

Chapter IR:VI

VI. IR Applications

- ❑ Web Technology
- ❑ Web Graph
- ❑ Web Crawling
- ❑ Web Archiving
- ❑ Web Content Extraction
- ❑ Near-duplicate Detection
- ❑ Link Analysis

- ❑ The Treachery of Answers
- ❑ Argument Retrieval Problems
- ❑ Argument Ranking I
- ❑ Argument Ranking II
- ❑ Argumentation-Related Resources
- ❑ Argument Search Engines
- ❑ Argument Search Evaluation I
- ❑ Argument Search Evaluation II

Cat / Lifespan

15 years

Domesticated

[Feedback](#)[How Long Do Cats Live? | petMD](#)www.petmd.com/blogs/thedailyvet/.../how_long_do_cats_live-11496 ▼

Aug 8, 2011 - This question, typically rephrased as, "How long will my cat (or dog, horse, etc.) live," is something veterinarians hear on a daily basis.

[Aging Cats: Changes, Health Problems, Food, and More](#)pets.webmd.com/cats/guide/aging-cats-qa ▼

WebMD veterinarian experts answer common questions cat owners have ... What else can you expect as your cat ages? ... Q: How long do cats usually live?

[What Is the Life Span of the Common Cat? - Cats - About.com](#)cats.about.com › [About Home](#) › [Cats](#) ▼

How long is the common cat supposed to live? Questions and answers from the About Guide to Cats.

[Ageing - How long do cats live | Adelaide Animal Hospital](#)adelaidevet.com.au/pet.../how-long-do-cats-live-ageing-and-your-feline ▼

Life expectancy depends on many things, including one important factor - whether your cat is an indoor-only cat or an outdoor cat. Indoor cats generally live from 12-18 years of age. Many may live to be in their early 20s. The oldest reported cat lived to be an

Cat

Animal



The domestic cat or the feral cat is a small, typically furry, carnivorous mammal. They are often called house cats when kept as indoor pets or simply cats when there is no need to distinguish them from other felids and felines. [Wikipedia](#)

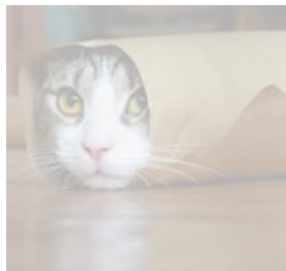
Scientific name: Felis catus**Lifespan:** 15 years (Domesticated)**Gestation period:** 64 – 67 days**Higher classification:** Felis**Daily sleep:** 12 – 16 hours**Mass:** 3.6 – 4.5 kg (Adult)[Feedback](#)



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Konrad
Lischka

How does Google know when my cat will die?

23. September 2015 by [Konrad Lischka](#), in [Blog @en](#)

How long do cats live? Exactly 15 years says Google.com. Not "10 to 15", not "about 15 years", but "15 years". That sounds like a definitive answer. It's Google's answer to the search query "[How long do cats live](#)".

The Treachery of Answers

Retrieving answers as a retrieval paradigm:

- ❑ Users ask questions that concern them.
- ❑ Search engines return direct answers from knowledge bases and the web.

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- ❑ Answers from knowledge bases often lack source reference and justification.
- ❑ Are answers chosen with attention to their accuracy and source credibility?
- ❑ Direct answers may lead users to believe that there are no other answers.
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The dilemma of the direct answer: [\[Potthast/Hagen/Stein 2020\]](#)

The dilemma of the direct answer is a user's choice between convenience and diligence when using an information retrieval system.

The impact on society of giving direct answers at scale is not well-understood.

The Treachery of Answers



Hi, how can I help?

How long do cats live?



15 years.



Ceci n'est pas une réponse.

Remarks:

❑ Copyright notice:

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- “La Trahison des réponses” is a derivation from “La Trahison des images” (1929; [“The Treachery of Images”](#)) by René Magritte.
- The canvas and handwriting have been derived from a 2019 public domain reproduction of Magritte’s painting by Thomas Hawk at [publicdelivery.org](#).
- The image of the cat has been taken from a public domain reproduction of the painting “Sitting Cat” (1815) by Jean Bernard Duvivier at [rawpixel.com](#).
- The cat’s image was kindly colorized manually by user [BlueBudgieOne](#) on Reddit’s [/r/colorizationrequests](#).

