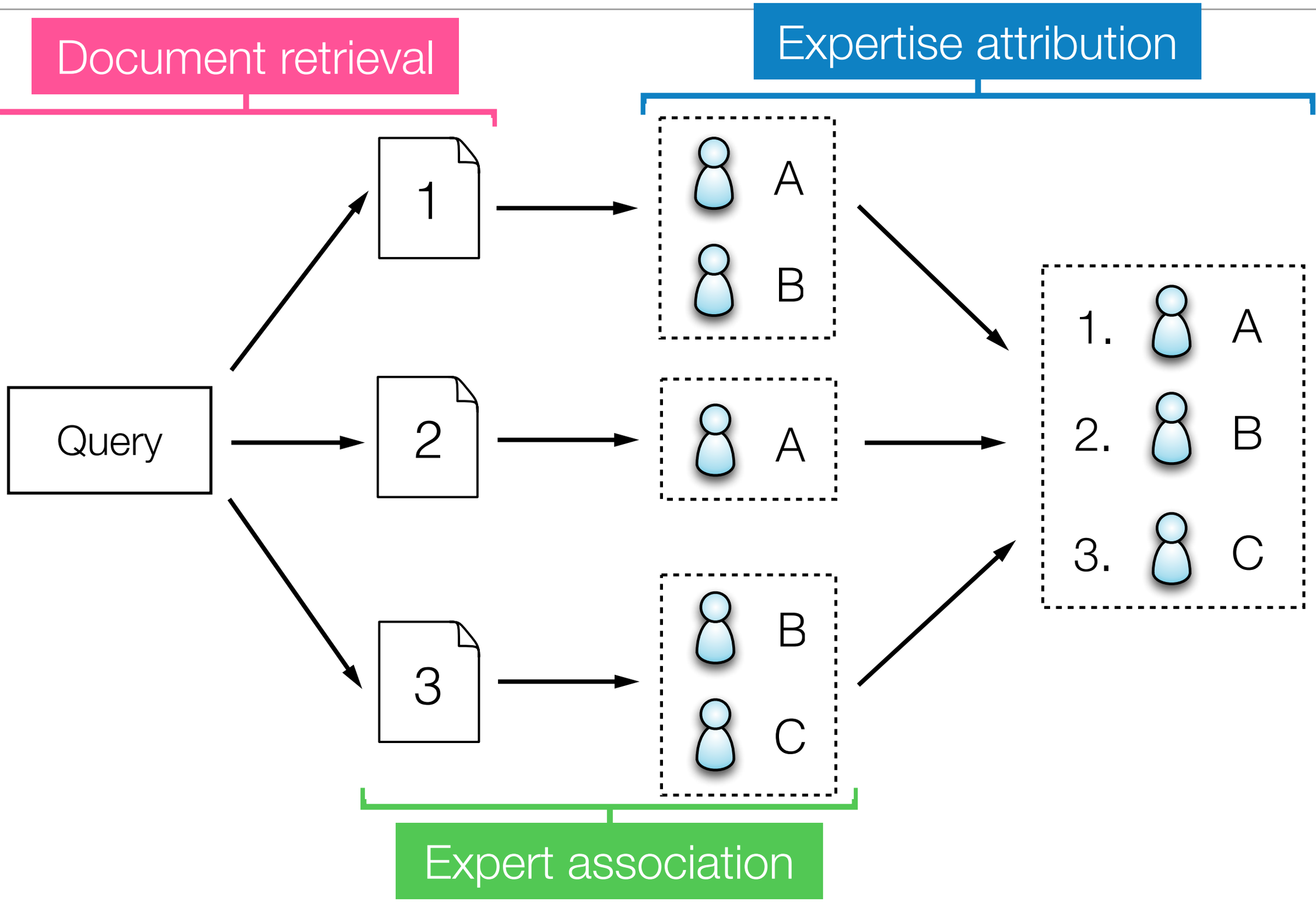
Examples of expertise evidence

- **Content-based evidence**
  - Articles, books, technical reports, etc.
  - Resumes and homepages
  - E-mail or forum messages
  - Corporate communications
- **Social evidence**
  - Organizational structure
  - E-mail networks
  - Bibliographic information

