Exploring the Reality of Professional Search Beyond Academic Advancements in NLP and IR

Udo Kruschwitz
University of Regensburg

25 July 2024

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Setting the Scene

- Yesterday you learned a lot about NLP, IR and how the two fields have moved closer together
- You also know that NLP and IR have witnessed astonishing progress in the last 5 years
- ChatGPT is an impressive example of this shift
- But if you ask a patent expert or a medical expert, they will be much less impressed by ChatGPT & Co. How come?

My Job Today

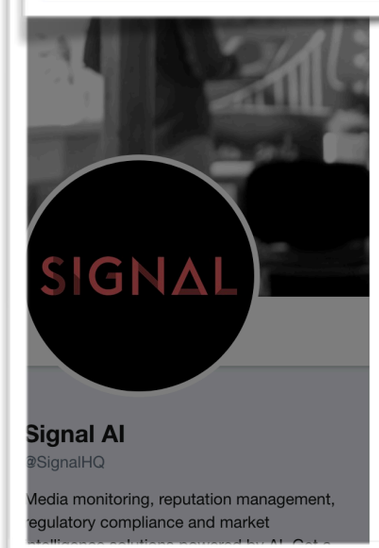
- Introduce you to *Professional Search*, an interesting subfield of IR that has received much less (academic) attention than Web Search
- Explore why advances as reported by research papers have not much changed the way professional search is being conducted
- Ideally: make you want to read up on it

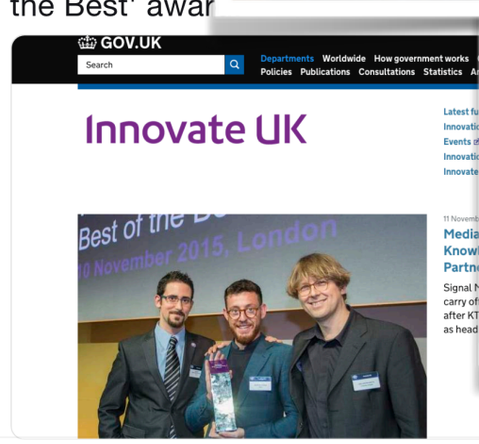
Let’s start with a single slide about myself

Some Activities I am Involved in

Information Retrieval specialist group: Search Solutions

Search Solutions is an annual conference that is usually held in November

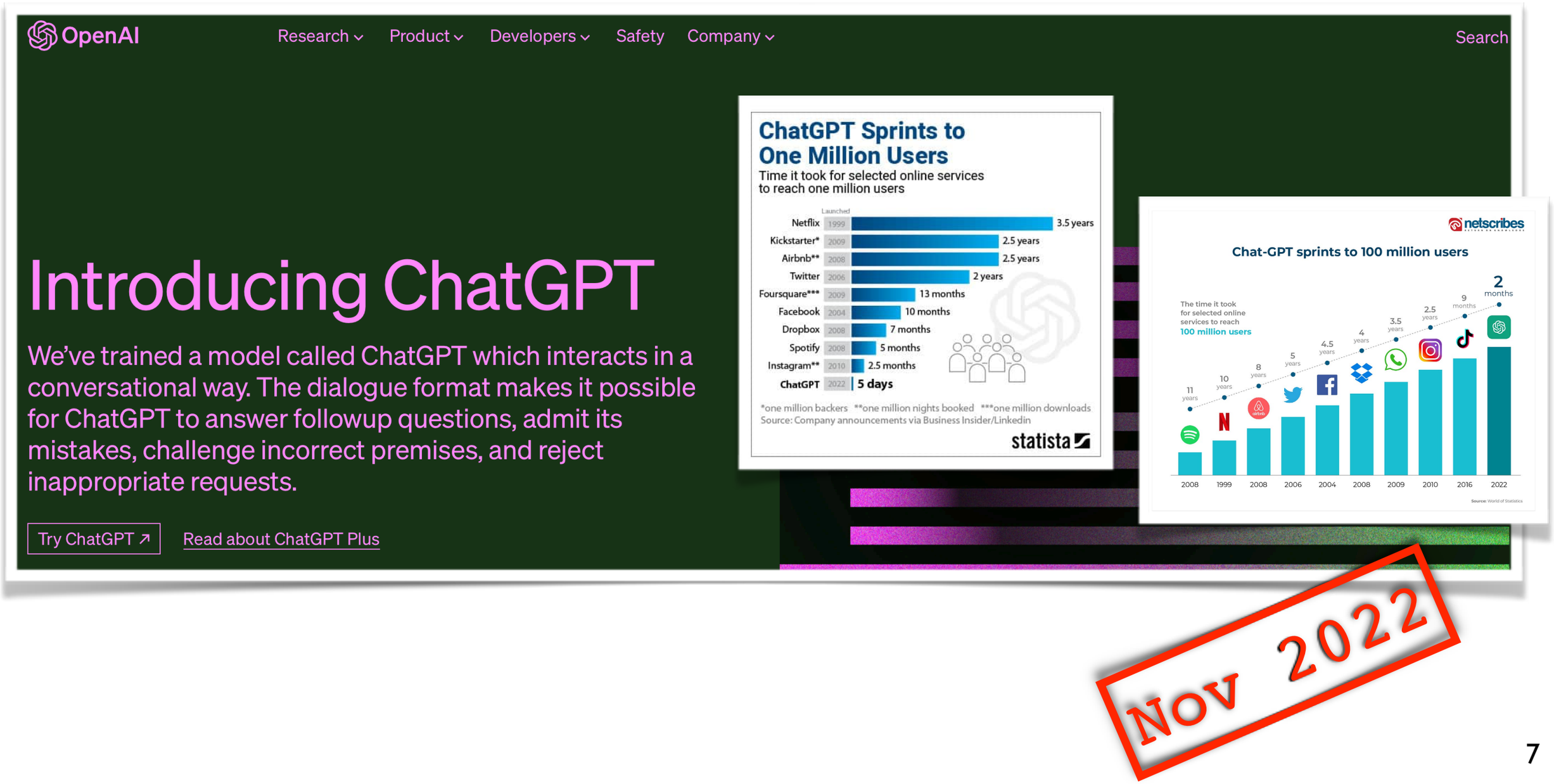




NLP + IR

… over to my talk …

The Context



Nov 2022

What followed

STEPHEN THOMAS IDEAS APR 21, 2023 9:00 AM

Who Will You Be After ChatGPT Takes Your Job?

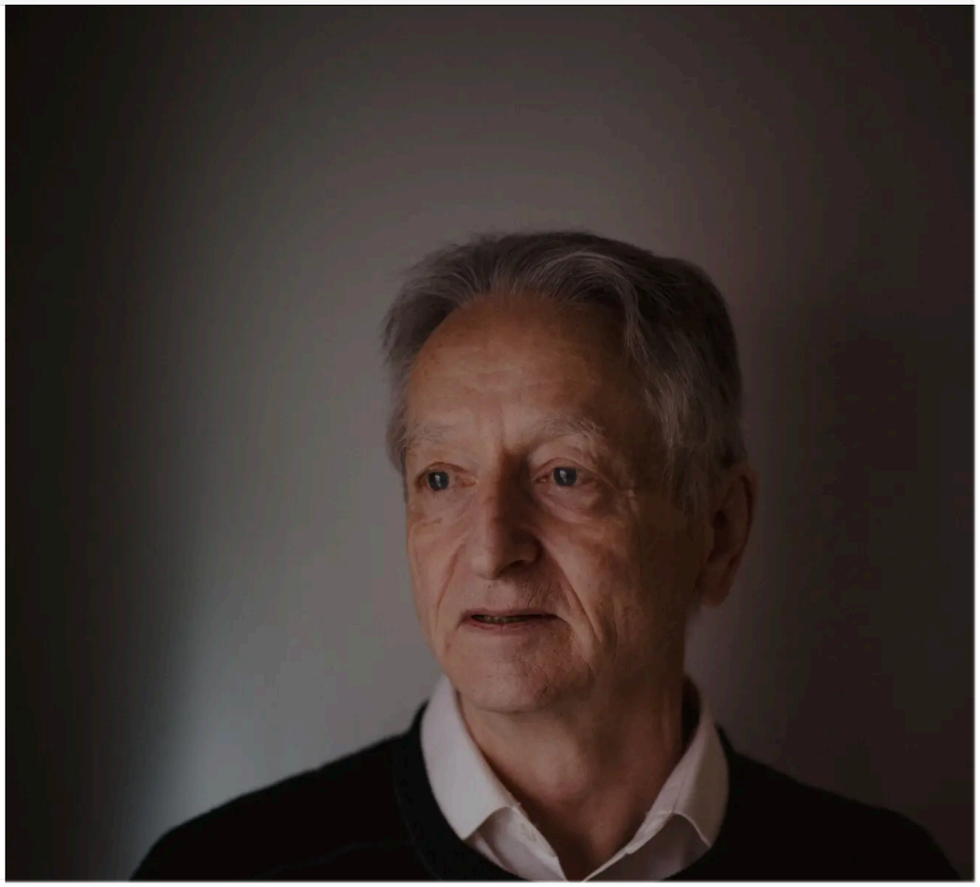
Generative A

ChatGP

'The Godfather of AI' Quits Google and Warns of Danger Ahead - The New York Times

'The Godfather of A.I.' Leaves Google and Warns of Danger Ahead

For half a century, Geoffrey Hinton nurtured the technology at the heart of chatbots like ChatGPT. Now he worries it will cause serious harm.



