

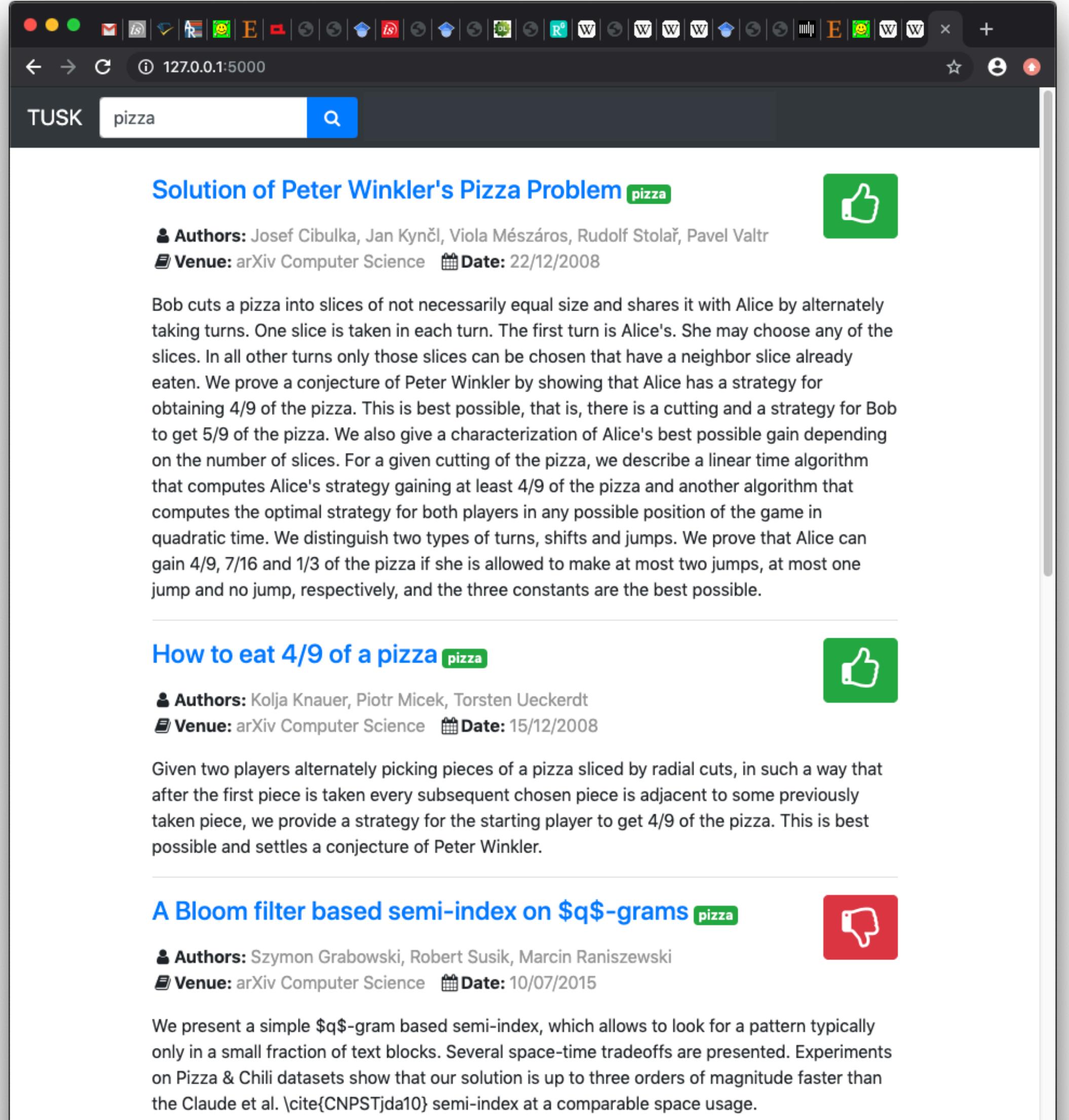
Manuscripts and newspapers: Using machine learning to map the sciences and identify political bias

Alan Medlar and Dorota Glowacka

SCIENTIFIC LITERATURE

Motivation

- We perform **exploratory search** user studies on scientific literature
- Full-text retrieval has higher recall (and lower precision) over searching bibliographic records (title, abstract, etc.)
- Could using abstracts for retrieval impact experimental results?



The screenshot shows a web browser window titled "TUSK" with the URL "127.0.0.1:5000". The search bar contains the word "pizza". Below the search bar, there are three search results, each with a green thumbs-up icon on the right.

- Solution of Peter Winkler's Pizza Problem** [pizza](#)
Authors: Josef Cibulka, Jan Kynčl, Viola Mészáros, Rudolf Stolař, Pavel Valtr
Venue: arXiv Computer Science Date: 22/12/2008
Bob cuts a pizza into slices of not necessarily equal size and shares it with Alice by alternately taking turns. One slice is taken in each turn. The first turn is Alice's. She may choose any of the slices. In all other turns only those slices can be chosen that have a neighbor slice already eaten. We prove a conjecture of Peter Winkler by showing that Alice has a strategy for obtaining 4/9 of the pizza. This is best possible, that is, there is a cutting and a strategy for Bob to get 5/9 of the pizza. We also give a characterization of Alice's best possible gain depending on the number of slices. For a given cutting of the pizza, we describe a linear time algorithm that computes Alice's strategy gaining at least 4/9 of the pizza and another algorithm that computes the optimal strategy for both players in any possible position of the game in quadratic time. We distinguish two types of turns, shifts and jumps. We prove that Alice can gain 4/9, 7/16 and 1/3 of the pizza if she is allowed to make at most two jumps, at most one jump and no jump, respectively, and the three constants are the best possible.
- How to eat 4/9 of a pizza** [pizza](#)
Authors: Kolja Knauer, Piotr Micek, Torsten Ueckerdt
Venue: arXiv Computer Science Date: 15/12/2008
Given two players alternately picking pieces of a pizza sliced by radial cuts, in such a way that after the first piece is taken every subsequent chosen piece is adjacent to some previously taken piece, we provide a strategy for the starting player to get 4/9 of the pizza. This is best possible and settles a conjecture of Peter Winkler.
- A Bloom filter based semi-index on \$q\$-grams** [pizza](#)
Authors: Szymon Grabowski, Robert Susik, Marcin Raniszewski
Venue: arXiv Computer Science Date: 10/07/2015
We present a simple \$q\$-gram based semi-index, which allows to look for a pattern typically only in a small fraction of text blocks. Several space-time tradeoffs are presented. Experiments on Pizza & Chili datasets show that our solution is up to three orders of magnitude faster than the Claude et al. \cite{CNPSTjda10} semi-index at a comparable space usage.

Abstracts vs. full-text

Holes in the Outline: Subject-dependent Abstract Quality and its Implications for Scientific Literature Search

Chien-yu Huang and Arlene Casey
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ABSTRACT

Scientific literature search engines typically index abstracts instead of the full-text of publications. The expectation is that the abstract provides a comprehensive summary of the article, enumerating key points for the reader to assess whether their information needs could be satisfied by reading the full-text. Furthermore, from a practical standpoint, obtaining the full-text is more complicated due to licensing issues, in the case of commercial publishers, and resource limitations of public repositories and pre-print servers.

In this article, we use topic modelling to represent content in abstracts and full-text articles. Using Computer Science as a case study, we demonstrate that how well the abstract summarises the full-text is subfield-dependent. Indeed, we show that abstract representativeness has a direct impact on retrieval performance, with poorer abstracts leading to degraded performance. Finally, we present evidence that how well an abstract represents the full-text of an article is not random, but is a consequence of style and writing conventions in different subdisciplines and can be used to infer an "evolutionary" tree of subfields within Computer Science.