Argument Retrieval Problems

Basic Argument Model

Conclusion *Mankind will be able to travel to other galaxies.*

Premise 1 *Photon drives can take you up to relativistic velocities.*

Premise 2 *In August 2019 Lightsail2 demonstrated its functioning.*

Premise 3 *NASA announces progress on torpor (human hibernation).*

Argument Retrieval Problems

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Argument:

- A conclusion (claim) supported by premises (reasons). [\[Walton et al. 2008\]](#)

Conclusion and premises are considered as propositions.

- Conveys a stance on a controversial topic. [\[Freeley and Steinberg, 2009\]](#)

Assignment of truth values to the propositions:

$\mathcal{I}(\text{"Mankind will be able to travel to other galaxies."}) = 1, \mathcal{I}(\text{"Photon ..."}) = 1, \dots$

- The mechanism ("calculus", "argumentation type") to obtain ("derive") the conclusion from the premises is left implicit and is usually informal.

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Argument Retrieval Problems

Basic Argument Model

Thesis / Major claim t *Human beings will colonize other planets.*

A_{pro} { c_1 Mankind will be able to travel to other galaxies.

P_1 { p_1 *Photon drives can take you up to relativistic velocities.*

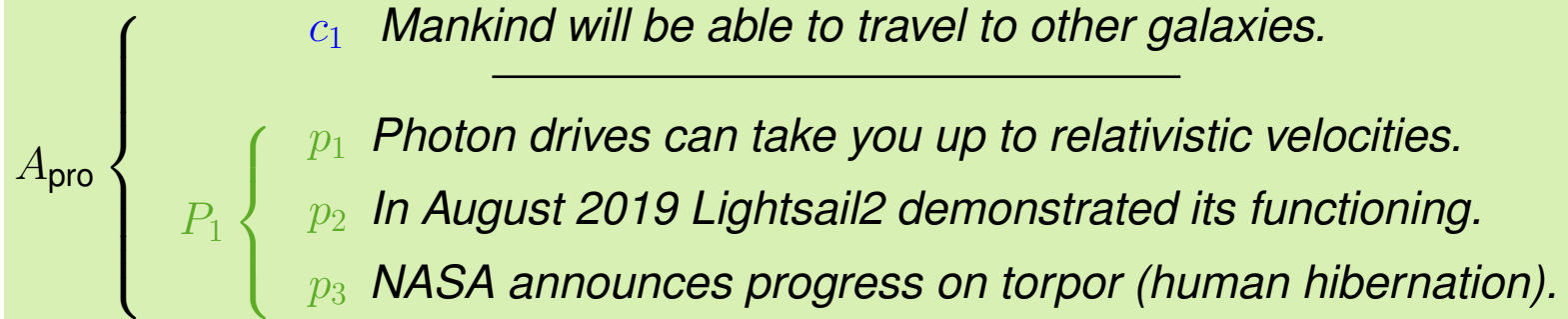
p_2 *In August 2019 Lightsail2 demonstrated its functioning.*

p_3 *NASA announces progress on torpor (human hibernation).*

Argument Retrieval Problems

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Thesis / Major claim t *Human beings will colonize other planets.*



- Note: $c_1 \succ t$
- “ c_1 supports t ” (entailment in a cogent, nonobligatory sense)
 - “ t is compatible with c_1 ” (but the real argumentation focus)

Argument Retrieval Problems

Basic Argument Model

Thesis / Major claim t *Human beings will colonize other planets.*

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$A_{\text{con}} \left\{ \begin{array}{l} c_2 \text{ Mankind will never explore other galaxies.} \\ P_2 \left\{ \begin{array}{l} p_4 \text{ Matter cannot pass through wormholes.} \\ p_5 \text{ Hawking explained why time travel is impossible.} \end{array} \right. \end{array} \right.$

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□ The standard interpretation \mathcal{I} of all propositions, t , c_i , p_j , is 1 (true).