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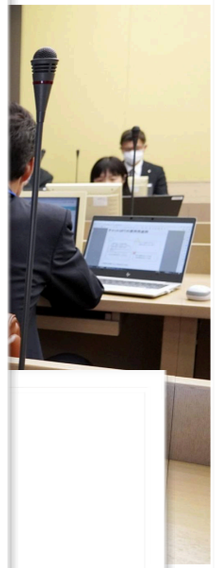

S

A

e that.

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2024: NLP / IR Problems Solved?

nature

Explore content ⌄ About the journal ⌄ Pu

nature > news > article

NEWS | 15 April 2024

AI now beats hum.
— new benchmark
major report

Stanford Uni
tools.

IEEE Spectrum / AI Outperforms Humans in Theory of Mind Tests

Type to search

NEWS | ARTIFICIAL INTELLIGENCE

AI Outperforms Humans in Theory of Mind Tests › Large language models convincingly mimic the understanding of mental states

BY ELIZA STRICKLAND | 20 MAY 2024 | 5 MIN READ

In the past several years, some AI systems have surpassed human performance on certain benchmark tests, and others have made rapid progress.

— Image classification
— Basic-level reading comprehension
— Visual commonsense reasoning*
— Multitask language understanding†

al Issues Jobs

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Google DeepMind unveils 'superhuman' AI system that excels in fact-checking, saving costs and improving accuracy

Michael Nuñez
@MichaelFNunez

March 28, 2024 4:31 PM

Let’s get back to that later …

Motivational Question …

Search = Web Search?

Not quite …

Beyond Web Search

Web search is not everything, many more search applications exist, e.g. …

Beyond Web Search

- Desktop search
- Digital library search
- Database search
- Expertise search
- Product search
- Blog search
- Enterprise search
- Professional search
- … and the search continues …

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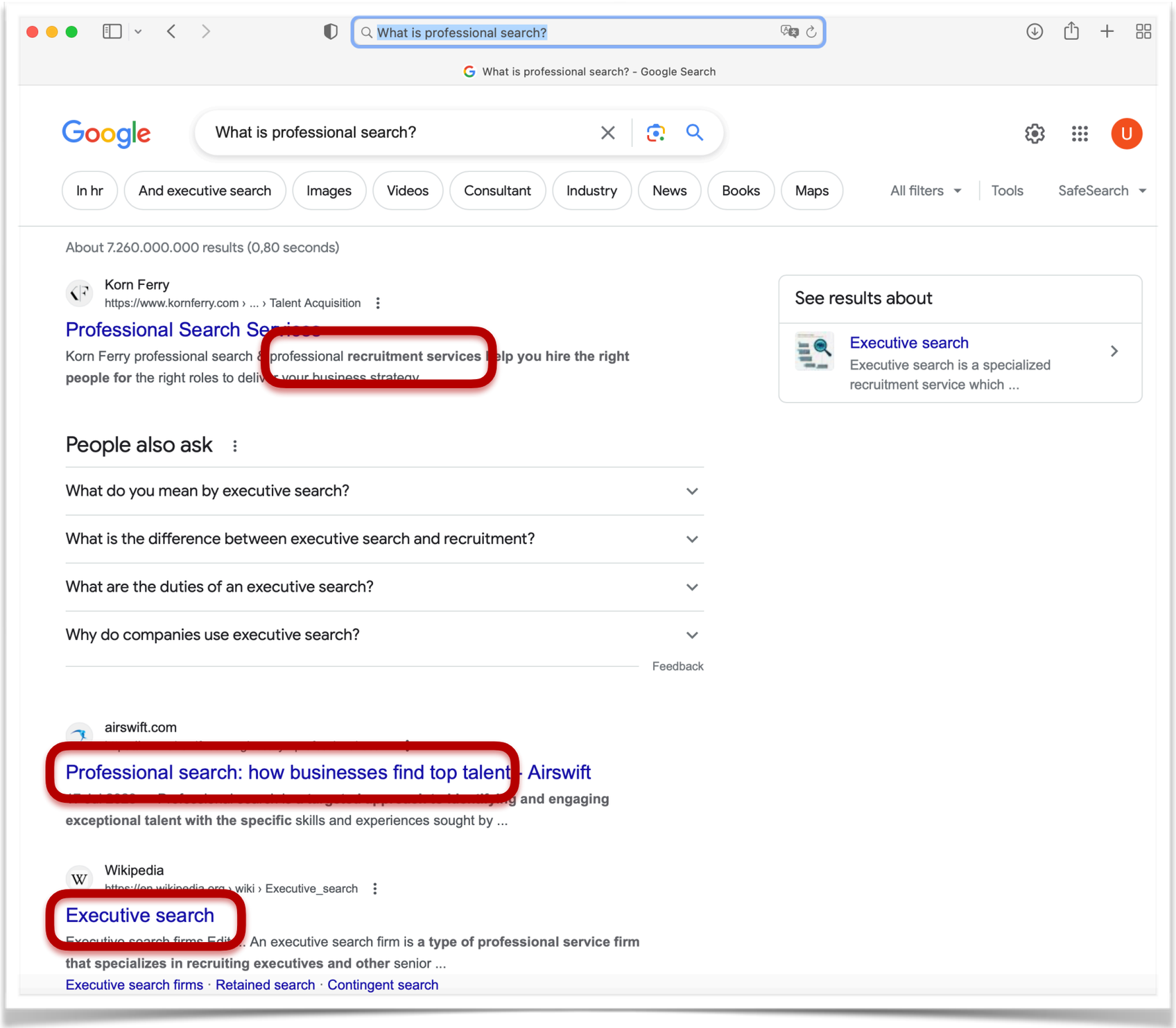
Beyond Web Search

- **Desktop search**
- **Digital library search**
- **Database search**
- **Expertise search**
- **Product search**
- Blog search
- **Enterprise search**
- **Professional search**
- …

most of them pre-date Web Search

What is Professional Search?

What is Professional Search?



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What is Professional Search?

The meaning of "professional search" can vary depending on the specific context in which it is used. It generally relates to searching for information, individuals, or services that cater to the needs of professionals or businesses.

ChatGPT

What is Professional Search?

What is professional search?

Sources

Professional search: how businesses find top...
airswift · 1

Professional Search Services | Korn Ferry
kornferry · 2

Executive search - Wikipedia
en.wikipedia · 3

View 2 more

Answer

Professional search, also known as executive search or headhunting, is a specialized recruitment service focused on identifying and engaging highly skilled and experienced candidates for specific roles within organizations. This approach is distinct from traditional job searching, as it targets passive candidates who may not be actively seeking new opportunities but possess the necessary skills and experience required by the hiring company [1] [2].

Perplexity

What is Professional Search?

An Introduction to Professional Search

John I. Tait

johntait.net Ltd.

Today, in the early 21st century, for most people, if one talks about "search" people tend to automatically think of the use of modern internet search engines like Google, Bing!, Baidu or Yandex. Further people think of either general members of the public, or people whose primary job function is not search, undertaking the searches. However, for most of the history of information retrieval, searching has been done by professional information specialists, whose training and skills were and are focussed on locating and retrieving information for and on behalf of others. This volume is focussed on recent research, principally undertaken in the context of the EU-funded COST network MUMIA, reviewing new, mainly technological, research intended to address the needs of professional searchers.

Professional search is defined by the fact that the searchers are undertaking the searches on a professional, paid, basis, as opposed to of their own volition on a voluntary basis out of personal interest. Typically, professional searchers are provided with a brief of some sort ("Find enforceable Indian patents relating to the use of nor epinephrine reuptake inhibitors in the treatment of depression") together with a budget in time or money.