CCS CONCEPTS

- Information systems → Document structure; Document collection models;

KEYWORDS

scientific literature search, topic models, term taxonomy

ACM Reference Format:

Chien-yu Huang and Arlene Casey and Dorota Glowacka and Alan Medlar. 2019. Holes in the Outline: Subject-dependent Abstract Quality, and its Implications for Scientific Literature Search. In *2019 Conference on Human Information Interaction and Retrieval (CHIIR '19)*, March 10–14, 2019, Glasgow, United Kingdom. ACM, New York, NY, USA, 5 pages. <https://doi.org/10.1145/3295750.3298953>

1 INTRODUCTION

In scientific literature search abstracts are frequently used as the primary source for indexing and as snippet text that is displayed with search results. The reasons for this are twofold. First, readers assume that abstracts convey sufficient information about the paper

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© 2019 Association for Computing Machinery.
ACM ISBN 978-1-4503-6025-8/19/03...\$15.00
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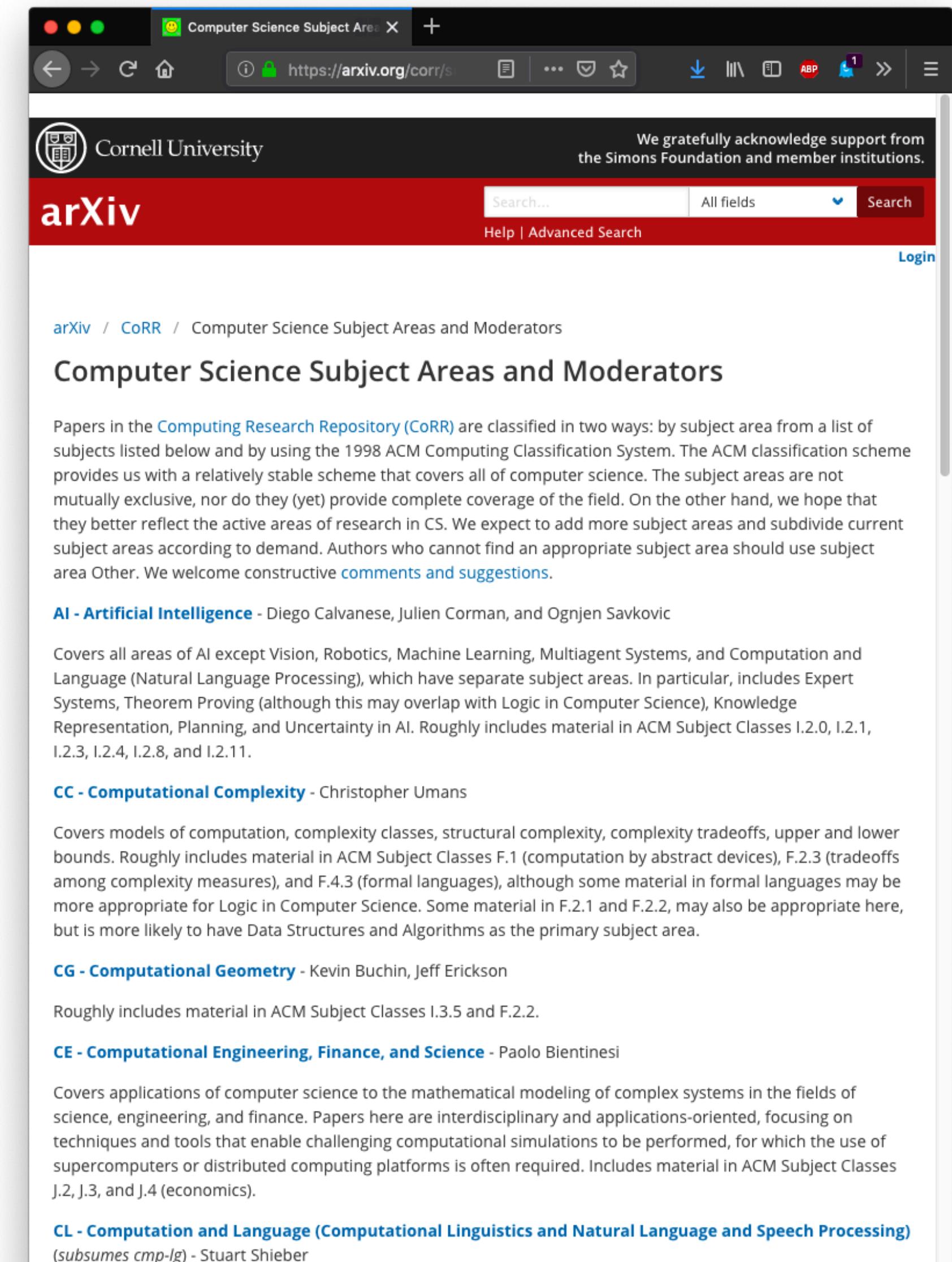
- **Bioinformatics:** article sections (e.g. results) besides abstract provides better representations of certain biological concepts
- **Medicine:** clinical decisions based solely on abstracts results in **worse patient outcomes**
- **General:** well-known differences between established/emerging fields, theoretical/applied fields, individual fields tend to have own style/expectations

Research questions

- **RQ1:** How well do abstracts represent the full-text of a paper in different CS subfields?
- **RQ2:** If there are differences between subfields, could this impact (perceived) retrieval performance?

Data preprocessing

- **35,137 CS papers** from arXiv (2007-mid 2015)
 - 23% papers associated with > 1 category (40 possible author-assigned categories)
 - Extracted 6.7 sections per article (SD = 2.7)
 - Classify **sections** as abstract, introduction, background, related work, methods, results, discussion, conclusions and back matter
 - Classified **53%** of sections based on headings **that occurred at least twice** (35% of headings were unique)
 - Classified 3.3 sections per article (SD = 1.2)



The screenshot shows a web browser window displaying the 'Computer Science Subject Areas' section of the arXiv website. The page is headered by the Cornell University logo and the arXiv logo. A red navigation bar contains links for 'Search...', 'All fields', 'Help | Advanced Search', and 'Login'. Below the header, a breadcrumb trail shows 'arXiv / CoRR / Computer Science Subject Areas and Moderators'. The main content area is titled 'Computer Science Subject Areas and Moderators' and explains the classification scheme. It lists several subject areas with their descriptions and authors:

- AI - Artificial Intelligence** - Diego Calvanese, Julien Cormann, and Ognjen Savkovic: Covers all areas of AI except Vision, Robotics, Machine Learning, Multiagent Systems, and Computation and Language (Natural Language Processing), which have separate subject areas. In particular, includes Expert Systems, Theorem Proving (although this may overlap with Logic in Computer Science), Knowledge Representation, Planning, and Uncertainty in AI. Roughly includes material in ACM Subject Classes I.2.0, I.2.1, I.2.3, I.2.4, I.2.8, and I.2.11.
- CC - Computational Complexity** - Christopher Umans: Covers models of computation, complexity classes, structural complexity, complexity tradeoffs, upper and lower bounds. Roughly includes material in ACM Subject Classes F.1 (computation by abstract devices), F.2.3 (tradeoffs among complexity measures), and F.4.3 (formal languages), although some material in formal languages may be more appropriate for Logic in Computer Science. Some material in F.2.1 and F.2.2, may also be appropriate here, but is more likely to have Data Structures and Algorithms as the primary subject area.
- CG - Computational Geometry** - Kevin Buchin, Jeff Erickson: Roughly includes material in ACM Subject Classes I.3.5 and F.2.2.
- CE - Computational Engineering, Finance, and Science** - Paolo Bientinesi: Covers applications of computer science to the mathematical modeling of complex systems in the fields of science, engineering, and finance. Papers here are interdisciplinary and applications-oriented, focusing on techniques and tools that enable challenging computational simulations to be performed, for which the use of supercomputers or distributed computing platforms is often required. Includes material in ACM Subject Classes J.2, J.3, and J.4 (economics).
- CL - Computation and Language (Computational Linguistics and Natural Language and Speech Processing)** (subsumes cmp-lg) - Stuart Shieber

Representation

- **Full-text** and **sections** represented using probabilistic topic models
 - Topic model inferred from full-text + used to predict individual sections (100 topics)
 - Multi-sections merged using element-wise summarisation and normalised
- Representativeness metric
 - **KL divergence**: two discrete probability distributions, P and Q, "how much information is lost when Q is used to approximate P"