Examples of expertise evidence

- **Activity-based evidence**
  - Software library usage
  - Search and publication history
  - Project time charges

Document-centric expert finding



Document-centric expert finding

- **Document retrieval**
  - Can use a regular search engine for this → saves in development costs!
- **Expert association**
  - Difficulty depends on the type of expertise evidence
- **Expert attribution**
  - Different methods
    - Expert receives **score** of most relevant document
    - Expert receives the **sum** of all his/her document relevance scores
    - Expert receives the **weighted sum** of all his/her document relevance scores

Designing a university-wide expert search engine

- Problems with old situation at Tilburg University
  - New researchers at Tilburg University cannot be found
  - People who do not have an expertise profile cannot be found
  - Information divided over different repositories

- Solution: designing a **university-wide** expert search engine
  - Covered **1,944 experts** at Tilburg University
  - Data sources include publications (40,000+), theses (12,500+), course descriptions, research descriptions, self-assessed expertise areas

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Display all documents (14 more)...

3. **Prof.Dr. M.G.J. Swerts**
FGW:, Faculty Humanities

- Detecting problematic turns in human-machine interactions: Rule induction versus memory-based learning approaches *(publication, 2001)*
- Improving machine-learned detection of miscommunications in human-machine dialogues through informed data splitting *(publication, 2002)*

Display all documents (9 more)...

- Error Detection in Spoken Human-Machine Interaction *(publication, 2001)*
- The dual of denial: Two uses of disconfirmations in dialogue and their prosodic correlates *(publication, 2002)*
- Problem Detection in Human-Machine Interactions based on Facial Expressions of Users *(publication, 2005)*
- Audiovisual perception of communication problems *(publication, 2004)*
- Audiovisual cues to uncertainty *(publication, 2003)*
- How auditory and visual prosody is used in end-of-utterance detection *(publication, 2006)*
- Audiovisual prosody and feeling of knowing *(publication, 2005)*
- The communicative import of gestures: Evidence from a comparative analysis of human-human and human-machine interactions *(publication, 2007)*
- Predicting end of utterance in multimodal and unimodal conditions *(publication, 2005)*

4. **dr. P.K. Lendvai**
FGW:, Faculty Humanities

Evaluating a university-wide expert search engine

- Expert-based evaluation

  - Enlisted 30 Tilburg university researchers

    - Randomly selected, proportionately divided over the different faculties

  - Asked to write down a self-selected expertise area, **rate their own expertise** and that of **five other university researchers**

    - Provided us with expert-assessed relevance judgments for optimization

  - Query the expert search engine for this expertise area and evaluate the results

  - Mean satisfaction was **3.77** on a five-point Likert scale (SD = 0.90)

Evaluating a university-wide expert search engine

- User-based evaluation
  - Comparing **two systems**
    - Our expert search engine (**new system**)
    - Any combination of the other information sources (expertise database, publication and thesis repositories, course catalog, intranet search engine) (**old system**)
  - with two different **user groups**
    - 57 Tilburg University students (**internal** to Tilburg University)
    - 44 Dutch high-school seniors (**external** to Tilburg University)
  - that each completed **six** expertise seeking tasks
    - 3 expert finding tasks
    - 3 thesis supervisor finding tasks