This has two main consequences for the professional searchers methods of working. First, it generates various potential additional sources of error: they may misunderstand the brief, for example because of a lack of technical or legal expertise; or they may not properly understand the notions of relevance for retrieved docu-

Let’s adopt that definition

Professional Search

- Search conducted on a professional, paid basis
- Information need is provided as some sort of brief
- Not simply QA
- Implies costs (time / money)
- Outcome with potentially significant consequences
- Very different from Web search

Let’s look at some examples

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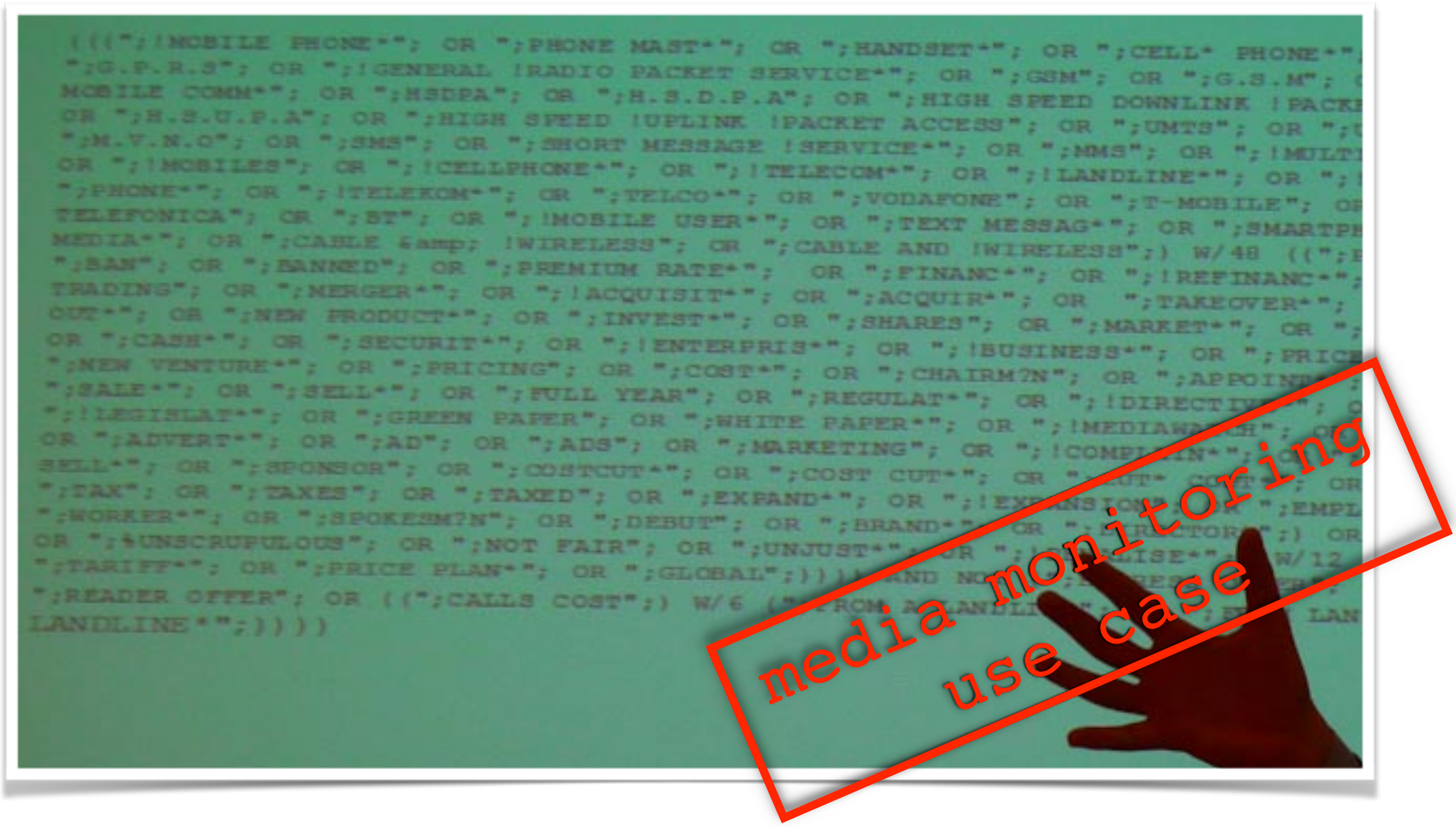
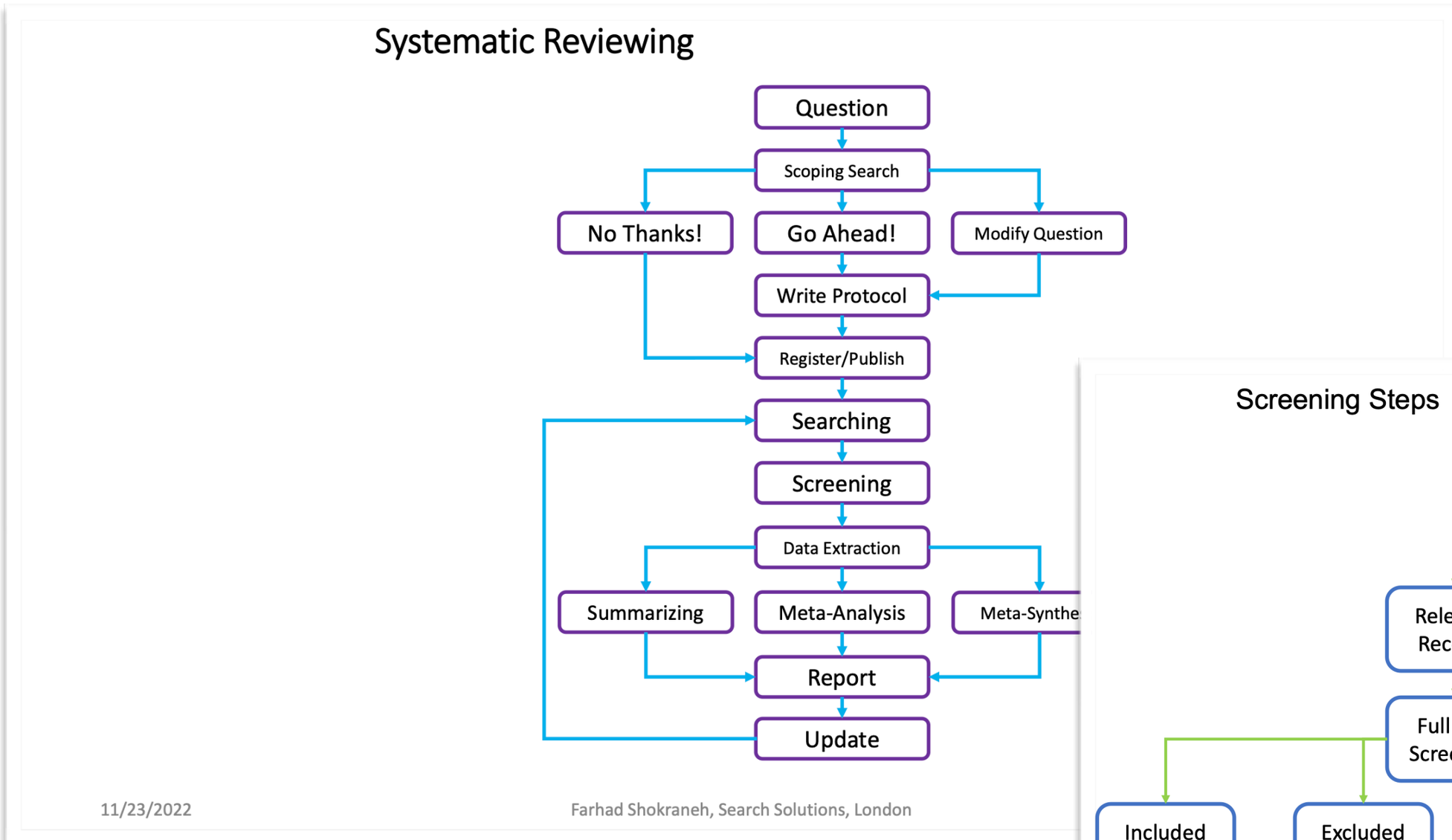
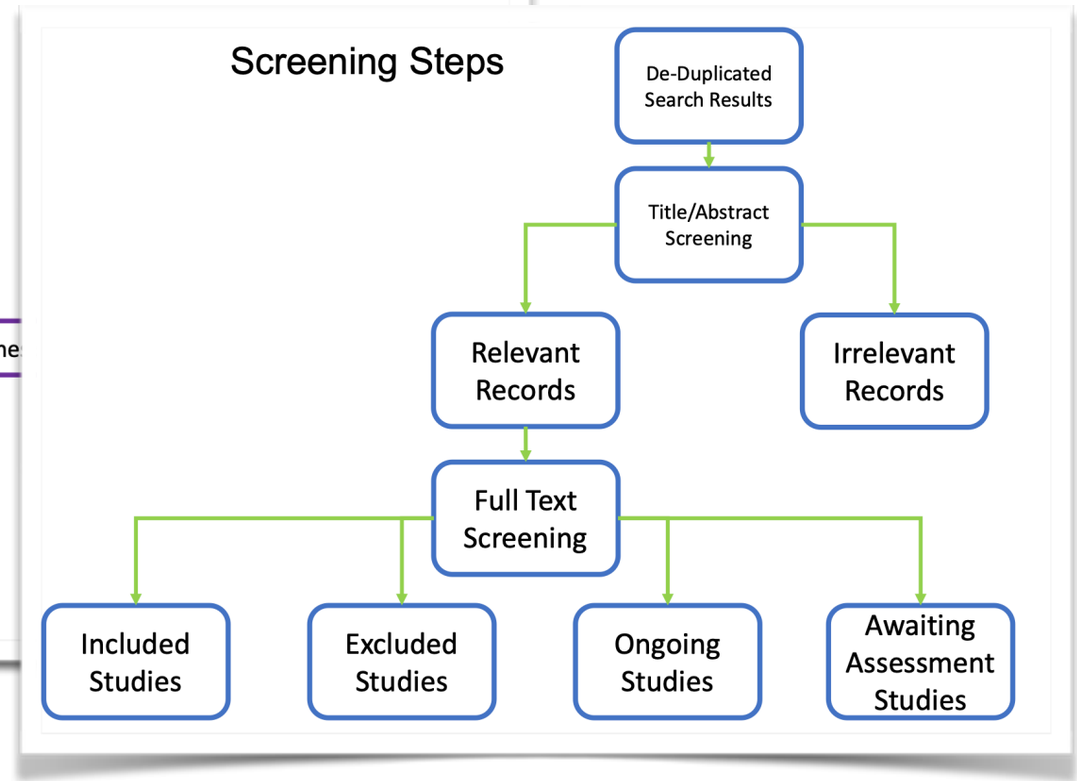
Professional Search …