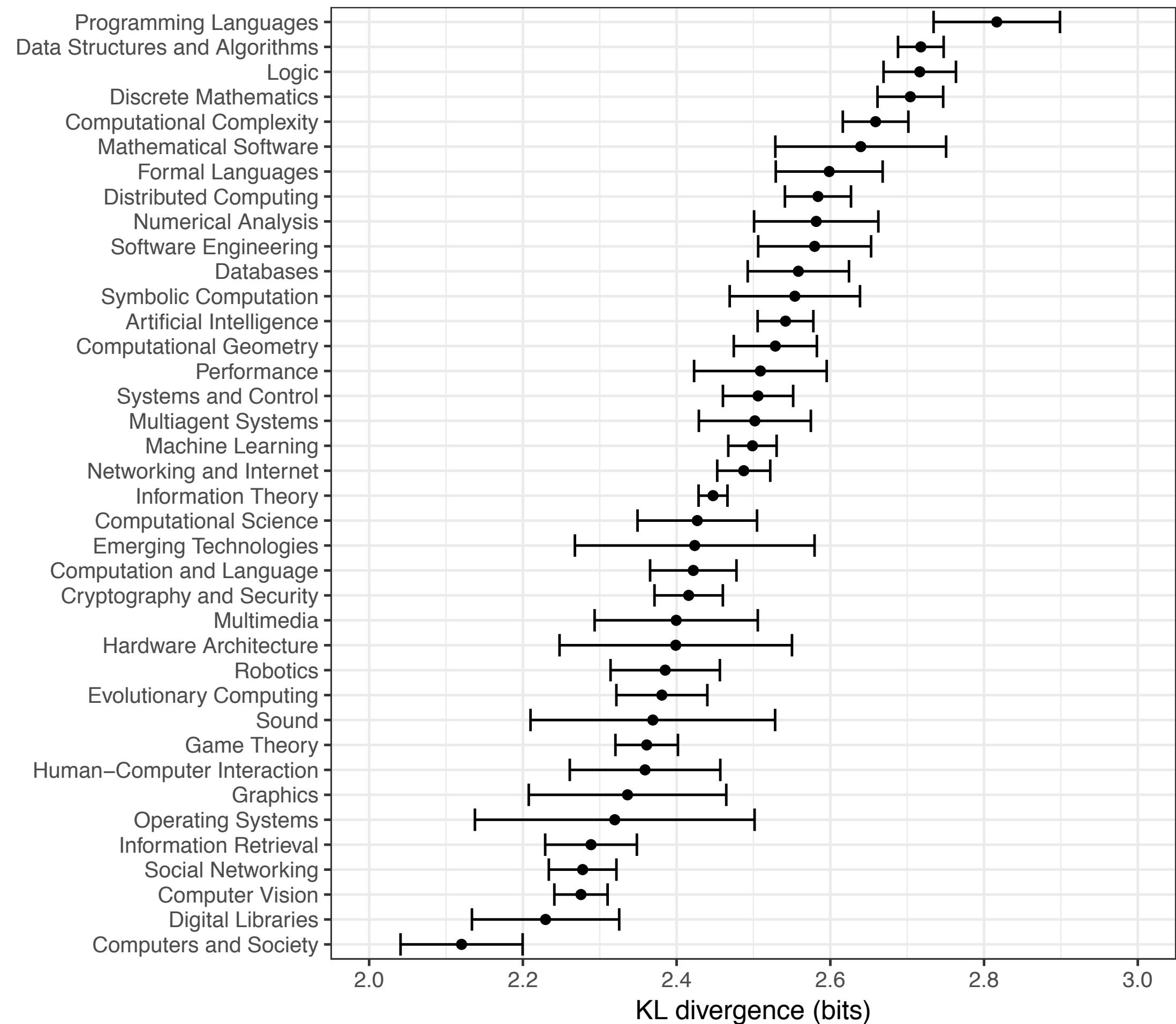
$$D_{KL} (P||Q) = \sum_i P(i) \log_2 \left(\frac{P(i)}{Q(i)} \right)$$

Full-text

Abstract

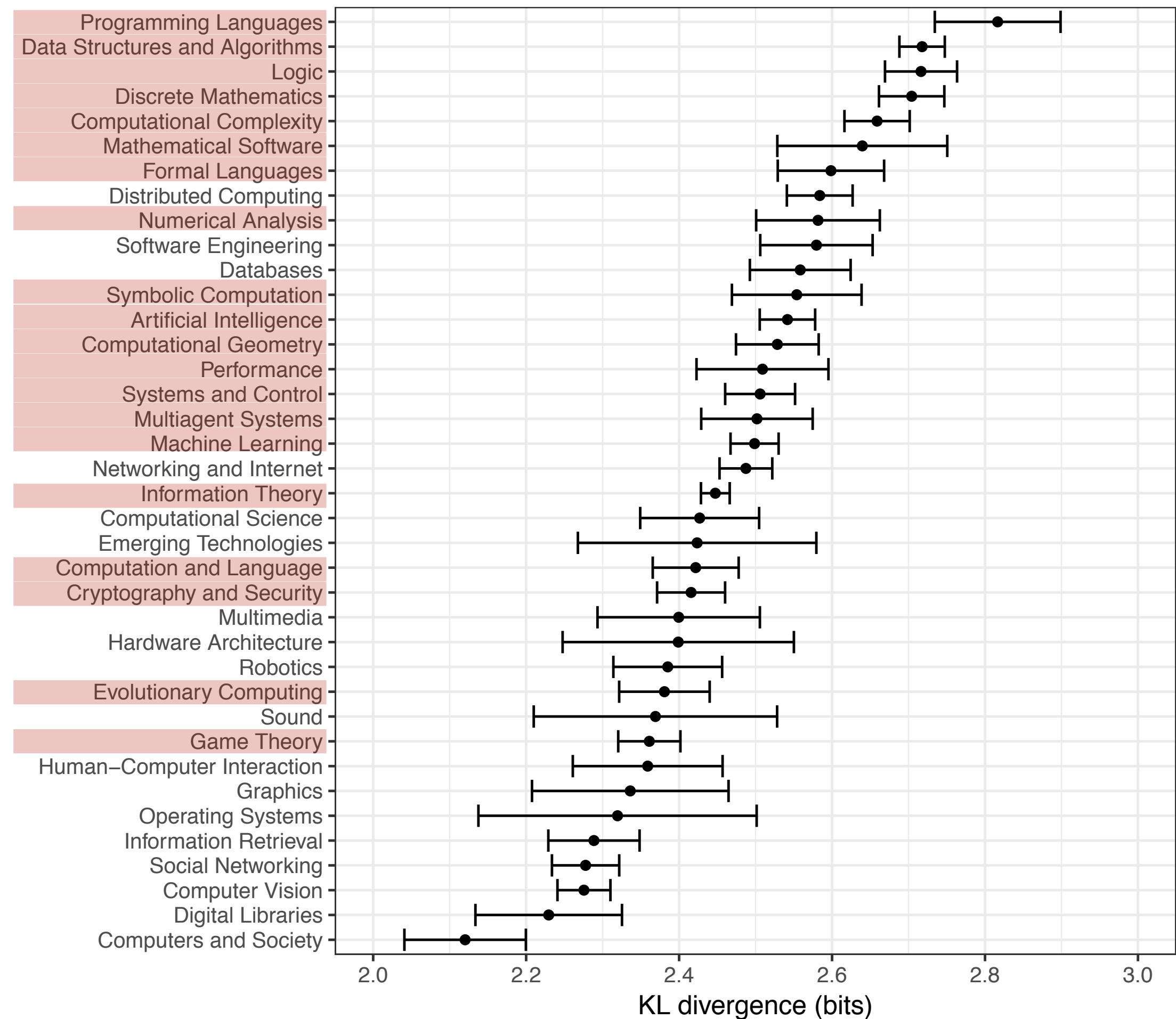
Abstract representativeness is subfield-specific

- The degree to which abstracts represent the full-text is **subfield-specific**
- **Higher mean KL divergence** (less representative abstract) appear to be more theoretical...
- Lower mean KL divergence (more representative abstract) appear to be more applied...
- Theoretical abstracts tend to be shorter, but KL divergence is not correlated with abstract length ($R^2 = 0.003, p < 2.2 \times 10^{-16}$)