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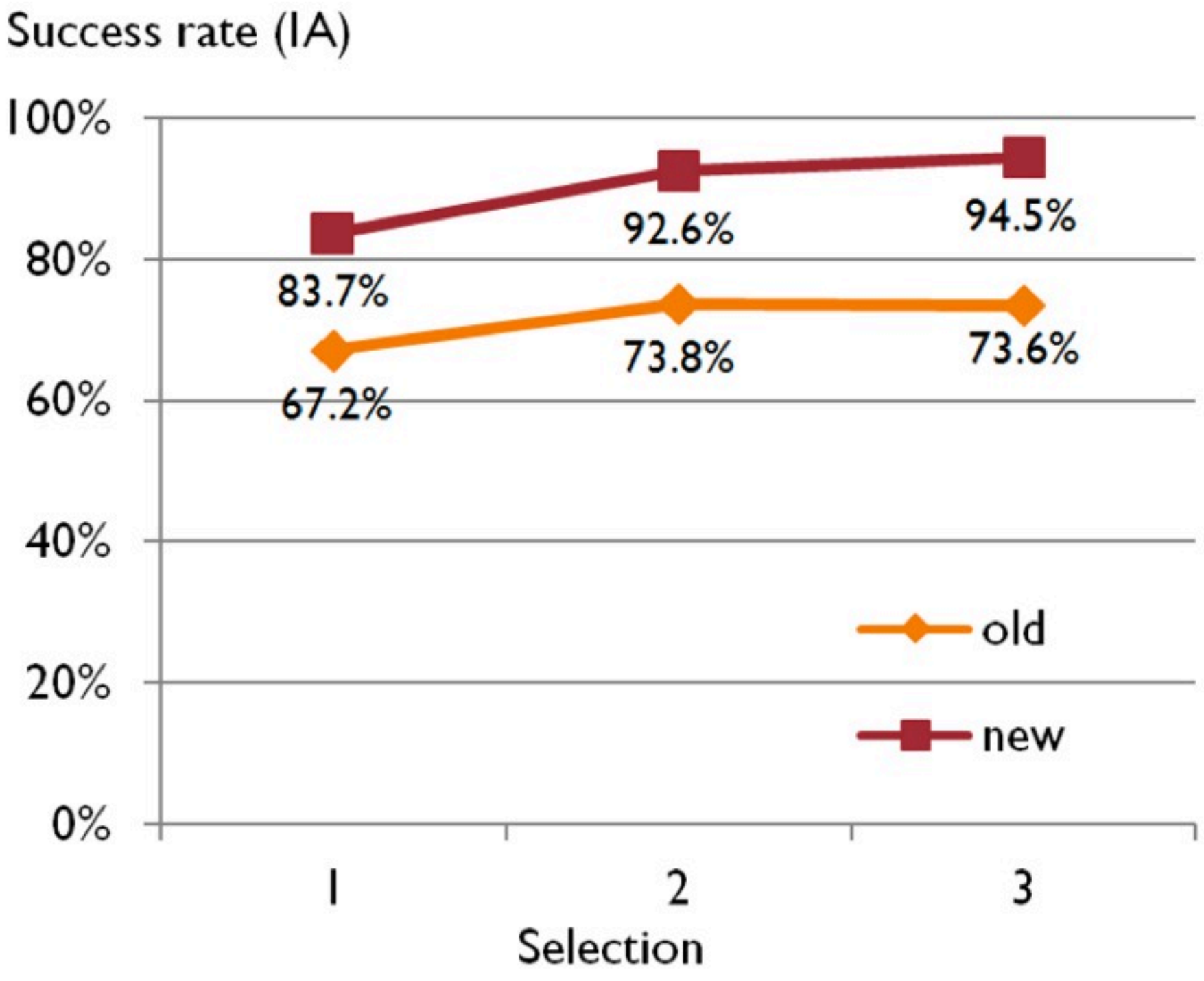
Example expert finding task:

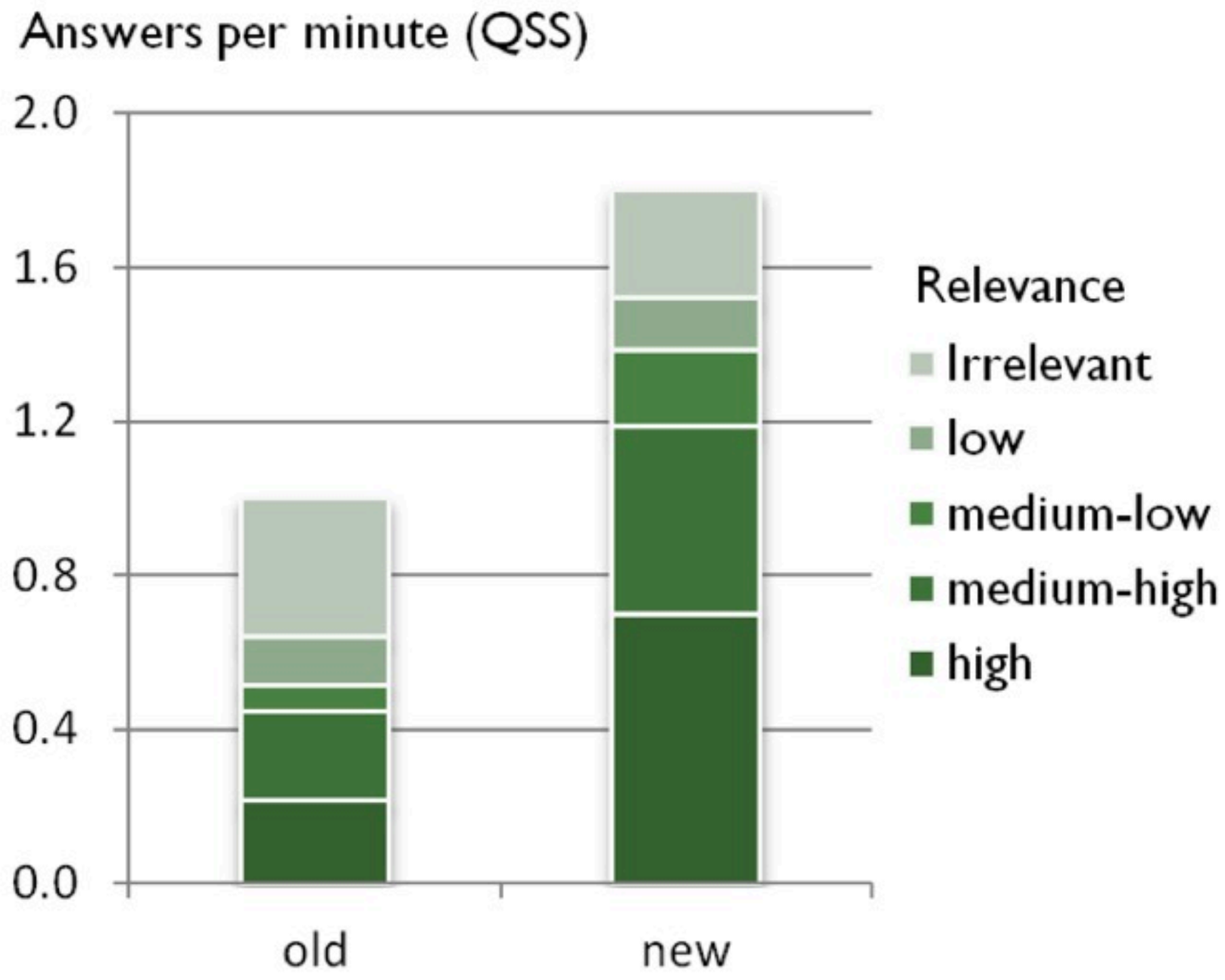
Tax competition is a governmental strategy of attracting foreign direct investment and high value human resources by their taxation level.

A newspaper reporter is looking for experts on tax competition. Which experts within Tilburg University would you recommend?

Results: Effectiveness



Results: Efficiency



Results: Satisfaction & learning curve

- High satisfaction of all groups
  - Overall mean satisfaction of **4.08** (SD 0.66)

- **No learning curve** for external users!
  - Externals found **0.87 answers/minute** with the new system (compared to 0.19 for the old system)
    - More than four times as fast!
  - Internals found **0.58 answers/minute** with the new system (vs. 0.22)

Conclusions

- What do we know?

  - Supporting the need to search for experts is important

  - Expertise databases **just don't cut it**

  - Need to design search engines that successfully support expert search

  - **Searching for documents to find people** is a good expert search strategy

  - Expert search engines are **more effective, efficient and satisfying** to use than existing, disparate systems

Conclusions

- Open questions

  - Which **contextual factors** influence the search for experts?

    - Media experience, topical knowledge, familiarity are all important
    - What about other contextual information?

  - Scaling problems?

    - How can we scale up to **nation-wide expert search**?

  - Visualization of expertise

    - How can we best **visualize** the search results of an expert search engine?
    - How should people **interact** with the search results of an expert search engine?

Questions? Comments? Suggestions?