… can involve complex *queries*



… can be a complex *process*





https://www.bcs.org/media/10480/ss22-tutorial-fshokraneh.pdf

… can be *expensive*

opentext™

SUCCESS STORY

Serious Fraud Office

Industry
- Government

Solution
- OpenText™ Axcelerate™

Services
- OpenText™ Professional Service

Results

- **Simplified document review process** saves time
- Identified relevant documents, **categorizing and analyzing data automatically**
- **Increased efficiency** of investigators and prosecutors to **expedite cases**

SFO serious fraud office

Serious Fraud intelligence i

UK fraud investigators tur eDiscovery solution, to ex

"We're presenting OpenTex to investigators to use the t analytics to get to the docu and to understand the case That's really important to us Axcelerate changes the wa investigate. It has become a more intuitive and iterative We're embedding that in the our investigations now."

Richard Day
Head of eDiscovery
Serious Fraud Office

The Serious Fraud Office (SFO) is a branch of the UK criminal justice system dedicated to investigating and prosecuting large-scale cases of fraud, bribery and corruption. Its jurisdiction includes England, Wales and Northern Ireland, but its investigations frequently require collaboration with law enforcement agencies around the world.

The white-collar crimes pursued by the SFO require complex, time-consuming and resource-intensive investigations as criminals invent new ways to propagate fraud and hide evidence. Richard Day, head of eDiscovery at the Serious Fraud Office, explained: ***"Fraud is constantly evolving. The internet has been a massive boon for fraudsters."***

Each case requires SFO investigators to review staggering numbers of documents. ***"The volume of data is a huge challenge,"*** said Day.

Ben Denison, chief technology officer at the Serious Fraud Office, described some recent examples. ***"The Panama Papers leak involved 10.5 million documents. Our investigation into a bribery case with Rolls-Royce had 30 million. We've got one now with 60 million and another one in the pipeline with potentially 100 million documents."***

To meet these challenges, the SFO has turned to artificial intelligence (AI), a powerful new weapon in the fight against crime. Using AI to review, analyze and provide insight into vast amounts of digital content, the SFO can expedite its investigations and improve its chances of successfully prosecuting economic crimes. ***"We've had to change the way that we work. We can no longer just sit in front of a data pool and throw search terms at it,"*** explained Day. ***"It would take a team of 10 reviewers three years to look through two million documents. It's just not possible. We have to find defensible ways to cut it down. AI technology is no longer 'nice to have' for us—we have to have it."***

https://www.opentext.com/file_source/OpenText/Customers/en_US/PDF/sfo-19-en.pdf

… can be *time-consuming*

- Not a one-off ad hoc query submitted to a search engine
- Can take a long time to finish a search (up to months for systematic reviews, not much different for e-discovery)

DOI: dx.doi.org/10.5195/jmla.2018.323

It takes longer than you think: librarian time spent on systematic review tasks*

Krystal Bullers, AHIP; Allison M. Howard, AHIP; Ardis Hanson; William D. Kearns; John J. Orriola; Randall L. Polo; Kristen A. Sakmar

See end of article for authors' affiliations.

Introduction: The authors examined the time that medical librarians spent on specific tasks for systematic reviews (SRs): interview process, search strategy development, search strategy translation, documentation, deliverables, search methodology writing, and instruction. We also investigated relationships among the time spent on SR tasks, years of experience, and number of completed SRs to gain a better understanding of the time spent on SR tasks from time, staffing, and project management perspectives.

Methods: A confidential survey and study description were sent to medical library directors who were members of the Association of Academic Health Sciences Libraries as well as librarians serving members of the Association of American Medical Colleges or American Osteopathic Association.

Results: Of the 185 participants, 143 (77%) had worked on an SR within the last 5 years. The number of SRs conducted by participants during their careers ranged from 1 to 500, with a median of 5. The major component of time spent was on search strategy development and translation. Average aggregated time for standard tasks was 26.9 hours, with a median of 18.5 hours. Task time was unrelated to the number of SRs but was positively correlated with years of SR experience.

… requires *expertise*

- Health specialists
- Patent examiners
- Legal experts
- Search professionals of various flavours

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… can have wide-ranging *impact*

FORBES > INNOVATION > HEALTHCARE

Journal Retracts Flawed Study That Claimed Face Masks May Cause Covid-19 Symptoms

Bruce Y. Lee Senior Contributor

I am a writer, journalist, professor, systems modeler, computational and digital health expert, avocado-...

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0

May 24, 2023, 07:06am EDT

Forbes

Timothy Caulfield · May 19, 2023
@CaulfieldTim · **Follow**

Often referenced "masks do harm" study retracted.

See: frontiersin.org/articles/10.33...

Editors: "...complaints were valid ... the article does not meet the standards of editorial & scientific soundness..."

Will likely live on as a zombie & retraction part of a conspiracy narrative.

RETRACTION article
Front. Public Health
Sec. Environmental health and Exposome
Volume 11 - 2023 | doi: 10.3389/fpubh.2023.1221666

Retraction: Physio-metabolic and clinical consequences of wearing face masks - Systematic review with meta-analysis and comprehensive evaluation

Frontiers Editorial Office[1*]

Stacey Butters #fella
@drstaceybutters · **Follow**

Thankfully retracted, but immense harm done by it already when published.