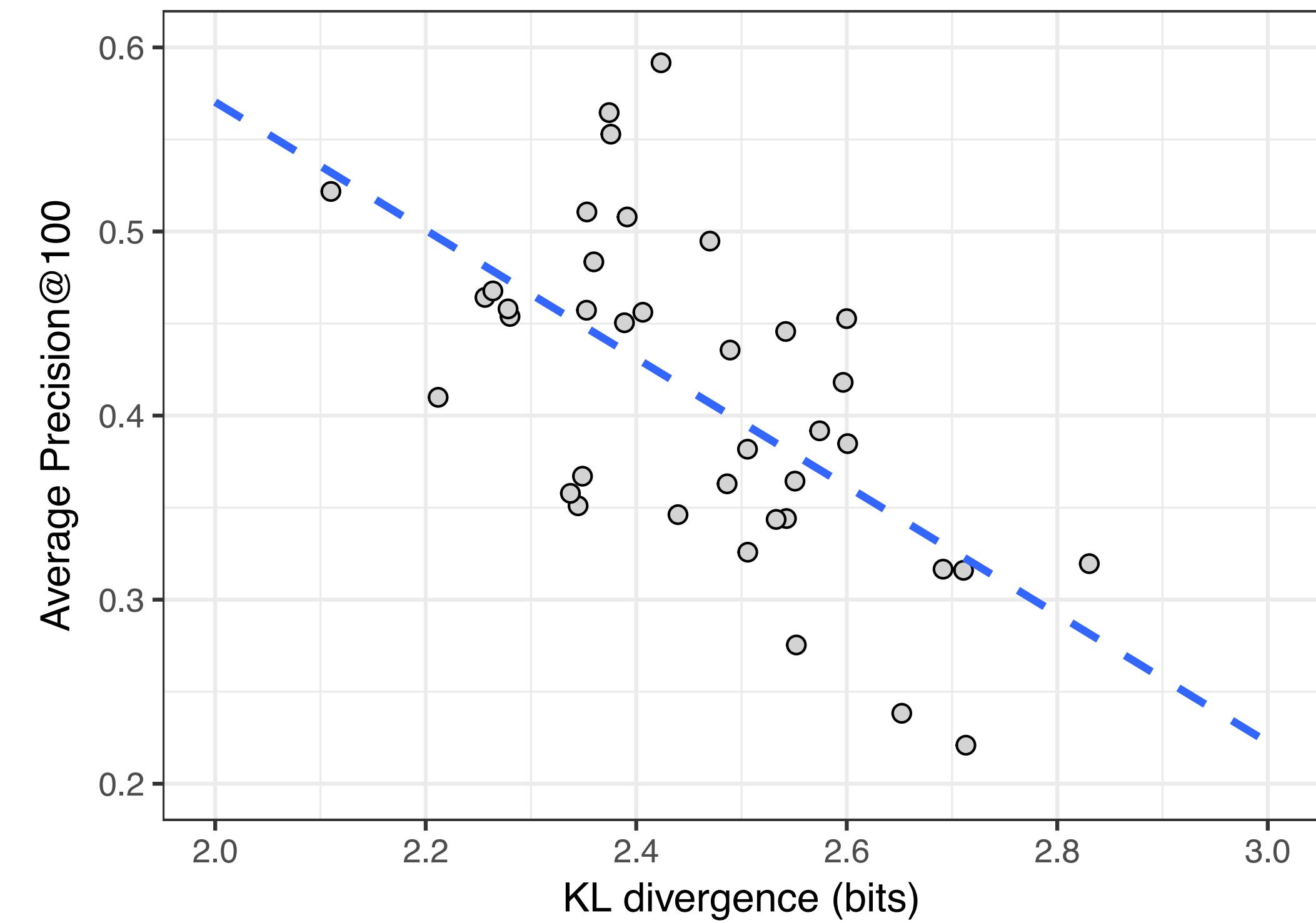
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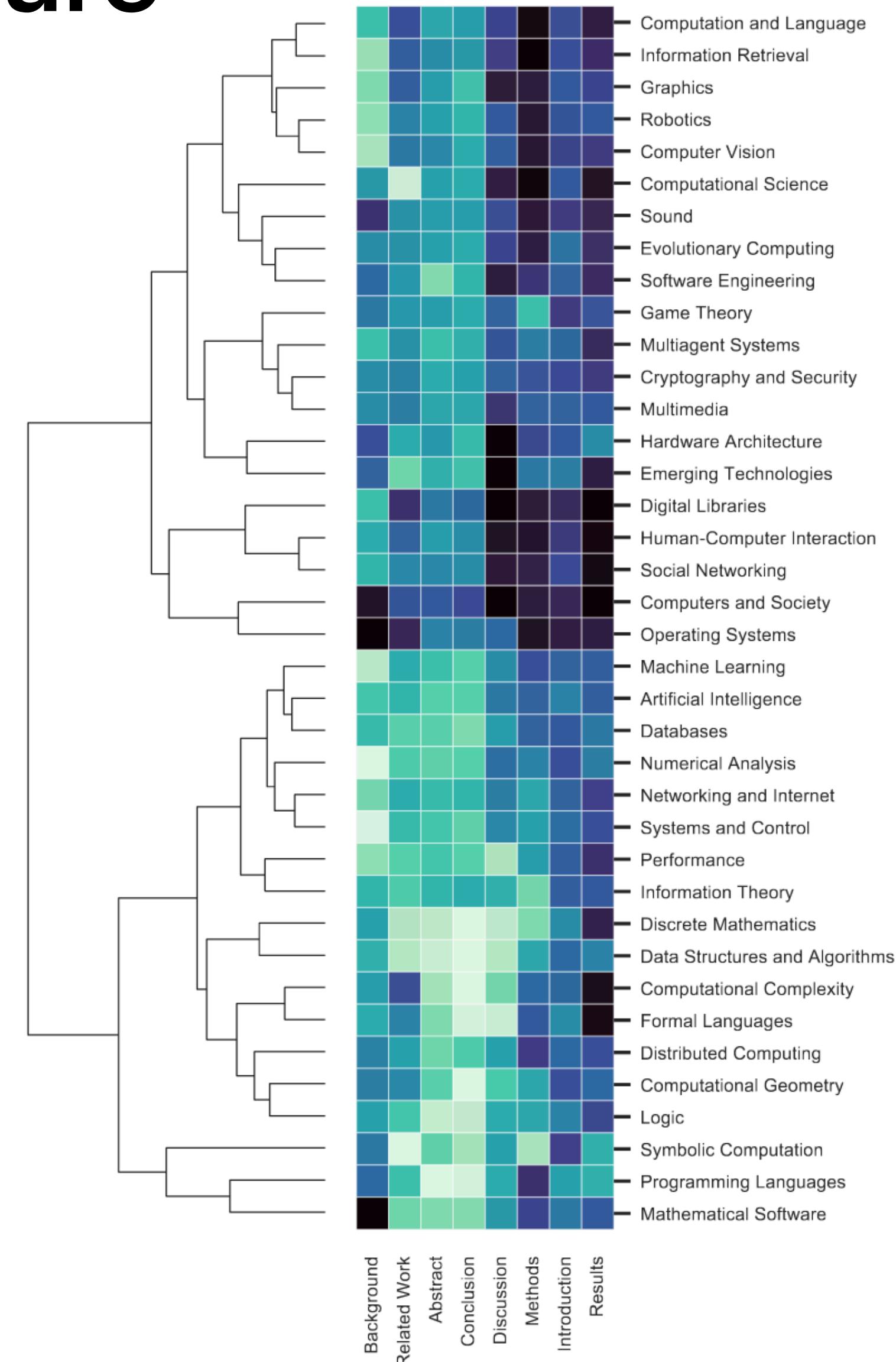
Abstract representativeness is correlated with retrieval performance

- What is the impact on retrieval?
 - Generate queries that **disproportionately favour specific subfields** (most informative features from multi-class SVM, removed duplicates, manually removed junk)
 - 1,257 queries (33.1 per category, SD = 14.5)
 - Retrieve top-100 results using full-text and abstracts - calculate precision@100
- Precision@100 negatively correlated with KL divergence ($R^2 = 0.38$, $p = 3.65 \times 10^{-5}$)



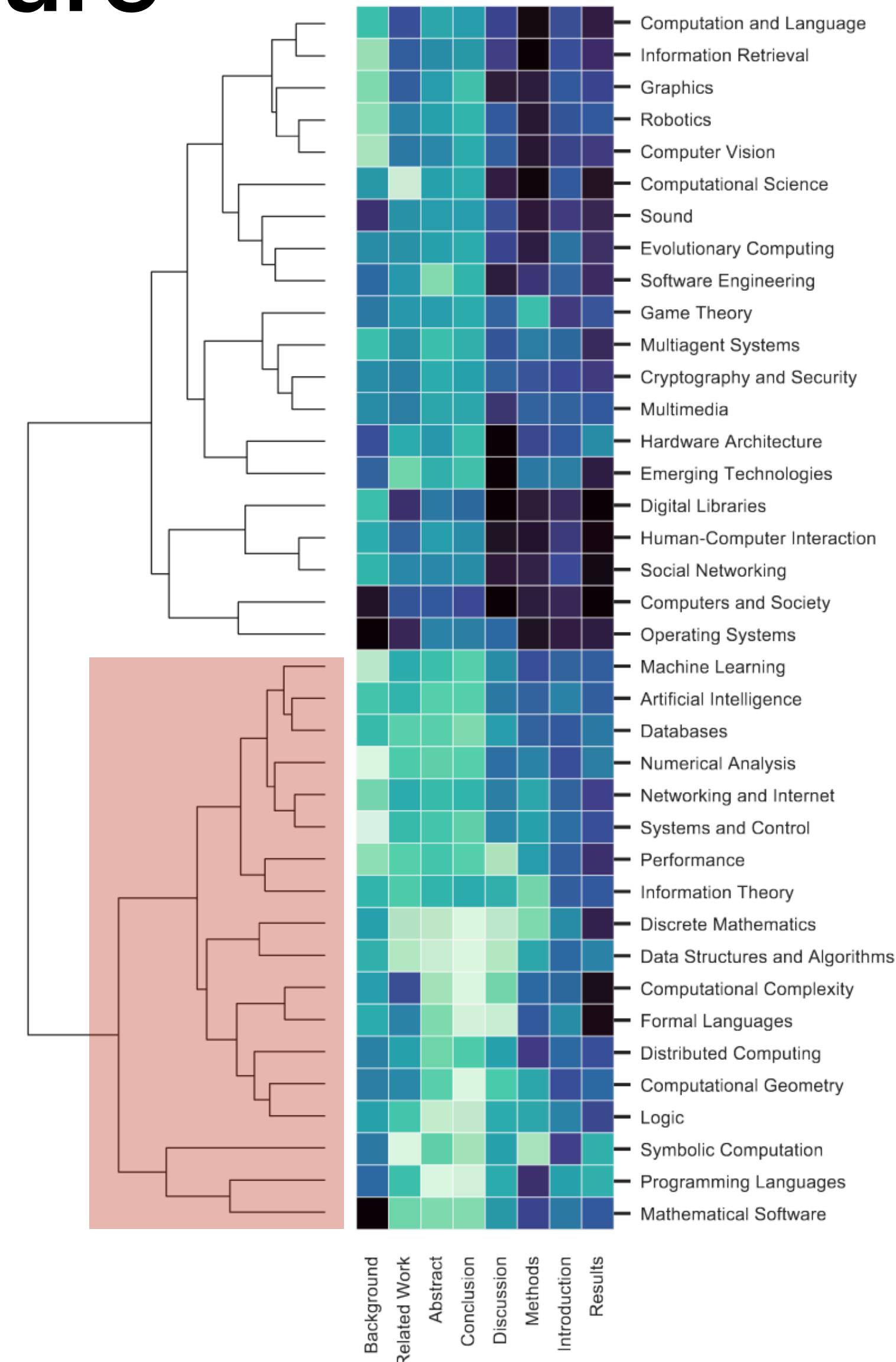
Section-wise representativeness captures domain structure