Note: □ $c_1 \approx \neg c_2$ “ $\neg c_2$ is a paraphrase of c_1 ”

$\Rightarrow c_2$ can be expressed as c_1 with opposite truth assignment, $\mathcal{I}(c_1) = 0$, $\mathcal{I}(c_2) = 1$

Argument Retrieval Problems

(1) Argument Relevance Π_{rel}

Query *Will human beings colonize other planets?*

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Given in Π_{rel} :

- information need, expressed as query, $q \in Q$
- set of arguments, $A = \{(c_1, P_1), (c_2, P_2), \dots, (c_n, P_n)\}$
- * (possibly hidden) human selection of the relevant arguments, A_q^* , $q \in Q$

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- * (possibly hidden) human selection of the relevant arguments, \mathbf{A}_q^* , $q \in Q$

Sought in Π_{rel} :

- a relevance function $\rho : Q \times \mathbf{A} \rightarrow \{0, 1\}$, such that ...

the macro-averaged F -measure (precision, recall) regarding \mathbf{A}_q^* , $q \in Q$, is maximum

Argument Retrieval Problems

(2) Argument Ranking Π_{rank}

Query *Will human beings colonize other planets?*

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Given in Π_{rank} :

- information need, expressed as query, $q \in Q$
- set of relevant arguments, $A_q = \{(c_1, P_1), (c_2, P_2), \dots, (c_m, P_m)\}$
- * (possibly hidden) human ranking of the relevant arguments, $\pi_{A_q}^*$, $q \in Q$

Argument Retrieval Problems

(2) Argument Ranking Π_{rank}

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- set of relevant arguments, $A_q = \{(c_1, P_1), (c_2, P_2), \dots, (c_m, P_m)\}$
- * (possibly hidden) human ranking of the relevant arguments, $\pi_{A_q}^*$, $q \in Q$

Sought in Π_{rank} :

- a ranking function $\sigma : Q \times \mathcal{P}(A) \rightarrow \Pi$, such that ...
the mean rank correlation $\bar{\tau}$ regarding $\pi_{A_q}^*$, $q \in Q$, is maximum

Argument Retrieval Problems

(3) – (7) Further Problems

3. Π_{counter} Retrieve the “best” counterargument
Given: query q , argument set A , argument A
4. Π_{sameside} Retrieve (all) arguments with the same stance
Given: argument set A , argument A
5. Π_{argdoc} Is the document argumentative?
Given: document d
6. Π_{argquery} Is the query argumentative?
Given: query q
7. Π_{argsum} Summarize an argument.
Given: argument A

Argument Retrieval Problems

(3) – (7) Further Problems

3. Π_{counter} Retrieve the “best” counterargument
Given: query q , argument set A , argument A
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6. Π_{argquery} Is the query argumentative?
Given: query q
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Notes:

- ☐ Π_{counter} can be cast as Π_{rank} if the query is negated.
- ☐ Π_{argdoc} and Π_{argquery} are decision problems.
- ☐ Π_{counter} and Π_{sameside} can be cast as decision problems as well.
- ☐ Challenge: development of domain-independent or “topic-agnostic” approaches.

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- ☐ Argument Search Evaluation II

Argument Ranking I

 args

abortion

All

Discussions

People

Pro vs. con view ▾ 9238 arguments retrieved in 1.0ms

PRO

Abortion is the ending of pregnancy by the removal or...
► Show full argument
Abortion is the ending of pregnancy by the removal or forcing out from the womb of a fetus or embryo before it is able to survive on its own. An **abortion** can occur spontaneously, in which ...
<https://www.debate.org/debates/abortion/350/> score ▾

Great, another forfeiter. As someone who has debated...

► Show full argument
Great, another forfeiter. As someone who has debated **abortion** before, I will put a link to my original **abortion** debate right here: <http://www.debate.org...> I will be using arguments that ...
<https://www.debate.org/debates/Abortion/328/> score ▾

This should be fun :) The legalisation of abortion has...
► Show full argument
This should be fun :) The legalisation of **abortion** has been a big issue worldwide for a long period of time, not only politically but also on social and religious fronts. **Abortion** can be ...
<https://www.debate.org/debates/Abortion/156/> score ▾

There are many good and bad sides to abortion, But just...
► Show full argument
There are many good and bad sides to **abortion**. But just like everything, There is no black and white, just a whole range of gray. **Abortion** is one way that poverty can decrease. Most unplanned ...
<https://www.debate.org/debates/Abortion/741/> score ▾

Although I oppose abortion in most cases, I accepted this...
► Show full argument
Although I oppose **abortion** in most cases, I accepted this debate because Con's position is that **abortion** "can never be justified regardless of circumstances." That is the point I want to ...
<https://www.debate.org/debates/abortion/309/> score ▾

Abortion is needed to control the population so that the...
► Show full argument
Abortion is needed to control the population so that the population doesn't get too excess. By the 22 century, the population estimated to be 11.2 billion people and if **abortion** were **illegal**, ...
<https://www.debate.org/debates/Abortion/543/> score ▾