3:30 AM · May 21, 2023

First Take-home Messages

- Professional search is very different to Web search (e.g., query structure, complexity, search time)
- Searchers are professionals in their field
- Goal: support decision-making (much at stake!)
- Cost implications
- Not much attention in the academic community
- … but demand in industry

Let’s drill down a bit more

Example 1: Patent Search Strategy

```
1. A01N0025-004/CPC
2. RODENT OR RAT OR RATS OR MOUSE OR MICE
3. BAIT OR POISON
4. 2 AND 3
5. 1 OR 4
6. AVERSIVE OR ADVERSIVE OR DETER? OR REPEL?
7. NONTARGET OR (NON WITH TARGET) OR HUMAN OR
   DOMESTIC OR PET OR DOG OR CAT
8. 6 AND 7
9. 8 AND 5
10.     BITREX OR DENATONIUM OR BITREXENE OR
   BITTERANT OR BITTER
11.     10 AND 5
12.     9 OR 11
```

Examples adopted from Russell-Rose et al. (2018)

Example 2: Legal Database Search

```
express! or explicit! or specific! or directly w/25
third w/5 beneficiary w/25 contract or agreement or
clause or terms or provision w/25 "not" or
inappropriat! or unnecessar! or redundan! or no or
never w/15 third party w/5 beneficiar! w/5 standard
or test or factor or element or criteria
```

Example 3: Healthcare Information

1. Attention Deficit Disorder with Hyperactivity
2. adhd
3. addh
4. adhs
5. hyperactiv$
6. hyper
7. atter
8. brair
9. OR/1-
10. Chil
11. Adol

12. child$ or boy$ or girl$ or schoolchild$ or adolescen$ or teen$ or "young person$" or "young people$" or youth$
13. OR/10-12
14. acupuncture therapy/or acupuncture, ear/or electroacupuncture/
15. accupunct$
16. OR/14-15
17. 9 AND 13 AND 16

You need to be an expert to even understand the query!

More about Queries …

- Commonly based on Boolean logic
- Reuse of queries (*query strategies*)
- Scrutable
- Include expert terminology
- Submitted to expert databases

And there are other concerns …

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… the need for high-quality data

Systematic Reviews

Home About Articles Submission Guidelines Submit manuscript

Research | Open Access | Published: 17 July 2019

The strong focus on positive results in abstracts may cause bias in systematic reviews: a case study on abstract reporting bias

Bram Duyx, Gerard M. H. Swaen, Miriam J. E. Urlings, Lex M. Bouter & Maurice P. Zeegers

Systematic Reviews **8**, Article number: 174 (2019) | Cite this article

2516

Abs

Bac

Rese
outc
limit

less likely to be detected by systematic searches and to appear in systematic reviews. We aim to assess the occurrence of this 'abstract reporting bias' and quantify its impact in the literature on the association between diesel exhaust exposure (DEE) and bladder cancer.

Conclusions

This case study on abstract reporting bias shows that (a) more than half of all relevant articles were missed by a conventional search query and (b) this led to an overestimation of the pooled effect. Detection of articles will be improved if all studied exposure and outcome variables are reported in the keywords. The restriction on the maximum number of keywords should be lifted.

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… the need for high-quality data

nature

Explore content ⌄ About the journal ⌄ Publish with us ⌄ Subscribe

nature > news feature > article

NEWS FEATURE 18 July 2023

Medicine is plagued by untrustworthy clinical trials. How many studies are faked or flawed?

Investigations suggest that, in some fields, at least one-quarter of clinical trials might be problematic or even entirely made up, warn some researchers. They urge stronger scrutiny.

Not even considering GenAI!

I hope you can appreciate the complexity of professional search

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Professional Search Market

THOMSON REUTERS

WESTLAW™

NIH National Library of Medicine
National Center for Biotechnology Information

Log in

PubMed®

Advanced

PubMed® comprises more than 36 million citations for biomedical l
Citations may include links to full text content from PubMed Centra

Trip medical database
A smart, fast tool to find high quality clinical research evidence

Search | PICO | Advanced Pro | Recent Pro

Search terms

Search

Market Research Reports

Leading eDiscovery Software Vendors in World

Company	Head Quarter	About
Symantec	California, U.S.	**Symantec Corporation** is an U.S. based software company headquartered in Mountain View, California. The company's primary product is cybersecurity software. **Symantec™ eDiscovery Platform is** powered by Clearwell.
Relativity	Illinois, U.S.	**kCura** which was founded in 2001, is a developer of **eDiscovery platform Relativity**. With the success of Relativity, its flagship e-discovery platform, kCura solidified itself as a leader in the e-discovery space.
exterro	Oregon, U.S.	**Exterro, Inc** is an U.S. based eDiscovery software company, founded in 2005 and headquartered in Oregon. Exterro helps some of the world's largest fortune 500 organizations work smarter and more efficiently. Company's main product is **Exterro Fusion e-discovery**
nuix	Sydney, Australia	**Nuix Pty Ltd** is an Australian technology company, founded in 2000. The company produces a software platform for indexing, searching, analyzing and extracting knowledge from unstructured data. Company's main product is **Nuix e-Discovery Workstation**
FTI CONSULTING	Washington, D.C. , U.S.	**FTI Consulting** was founded in 1982. FTI is an independent global business advisory firm dedicated to helping organizations manage change, mitigate risk and resolve disputes. Company's main product is **Ringtail eDiscovery software**
MICRO	Berkshire, England	**Micro Focus International** plc is a multinati software and information technology business based in Newbury, Micro Focus inherited

Disclaimer : All product names, logos, and brands are property of their respective owners. Infographic data is sourced from company's annual reports.

Design Concept by : Sudeep Chakravarty (MarketResearchReports.com)

Ever heard of these companies?

Single Slide on Evaluation

Evaluation: Industry vs. Academia

Adopting Systematic Evaluation Benchmarks in Operational Settings

Jussi Karlgren

Abstract Evaluation of information systems in commercial and industrial settings differs from academic evaluation of methodology in important ways. Those differences have to do with differing organisational priorities between practice and research. Some of those priorities can be adjusted, others must be taken into account, to be able to include evaluation into an operational development pipeline.

Karlgren, J. (2019). Adopting Systematic Evaluation Benchmarks in Operational Settings. In: Ferro, N., Peters, C. (eds) Information Retrieval Evaluation in a Changing World. The Information Retrieval Series, vol 41. Springer

LLMs to the Rescue?

- Recall the importance of **transparency, reproducibility, explainability**
- This does not align well will LLMs (hallucinations, non-determinism, little explainability …)
- Now recall how much can be at stake when conducting professional search

How about RAG
… the new Kid on the Block?

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RAG = LLM + IR

Yesterday's Session (Saad)

Here comes RAG …

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ChatGPT

Academic and Professional Background

1. **Education and Early Career:**

   - Udo Kruschwitz obtained his Ph.D. in Computer Science from the University of Essex in the United Kingdom. His doctoral research focused on information retrieval, particularly

3. **Key Roles and Positions:**

   - **University of Regensburg:** Udo Kruschwitz recently became the president of the University of Regensburg in 2024, taking over from Prof. Dr. Udo Hebel. His appointment marks a significant leadership change for the institution, bringing his expertise in computer science and academic administration to the university (Universität Regensburg) (Wagner Lab).
   - **Previous Academic Roles:** Before his current position, he was a professor at the University of Essex, where he led various research projects and contributed to the university's computer science curriculum (Universität Regensburg).

better understand and anticipate user needs.

Hallucinations

Conclusions

Professional Search: Key Characteristics

- Search by professionals
- Queries are complex and time-intensive
- Quality of documents paramount
- Explainability, reproducibility is key
- Ranking typically secondary
- Largely recall-focussed (but not always, e.g. recruitment)
- Specialist databases

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2024: NLP / IR Problems Solved?

Well, no ...

Professional Search: Not an Easy Task

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July 2024

ChatGPT

Why hasn't ChatGPT solved the problem of professional search?

ChatGPT, while a powerful tool for generating natural language responses and processing information, faces several significant challenges when it comes to fully solving the problem of professional search. Here are some of the key reasons why:

1. **Depth of Domain Expertise**: Professional search often requires a deep understanding of highly specialized domains. While ChatGPT can generate responses based on training data, it may lack the detailed, nuanced understanding that domain-specific search tools possess. Professional search systems are built and fine-tuned with a focus on the specific needs and terminologies of particular fields.
2. **Access to Proprietary Databases**: Professional search often involves accessing proprietary databases and repositories that are behind paywalls or require specific subscriptions (e.g., PubMed, IEEE Xplore, LexisNexis). ChatGPT does not have direct access to these databases, limiting its ability to retrieve the most authoritative and up-to-date information.
3. **Advanced Search Features**: Professional search tools offer advanced features like Boolean operators, citation tracking, and field-specific filters. These functionalities are crucial for precise searching but are not inherently part of ChatGPT's capabilities. Implementing these advanced search functionalities within a conversational AI framework is a complex task.
4. **Citation and Verification**: Providing accurate citations and verifying the authenticity and credibility of sources is a cornerstone of professional search. While ChatGPT can generate text that sounds authoritative, it does not inherently verify the sources of its information or provide proper citations unless explicitly programmed to do so using external data sources.
5. **Dynamic and Evolving Knowledge**: Professional fields are constantly evolving, with new research, updates, and standards. Keeping up with these changes in real-time requires continuous updates and access to the latest publications, which is challenging for a static language model like ChatGPT, which is trained on data up to a certain point and does not update dynamically.
6. **Integration Challenges**: Integrating ChatGPT with the myriad of professional search databases and tools requires substantial effort in terms of API development, data harmonization, and system compatibility. This integration is non-trivial and requires collaboration with database providers and continuous maintenance.
7. **Contextual Understanding**: Professional search often involves understanding the specific context and intent behind a query, which can be highly nuanced. While ChatGPT can understand and generate context-aware responses to a degree, it may not always capture the full complexity required for highly specialized queries.
8. **User Trust and Reliability**: Professionals rely on search tools to provide reliable and verifiable information. The generative nature of ChatGPT means that, without rigorous verification mechanisms, there is a risk of generating plausible-sounding but incorrect or misleading information.