- Are these trends random, or related to some underlying structure?
 - Calculate KL divergence between all 8 sections and full-text
 - Do hierarchical clustering (complete-linkage clustering with Euclidean distance)
- **Theoretical** and **applied** subtrees, deeper subtrees make sense
- Obvious errors explained by high variance (e.g. Operating Systems) or corpus bias (e.g. Networking and Internet, 23% associated with Information theory as well)



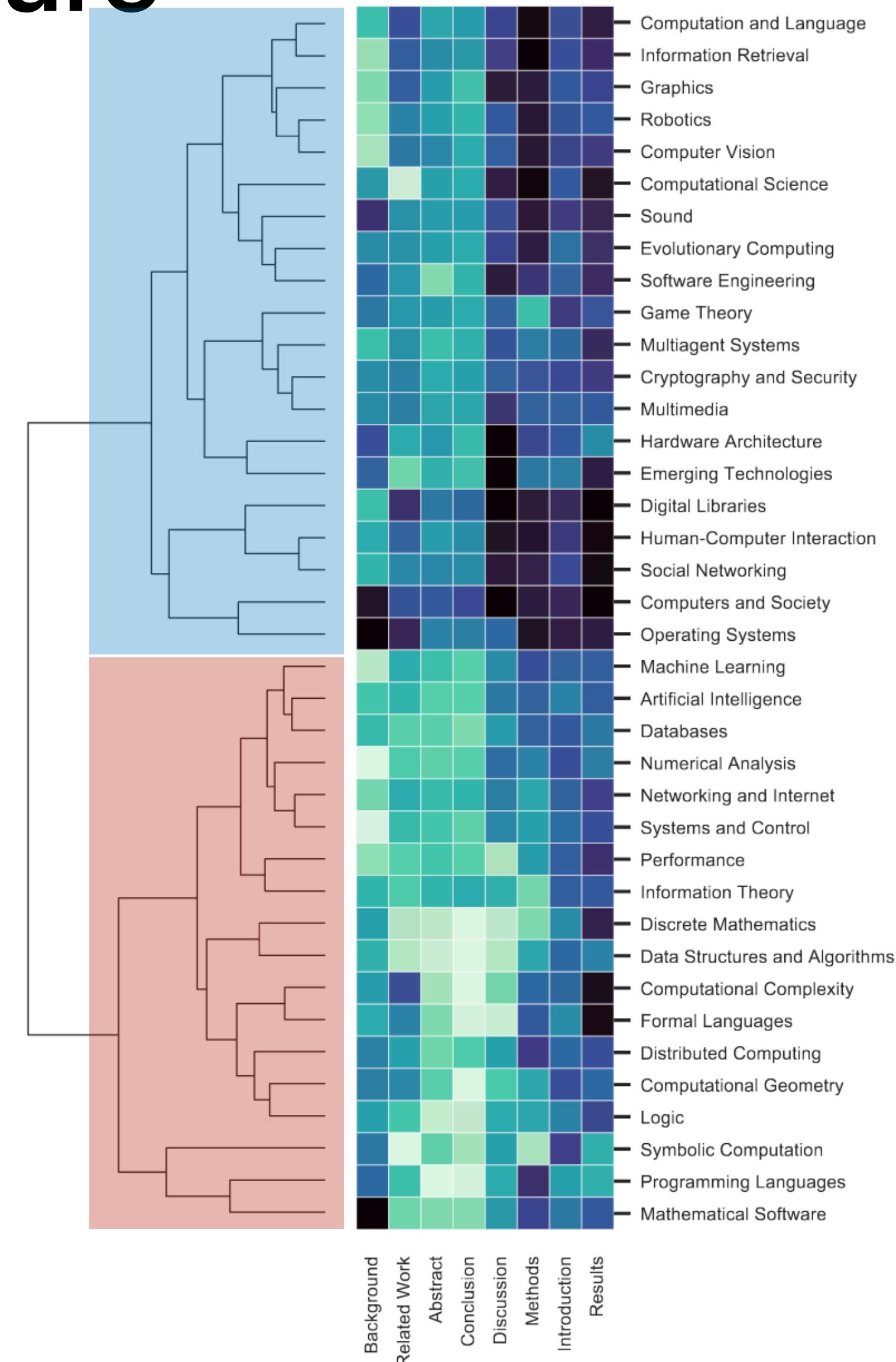
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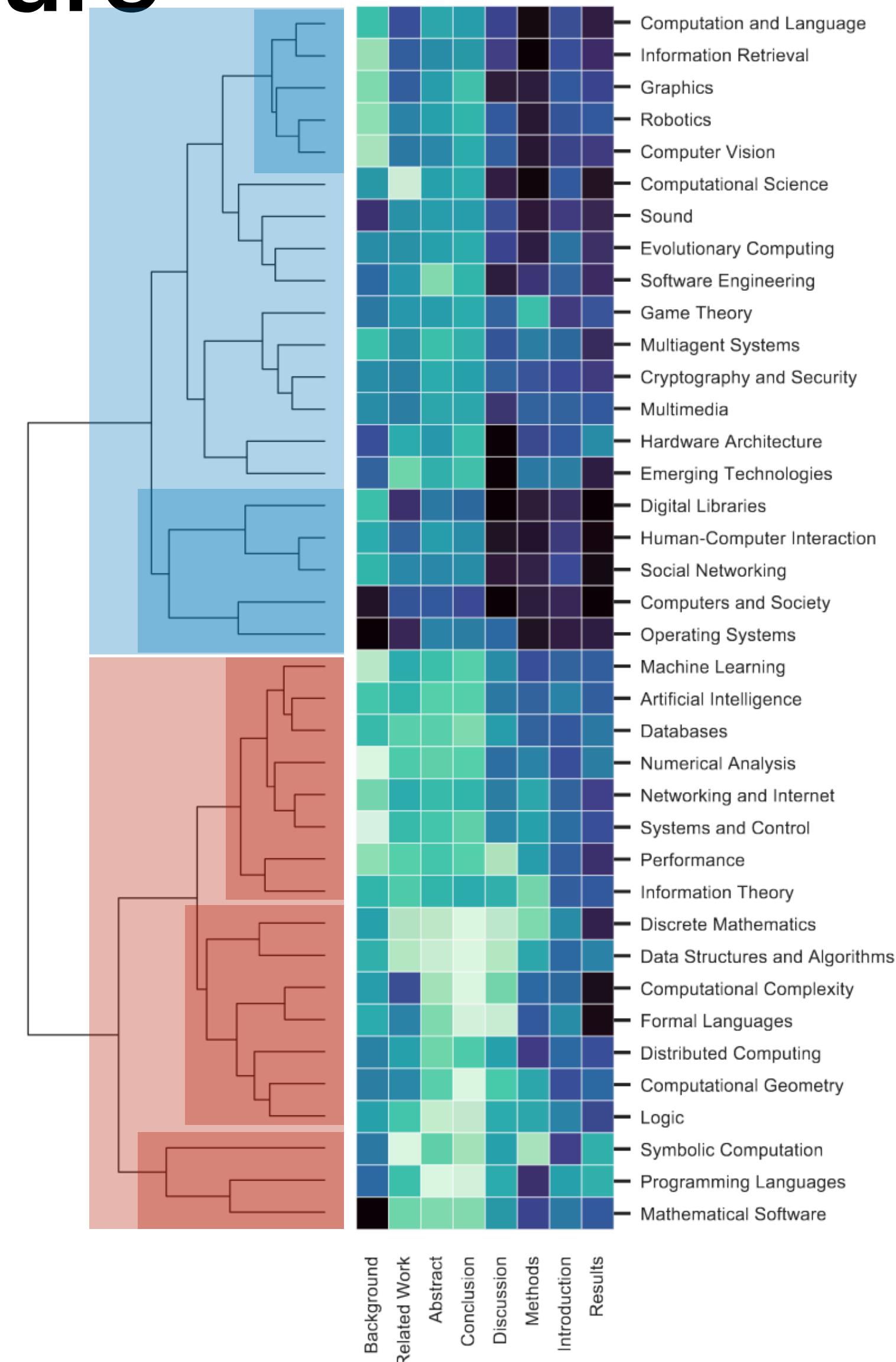
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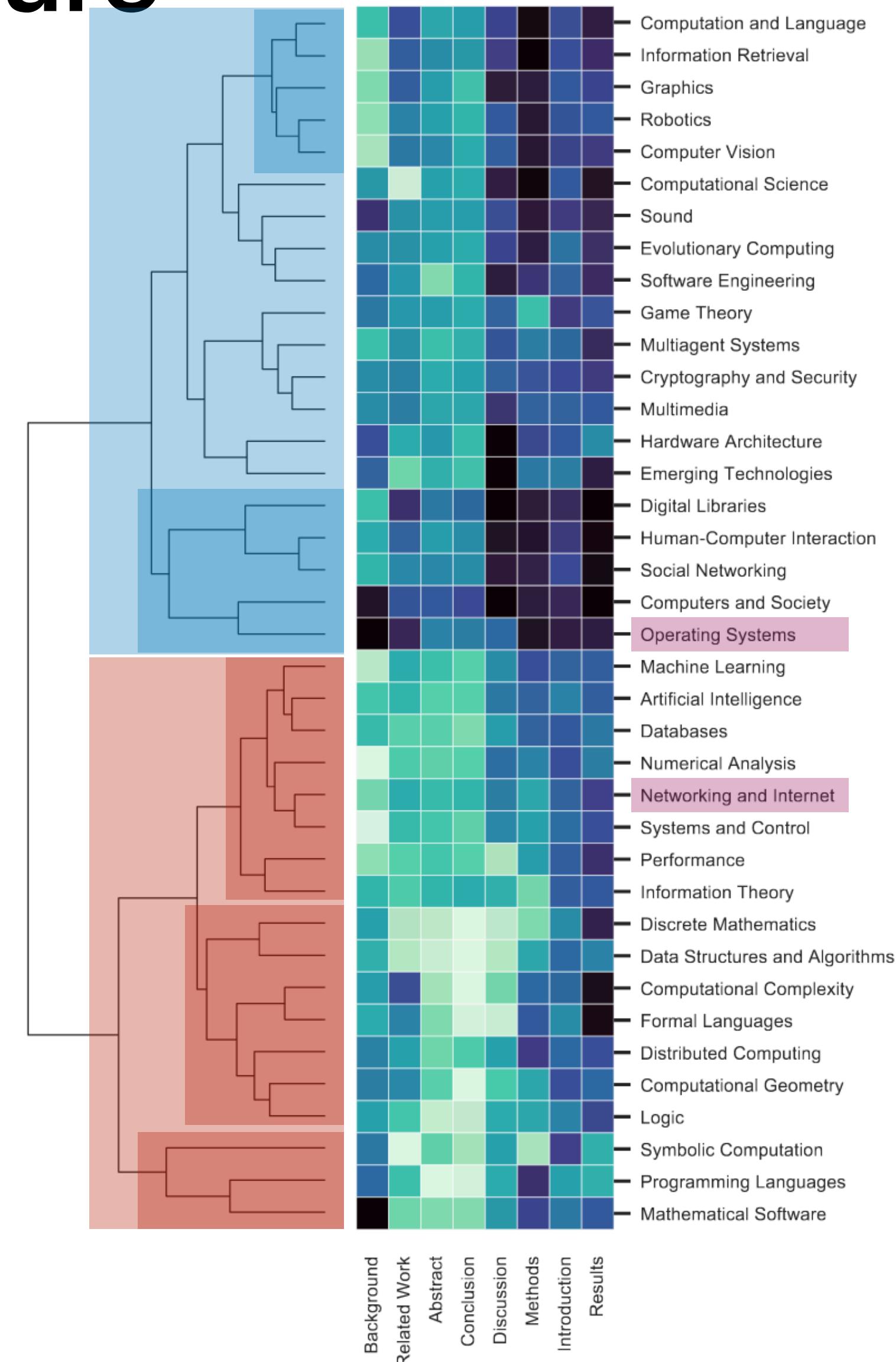
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Current work