CON

In 2011, there were about 730,322 abortions reported to...
► Show full argument
In 2011 there were about 730,322 abortions reported to the centers for disease control. There are about 1.7% of **abortion** of women's ages from 15-44 each year. Women who already had **abortion** ...
<https://www.debate.org/debates/Abortion/545/> score ▾

The greatest destroyer of peace is abortion because if a...
► Show full argument
"The greatest destroyer of peace is **abortion** because if a mother can kill her own child, what is left for me to kill you and you to kill me? There is nothing between," says Mother Teresa. ...
<https://www.debate.org/debates/Abortion/507/> score ▾

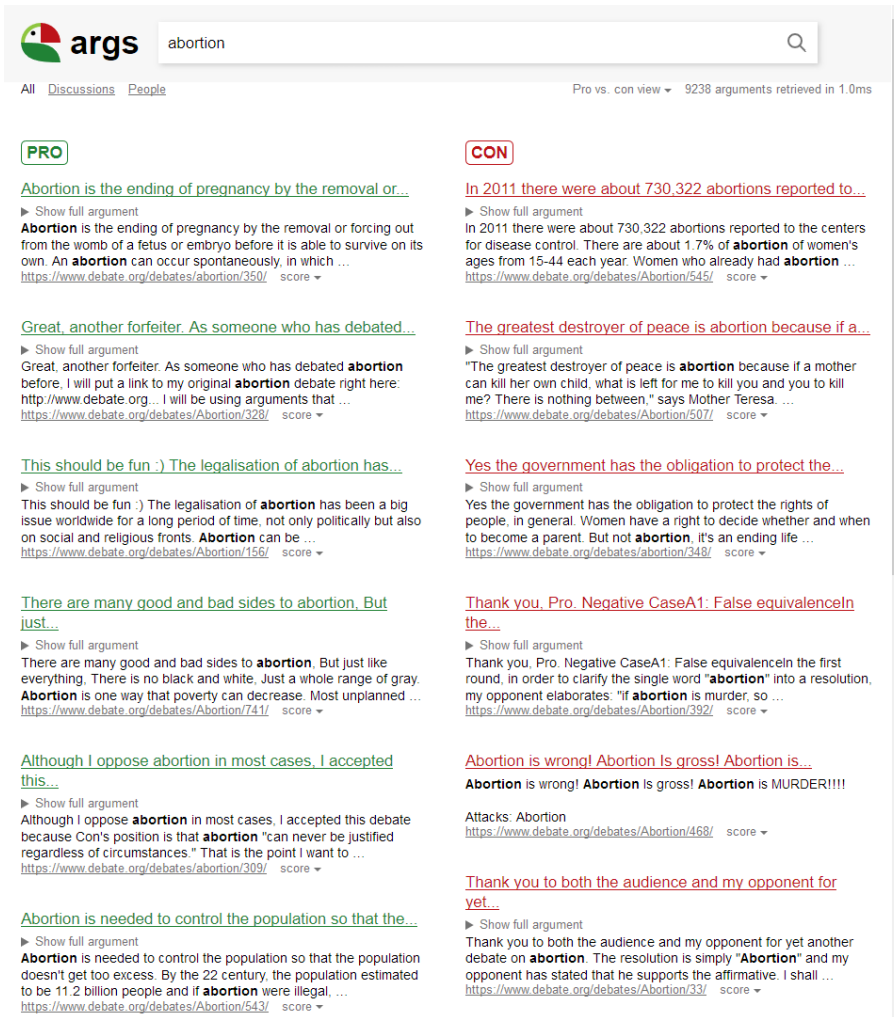
Yes the government has the obligation to protect the...
► Show full argument
Yes the government has the obligation to protect the rights of people, in general. Women have a right to decide whether and when to become a parent. But not **abortion**, it's an ending life ...
<https://www.debate.org/debates/abortion/348/> score ▾

Thank you, Pro. Negative CaseA1: False equivalenceIn the...
► Show full argument
Thank you, Pro. Negative CaseA1: False equivalenceIn the first round, in order to clarify the single word "**abortion**" into a resolution, my opponent elaborates: "If **abortion** is murder, so ...
<https://www.debate.org/debates/Abortion/392/> score ▾

Abortion is wrong! Abortion Is gross! Abortion is...
Abortion is wrong! **Abortion** is gross! **Abortion** is MURDER!!!!
Attacks: Abortion
<https://www.debate.org/debates/Abortion/468/> score ▾

Thank you to both the audience and my opponent for yet...
► Show full argument
Thank you to both the audience and my opponent for yet another debate on **abortion**. The resolution is simply "**Abortion**" and my opponent has stated that he supports the affirmative. I shall ...
<https://www.debate.org/debates/Abortion/33/> score ▾

Argument Ranking I



The screenshot shows the 'args' website search results for the query 'abortion'. The page is divided into two main sections: 'PRO' and 'CON'. Each section lists several arguments with their titles, brief descriptions, links to the full argument, and a score.