Professional Search: Summary by David Hawking

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78 CHAPTER 4. *1999–2008: CSIRO RESEARCH ON TEXT RETRIEVAL AND WEB SEARCH

***Professional Search**

Francisco Webber's claim that *professional search* is a world apart from web search is absolutely true. Whether professional search is conducted in a commercial intellectual property department, by an academic researcher doing a systematic review, by an e-discovery paralegal, or by an investment adviser looking for opportunities to tempt HNWIs,[38], the process of searching is utterly different from that supported by Google or Bing. Full recall is critical, there is no silver-bullet answer and large amounts of time and money may be invested in each search – the IRF reported that the German company BASF allocated €30,000 per patent search. As we will see further on, IP (intellectual property) searches may determine decisions involving hundreds of millions of dollars.

The Broader Picture

Scientific Progress *vs.* Industry Applications

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Medium Search

LLMs and RAG are Great, But Don't Throw Away Your Inverted Index Yet

Daniel Tunkelang · Follow
3 min read · Mar 29, 2024

25

Vectors, embeddings, large language models (LLMs), and retrieval-augmented generation (RAG) represent the cutting edge of search architecture, and it is very tempting to believe we can dispense with the traditional inverted index architecture entirely. You should be excited about this brave new world, but you should also proceed with caution.

Scientific Progress *vs.* Industry Applications

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pcguide.com/apps/gpt-3-cost/

How much did it cost to develop GPT-3?

According to OpenAI, the research organization responsible for developing GPT-3, the project's total cost is estimated to be around $4.6 million. This includes not only the cost of developing the model itself but also the cost of training it using massive amounts of data.

3 ENVIRONMENTAL AND FINANCIAL COST

Strubell et al. recently benchmarked model training and development costs in terms of dollars and estimated CO_2 emissions [129]. While the average human is responsible for an estimated 5t CO_2e per year,[2] the authors trained a Transformer (big) model [136] with neural architecture search and estimated that the training procedure emitted 284t of CO_2. Training a single BERT base model (without hyperparameter tuning) on GPUs was estimated to require as much energy as a trans-American flight.

Bender et al. (2021) "On the Dangers of Stochastic Parrots: Can Language Models Be Too Big?" FAccT 2021.

Some Key People in the Field

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Professional Search

Suzan Verberne (She/Her) · 1st
Associate Professor bij Leiden Institute of Advanced Computer Science (LIACS)
Nijmegen, Gelderland, Netherlands · Contact info
500+ connections
Ingo Frommholz, Norbert Fuhr, and 154 other mutual connections

Leiden Institute of Advanced Computer Science (LIACS)
Radboud University

Message More

Tony Russell-Rose · 1st
Research Scientist | Founder | Professor
London, England, United Kingdom · Contact info
500+ connections
Christian Wolff, Ingo Frommholz, and 234 other mutual connections

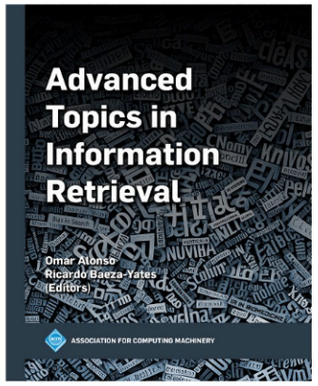
University of Essex
University of Nottingham

Message More

Omar Alonso • 1st
Sr. Manager, Applied Science @ Amazon | Part-time Faculty @ Northeast...
2d •

We are very happy to announce a new book. We're very thankful to all the friends and colleagues that contributed to this edited book. ACM Books will share more information in terms of publication date and other details.

Advances in AI and other technologies are overturning the basic assumptions and methods of Information Retrieval on the Web.



Advanced Topics in Information Retrieval

Edited by Omar Alonso and Ricardo Baeza-Yates

FORTHCOMING!

Information retrieval technology powers much of the functionality that runs the web searches for pages, people, music, messages, posts, and other objects that have become part of our daily digital life. As different web properties evolve over time and new services become mainstream, advanced techniques have continued to emerge to ensure that such functionality works from any device at scale. In this book, we describe these techniques in detail and provide extensive bibliographies for further reading. The book will be of interest to researchers, practitioners, and graduate students.

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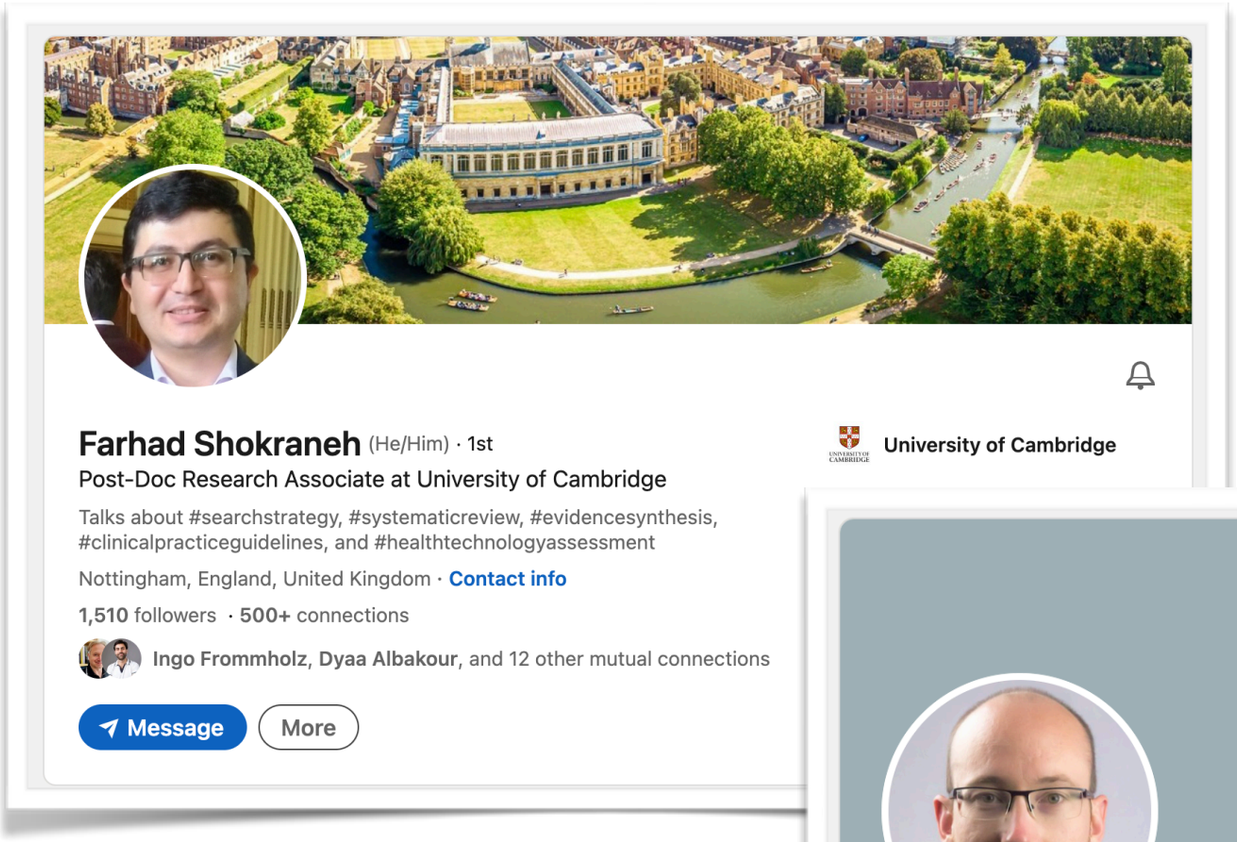