- Unexpectedly interesting results...
- In progress:
 - **Downloaded and preprocessed all of arXiv ($\sim 1.5M \rightarrow \sim 1M$)**
 - **CS, Physics, CS + Physics (monophyletic?)**
 - Better use of topic models
 - Improved tree building (phylogenetics)

POLITICAL BIAS

Motivation

- Facebook et al. recommend news articles, but **obscure** the publisher...
- Clicking on articles is telling Facebook "*more news about Brexit please!*"
- Can we automatically identify **political bias** in news articles?

Left & right wing framing of Article 50 high court verdict

Section:GDN BE PaGe:1 Edition Date:161104 Edition:01 Zone:S Sent at 3/11/2016 21:29 cYammaGentaYellow black

1 of 1 REM 25 years of Out of Time 'It was mindblowing' 9 770261 307859 44 Sci-fi gets emotional Arrival and Passengers + Reviews Nocturnal Animals Robbie Williams g2 film&music

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Turmoil for May as judges rule that parliament must decide on Brexit



Gina Miller outside the high court after successfully arguing that government must consult with MPs before starting the process to leave the EU. Photo: Adam Gray

● Legislation may be needed to trigger article 50

● No 10 says it will challenge court's decision

● Eurosceptic Tories demand early election

Bowena Mason Heather Stewart Owen Bowcott
Theresa May is heading for a rebellion over her Brexit strategy, after a high court judge ruled that she needs parliament's approval to trigger article 50 of the Lisbon treaty, the formal process for leaving the European Union without the permission of parliament.

Three senior judges declared yesterday that the government could not proceed with its plan to invoke article 50 without first consulting MPs and peers in a deal-making committee.

The decision was made after a legal challenge was mounted by Gina Miller, a former Labour MP who had argued that the prime minister, who had argued that he had the personal authority to begin the process without a parliamentary vote.

Downing Street has said it will challenge the judgment and is expected to lodge an appeal with the supreme court, with a hearing likely to take place next month.

May acknowledged that the ruling as it stands means Britain's departure from the bloc cannot go ahead until MPs have been consulted. She has said she will seek a "smooth" Brexit, without the permission of the European Union.

"The judges have laid out what we can't do, and not exactly what we can do, but parliament is sovereign and therefore both Commons and the Lords must be involved," she said.

Parliamentarians are unlikely to block Brexit outright, given that 52% of voters supported leaving in the June referendum. But they could still force a vote on the issue, as there appears to be a majority of MPs demanding greater transparency.

"The force of the argument is that the public interest which exists is vitally important. I think there is now consensus among the public that they want to know what is happening," said Nick Clegg, the Lib Dem leader.

"The force of the argument is that the public interest which exists is vitally important. I think there is now consensus among the public that they want to know what is happening," said Nick Clegg, the Lib Dem leader.

The decision is likely to cause political difficulties for the prime minister, who has argued that he had the personal authority to begin the process without a parliamentary vote.

The Guardian understands that the findings of the inquiry into Operation Midland have concluded.

Vikram Datta
Police and crime correspondent
Scotland Yard spent too long pursuing the investigation into allegations that prison officers sexually abused and killed children, so it should have ended the inquiry sooner, the independent report into Operation Midland has concluded.

The Met's findings led to allegations against public figures, including former police chief Lord Bramall and former home secretary Lord Brittan, as well as the former Tory MP Harvey Proctor. The report was handed to the Home Office by Sir Bernard Hogan-Howe, after a review over police actions and the conduct of the inquiry.

Nick's claims led to allegations against Scotland Yard, which collapsed amid controversy earlier this year, are more critical than those made by the Met's report, which did not have sent Scotland Yard into crisis mode.

The report, by Sir Richard Henriques, a retired high court judge, is understood to say that inconsistencies in the account of

the main witness, known as Nick, fatally flawed the investigation's chances of success, which meant it was never likely that the Met would have been able to conclude the case.

Henriques' report also criticises the Met's handling of the inquiry, particularly its failure to take any of the suspects to court and its failure to identify the one, let alone ask prosecutors to consider a charge.

Some in policing are understood to believe that Henriques' findings have failed to take sufficient account of key factors that may explain decision-making. These findings are understood to conclude in the report that the investigation should have ended sooner, and that it should have been pursued more quickly to police force to bring the Met's work to an end.

Richard Henriques, a retired high court judge, has been critical of Scotland Yard in his report, which was studied by senior officers and senior advisors at the Met, since they were delivered four weeks ago in draft form.

Continued on page 2 →

Met's Operation Midland 'should have ended sooner'

The goat is dead
Chicago celebrates as Cubs end 108-year wait for World Series win

Page 3 →



Free GIANT map of Britain inside tomorrow

Daily Mail FRIDAY, NOVEMBER 4, 2016 www.dailymail.co.uk DAILY NEWSPAPER OF THE YEAR 65p



The fencer: Sir Terence Etherton Worked with Tony Blair: Lord Justice Sales The Europhile: Lord Chief Justice Thomas

Fury over 'out of touch' judges who defied 17.4m Brexit voters and could trigger constitutional crisis

ENEMIES OF THE PEOPLE

MPS last night tore into an unelected panel of 'out of touch' judges for ruling that embittered Remain supporters in Parliament should be allowed to frustrate the overwhelming verdict of the British public.

By James Slack Political Editor

into chaos Mrs May's timetable for invoking article 50 in March next year.

Senior MPs – led by an ex-justice minister – said it was an outrage that an 'unholy alliance' of judges and embittered Remain backers could thwart the wishes of 17.4million Leave voters. They warned that Mrs May could be forced to hold an election early next year if the courts did not back down. Leave

Turn to Page 2

Left & right wing framing of Article 50 high court verdict

Section:GDN BE PaGe:1 Edition Date:161104 Edition:01 Zone:S Sent at 3/11/2016 21:29

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25 years of
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'It was
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theguardian

Turmoil for May as judges rule that parliament must decide on Brexit

Gina Miller outside the high court after successfully arguing that government must consult with MPs before starting the process to leave the EU. Photograph: Adam Gray

The court's ruling is a chance for MPs to put the national interest first and halt Brexit before it wreaks any more havoc, says **Polly Toynbee**

A momentous constitutional decision was taken by the high court of England and Wales yesterday. A prime minister's absolute power to do what they like, when they like, regardless of laws and treaties, was struck down. Theresa May cannot tear up our right to be EU citizens without the authority of parliament.

Judges, wisely, do not generally want to usurp the power of elected governments to govern. Laws made by judges are a poor substitute for those made by elected MPs in parliament. But this is a matter of the profoundest constitutional importance, with deep implications, controversial whichever way they had decided. They rightly pronounced that parliament is sovereign - which the Brexiteers claimed we were voting on, even if it no longer suited them.

What now? The government will appeal to the supreme court in December, though some suggest May should dash to the Commons for a quick vote, before a hazy coalition of cross-party remainers has time to organise. If the appeal fails, will MPs galvanise? Leaving it to the unelected Lords is no answer.

There are times when MPs need to rise above their party interests, their own interests and the views of their constituents. That may risk being voted out, but they may earn more respect by standing up for the national interest as best they can determine. In times of war or national crisis, defending the country

Continued on page 4 →

- Legislation may be needed to trigger article 50

- No 10 says it will challenge court's decision

- Eurosceptic Tories demand early election

Rowena Mason
Heather Stewart
Owen Bowcott

Theresa May is heading for a rebellion over her Brexit strategy, after the high court ruled that Britain could not leave the European Union without the permission of parliament.

Three senior judges declared yesterday that the government could not press ahead with triggering article 50 of the Lisbon treaty, the formal process for beginning Brexit, without first consulting MPs and peers in the Commons and Lords.

The decision, made after a legal challenge brought in the wake of the EU referendum in June, is a dramatic setback for the prime minister, who had argued she had the personal authority to begin the process without a parliamentary vote.

Downing Street has said it will change

the judgment and is expected to lodge an appeal with the supreme court, with a hearing likely to take place next month.

But David Davis, the Brexit secretary, acknowledged that the rulings it stands means Britain's departure from the bloc will require the consent of MPs and peers. "The judges have laid out what we can't do, and not exactly what we can do, but we're presuming that it requires an act of parliament and therefore both Commons and Lords," he said.

Parliamentarians are unlikely to block Brexit outright, given that 52% of voters opted to leave the EU on 23 June, but the need for legislation gives MPs the opportunity to disrupt the process by demanding May reveal more details about her plan for negotiating the terms of departure.

The Guardian understands a cross-party group of Tory and Labour MPs met yesterday afternoon to discuss how the

ruling can be used to force May to reveal more about her broad negotiating aims.

Shadow Brexit secretary Keir Starmer said he now believed it was "inevitable the prime minister will have to answer the big questions" on whether she wants Britain to be in the single market or the customs union, as there appears to be a majority of MPs demanding greater transparency.

"This is about accountability and scrutiny," he said. "Very many MPs accept and respect the referendum, of course, but the terms upon which we exit are vitally important. I think there is now consensus that the prime minister has got to disclose the overarching strategy. The idea that we are all to keep in the dark until some time in 2019 only has to be said to be rejected."

May has repeatedly insisted she will deliver the

Met's Operation Midland 'should have ended sooner'

Vikram Dodd
Police and crime correspondent

Scotland Yard spent too long pursuing the investigation into allegations that prominent establishment figures sexually abused and killed children and should have ended the inquiry sooner, the unpublished draft report into Operation Midland has concluded.

The Guardian understands that the findings of the inquiry into Operation Midland, which collapsed amid controversy earlier this year, are more critical than police chiefs were expecting, and have sent Scotland Yard into crisis mode.

The report, by Sir Richard Henriques, a retired high court judge, is understood to say that inconsistencies in the account of

the main witness, known as Nick, fatally flawed the investigation's chances of success, which meant it was never likely that a criminal case would reach the threshold needed to take any of the suspects to court. The report also criticises decisions and actions by officers involved in the high-profile, complex and emotive investigation.

Nick's claims led to allegations against public figures, including former military

chief Lord Bramall and former home secretary Lord Brittan, as well as the former Tory MP Harvey Proctor. The report was ordered by the Met commissioner, Sir Bernard Hogan-Howe, after a furore over police actions and decision-making in the case, which saw officers obtain warrants to raid the homes of suspects and search through their possessions.

The £2m Operation Midland ended in March after the Met concluded that there was insufficient evidence to arrest anyone, let alone ask prosecutors to consider a charge.

The findings from Henriques have been studied by senior officers and senior advisors at the Met, since they were delivered four weeks ago in draft form.

Henriques is understood to conclude

in the report that the investigation should have ended sooner, and that it should have been apparent more quickly to police that Nick's credibility was too low to serve as a basis for prosecution.

The force says there is "no timetable" for the publication of the limited excerpts they will publish, but has said it will withhold the full report because it contains confidential and sensitive information. It is believed that this refers to information about and from exonerated suspects and their accusers.

Some in policing are understood to be concerned that Henriques has failed to take sufficient account of key factors that may explain decision-making. These

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Continued on page 2 →

The goat is dead
Chicago celebrates as Cubs end 108-year wait for World Series win

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Daily

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FRIDAY, NOVEMBER 4, 2016

www.dailymail.co.uk

DAILY NEWSPAPER OF THE YEAR 65p

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Fury over 'out of touch' judges who defied 17.4m Brexit voters and could trigger constitutional crisis

ENEMIES OF THE PEOPLE

MPS last night tore into an unelected panel of 'out of touch' judges for ruling that embittered Remain supporters in Parliament should be allowed to frustrate the overwhelming verdict of the British public.

The Lord Chief Justice and two senior col-

By James Slack Political Editor

leagues were accused of putting Britain on course for a full-blown 'constitutional crisis' by saying Brexit could not be triggered without a Westminster vote.

The judgment by Lord Thomas – a founding member of the European Law Institute, a club of lawyers and academics aiming to 'improve' EU law – throws

into chaos Mrs May's timetable for invoking article 50 in March next year.

Senior MPs – led by an ex-justice minister – said it was an outrage that an 'unholy alliance' of judges and embittered Remain backers could thwart the wishes of 17.4million Leave voters. They warned that Mrs May could be forced to hold an election early next year if the courts did not back down. Leave

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for May as judges rule that

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Downing Street has said it will challenge

Eurosceptic Tories demand early election

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The Guardian understands that the findings of the Met's internal review of Operation Midland, which collapsed amid controversy earlier this year, are more critical than the report by Sir Richard Henriques, who has sent Scotland Yard into crisis mode.

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the main witness, known as Nick, fatally flawed the investigation's chances of success, which meant it was never likely that the police would have been able to prove the old needed to take any of the suspects to court and report any critical evidence to the Crown Prosecution Service. The force also failed to make the most of the available resources, which left officers obstructive and unwilling to raid the homes of suspects and search them.

Nick's claims led to allegations against public figures, including former police chief Lord Bramall and former home secretary Lord Brittan, as well as the former Tory MP Harvey Proctor. The report was welcomed by Nick's survivors, including Bernard Hogan-Howe, after a furor over previous reports that he had been critical of the force's handling of the case.