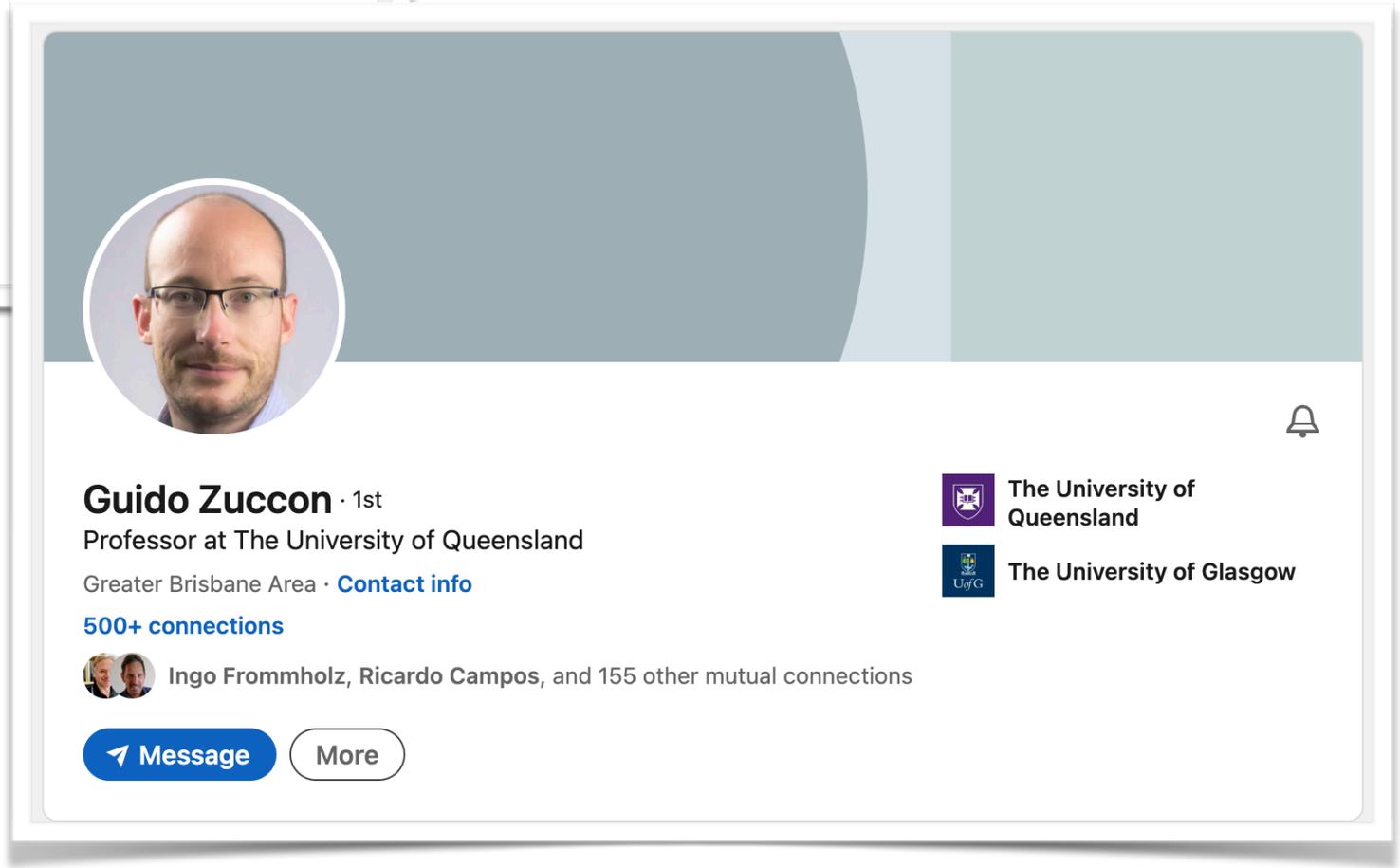

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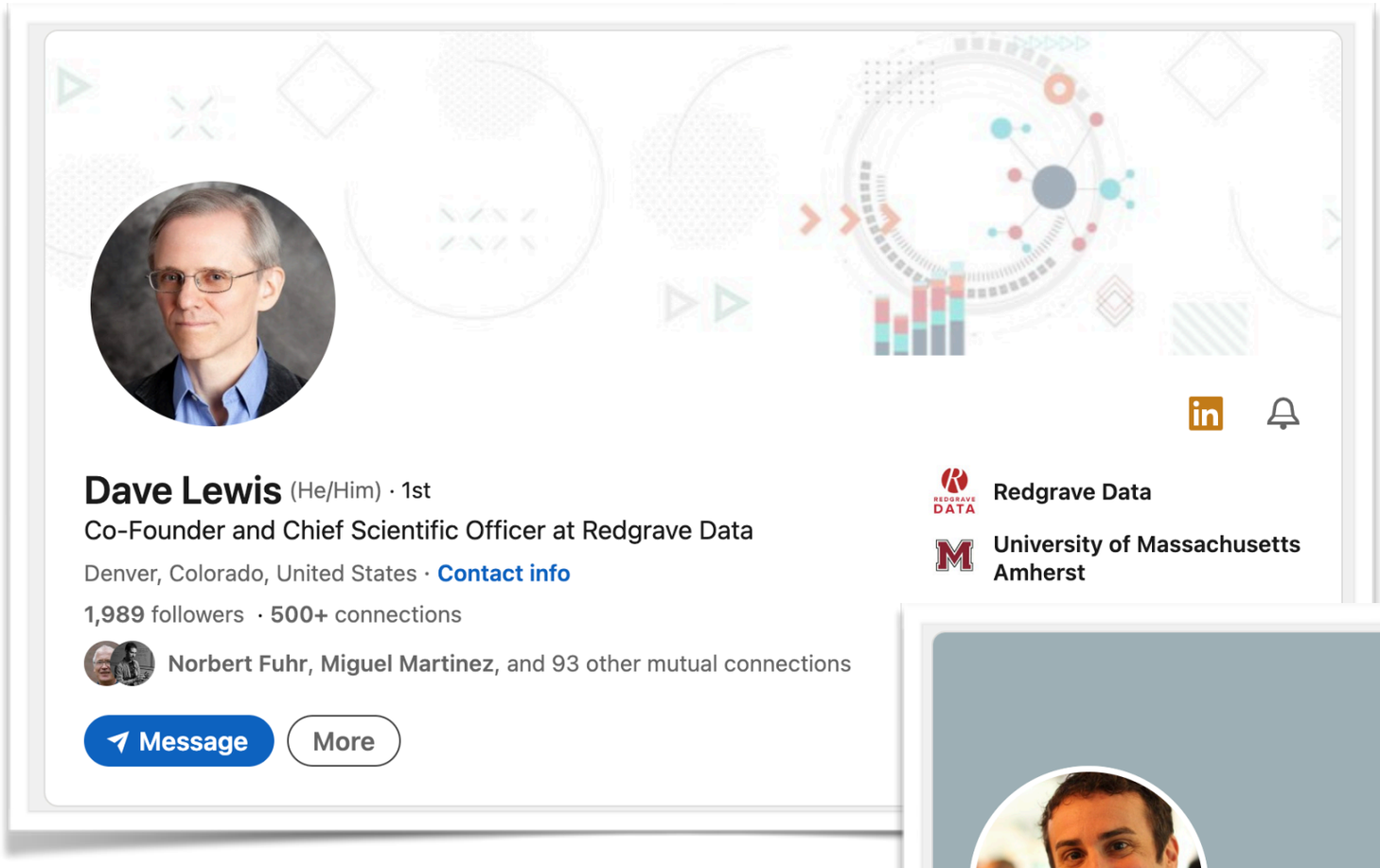