The findings from Henriques have been studied by senior officers and senior advisors at the Met, since they were delivered four weeks ago in draft form.

Henriques is understood to conclude

in the report that the investigation should have ended sooner, and that it should have been pursued more quickly by police and the CPS, rather than the force's own Nick's survivors.

The force says that, "no timetable" for trials was set, and that the limited exceptions they will publish, but has said it will withdraw from trials if they are unable to guarantee the safety of their accusers.

Some in policing are understood to say that Henriques' findings have failed to take sufficient account of key factors that may explain decision-making. These findings are understood to conclude

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The goat is dead
Chicago celebrates as Cubs end 108-year wait for World Series win

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Richard Henriques
A retired high court judge, Henriques has been more critical of Scotland Yard in his report than police chiefs that expected

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Free GIANT map of Britain inside tomorrow

Daily Mail FRIDAY, NOVEMBER 4, 2016 www.dailymail.co.uk DAILY NEWSPAPER OF THE YEAR 65p



The fencer: Sir Terence Etherton Worked with Tony Blair: Lord Justice Sales The Europhile: Lord Chief Justice Thomas

Fury over 'out of touch' judges who defied 17.4m Brexit voters and could trigger constitutional crisis

ENEMIES OF THE PEOPLE

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By James Slack Political Editor

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Turn to Page 2

Left & right wing framing of Article 50 high court verdict

Section:GDN BE PaGe:1 Edition Date:161104 Edition:01 Zone:S Sent at 3/11/2016 21:29 cYammaGentaYellowblack

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Sci-fi gets emotional Arrival and Passengers

Reviews Nocturnal Animals Robbie Williams

g2 film&music

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Three senior judges declared yesterday that the government could not press ahead with triggering article 50 of the Lisbon treaty, the formal process for beginning Brexit, without first consulting MPs and peers in the Commons and Lords.

The decision, made after a legal challenge brought in the wake of the EU referendum in June, is a dramatic setback for the prime minister, who had argued she had the personal authority to begin the process without a parliamentary vote.

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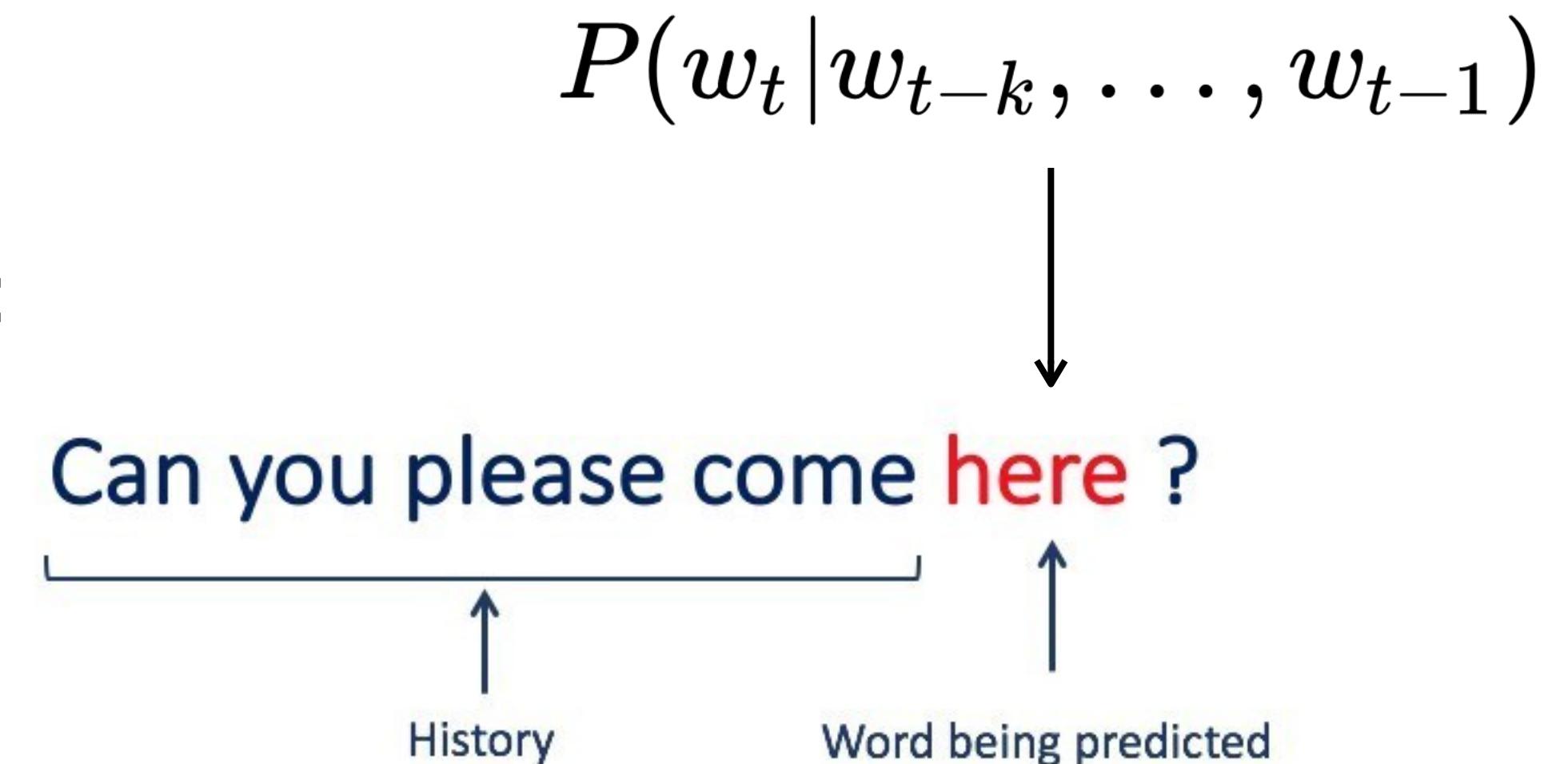
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Approach

- Data sets:
 - Left-wing British newspaper articles (Guardian)
 - Right-wing British newspaper articles (Daily Mail)
- Build two **language models**
- Calculate the **likelihood ratio** on a per word basis:
 - $1.0 = \text{neutral}$
 - $< 1.0 = \text{left-wing}$
 - $> 1.0 = \text{right-wing}$



Preliminary results (with broken data)

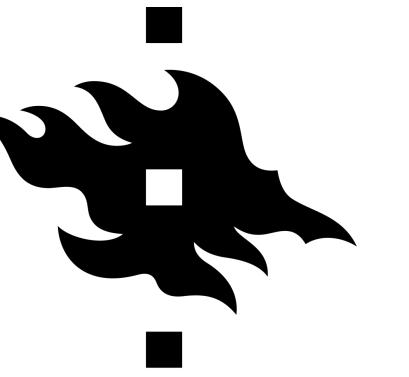
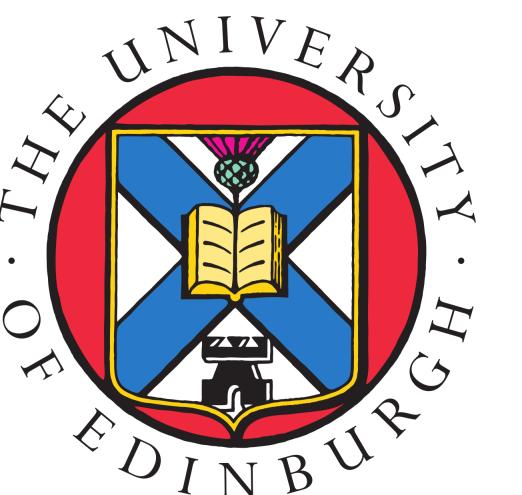
- **Left-wing** articles about UK politics

What is the original ' backstop ' in the **Withdrawal Agreement** ? Variously described as an insurance policy or safety net , the backstop is a device in the **Withdrawal Agreement** intended to ensure that there will not be a hard border between **Northern Ireland** and the **Republic of Ireland** , even if no formal deal can be reached on trade and security arrangements . It would mean that if there were no **workable** agreement on such matters , **Northern Ireland** would stay in the customs union and much of the single market , guaranteeing a friction - free border with the **Republic** . This would keep the **Good Friday** agreement intact . Both the **UK** and **EU** signed up to the basic idea in **December** 2017 as part of the initial **Brexit** deal , but there have been **disagreements** since on how
- **Right-wing** articles about UK or politics
- Model issues (see house of commons)

Brussels and allies across **Europe** . Johnson suggested the **EU** s position was influenced by the **manoeuvres** of **Conservative** MPs who have been examining legislative methods to stop no deal in the **House of Commons** , including former cabinet ministers like **Philip Hammond** . Downing

Acknowledgements

Chien-yu Huang
Arlene Casey



Yu An
Yang Liu