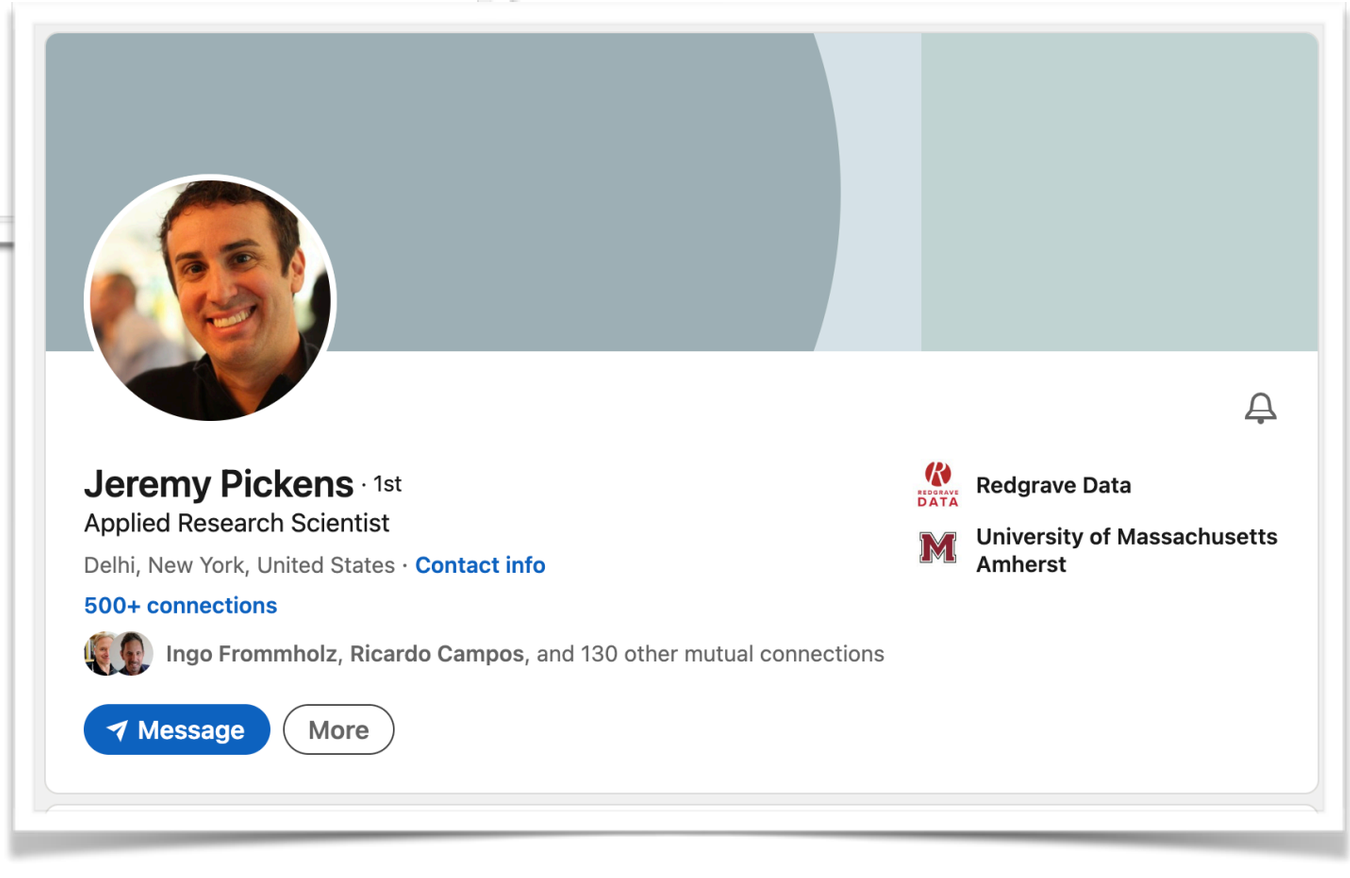

Reading

- Russell-Rose, Chamberlain & Azzopardi (2018). Information retrieval in the workplace: A comparison of professional search practices. IP&M. Vol 54(6).
- MacFarlane et al. (2022). Search strategy formulation for systematic reviews: Issues, challenges and opportunities. Intelligent Systems with Applications. Vol 15.
- Tait (2014). An Introduction to Professional Search. In: Professional Search in the Modern World. Springer.
- Bullers (2018). It takes longer than you think: librarian time spent on systematic review tasks. Journal of the Medical Library Association. Vol 106(2).

Reading

- Karlgren (2019). Adopting Systematic Evaluation Benchmarks in Operational Settings. In: Ferro, N., Peters, C. (eds) Information Retrieval Evaluation in a Changing World. The Information Retrieval Series, vol 41. Springer.
- Kaya & Bogers (2023). Understanding Recruiters' Information Seeking Behavior in Talent Search. CHIIR 2023.
- Bowman (2023). Eight Things to Know about Large Language Models. arXiv.

Closely related: Enterprise Search

Kruschwitz & Hull (2017) “Searching the Enterprise”. Foundations and Trends in Information Retrieval, 11(1).

Foundations and Trends® in Information Retrieval
Vol. 11, No. 1 (2017) 1–142
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DOI: 10.1561/1500000053

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Searching the Enterprise

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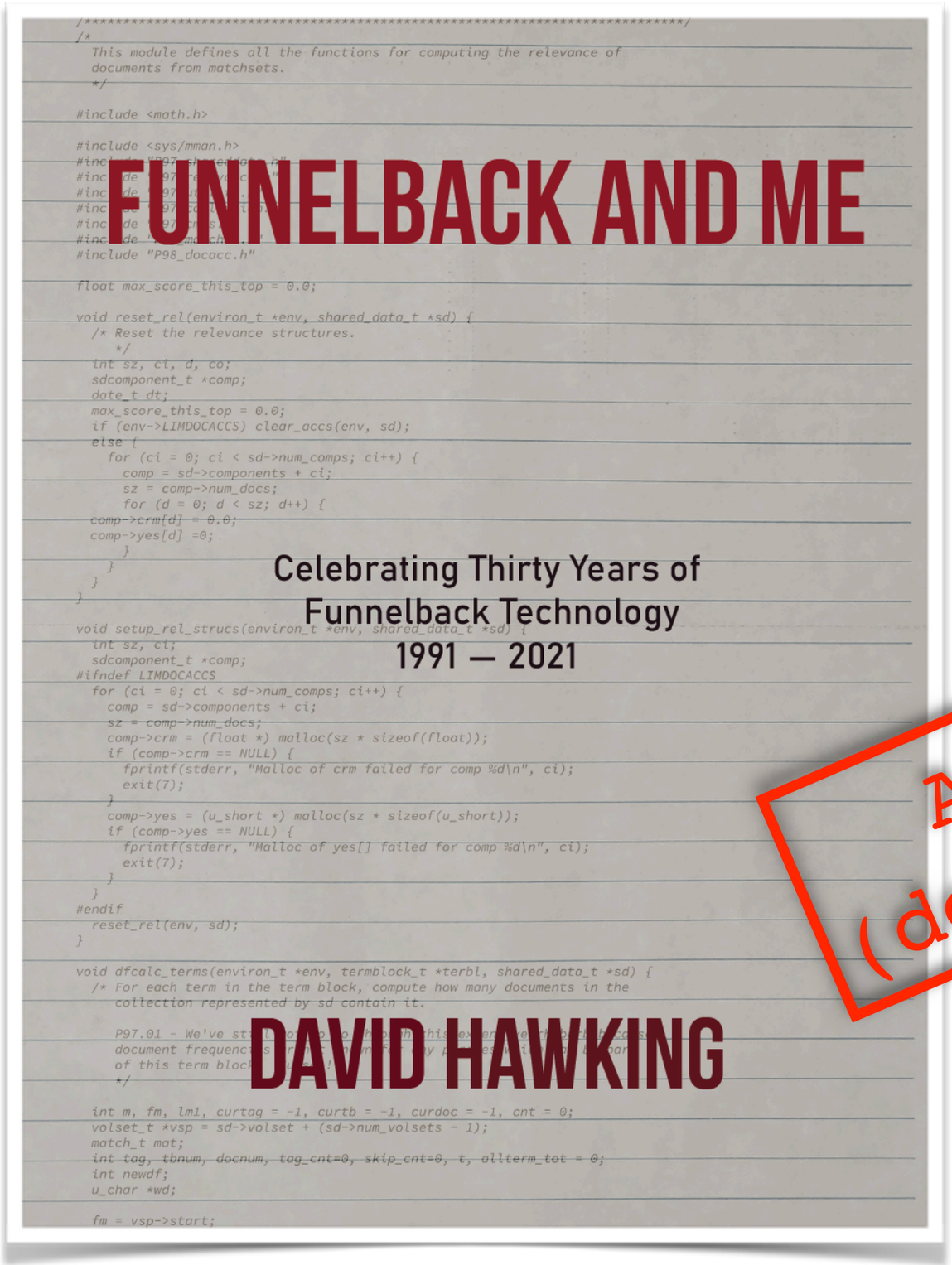

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