PRO

- Abortion is the ending of pregnancy by the removal or...**
► Show full argument
Abortion is the ending of pregnancy by the removal or forcing out from the womb of a fetus or embryo before it is able to survive on its own. An **abortion** can occur spontaneously, in which ...
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+ Query

Retrieval

"Argumentative"
documents

Argument mining

Arguments

Relation detection

Paraphrased
argument units

Graph analysis

Argument graph

Centrality: PageRank

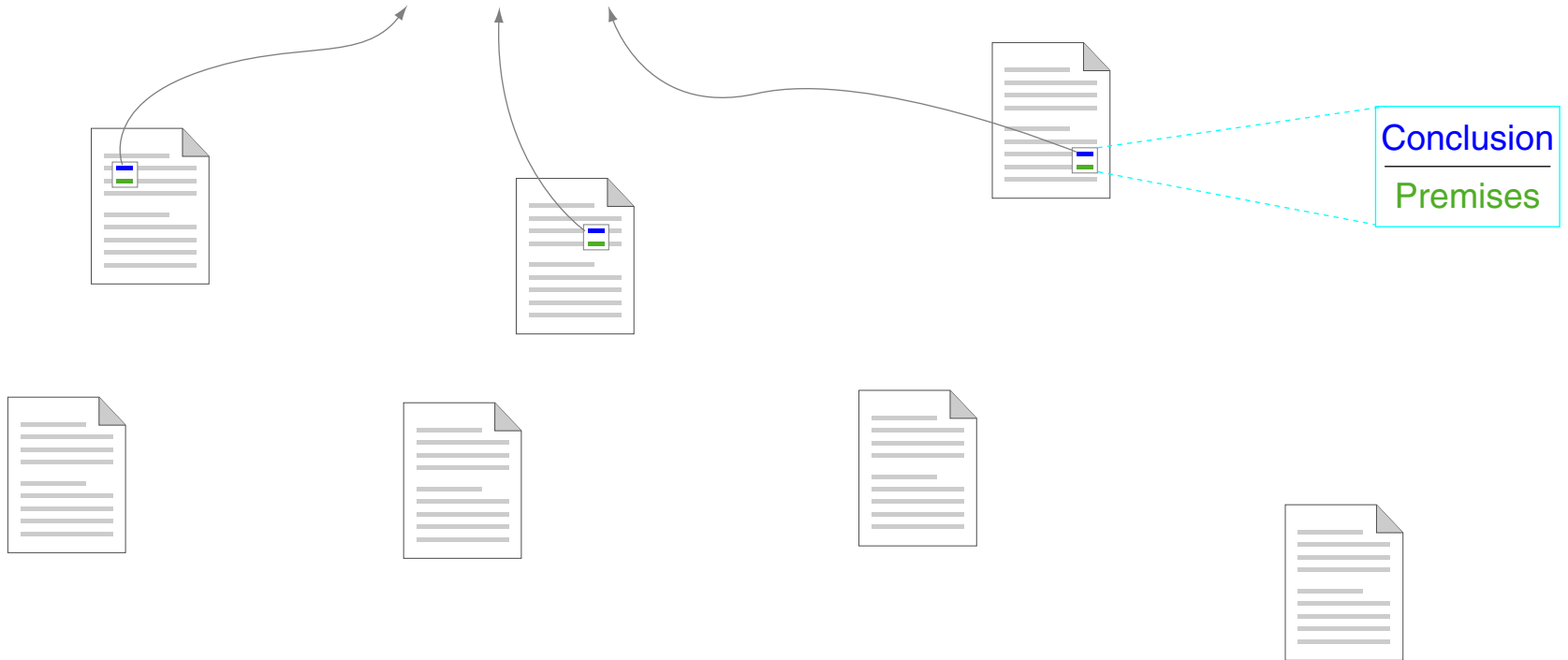
Ranking

Argument Ranking I

Query *Reintroduce death penalty?*

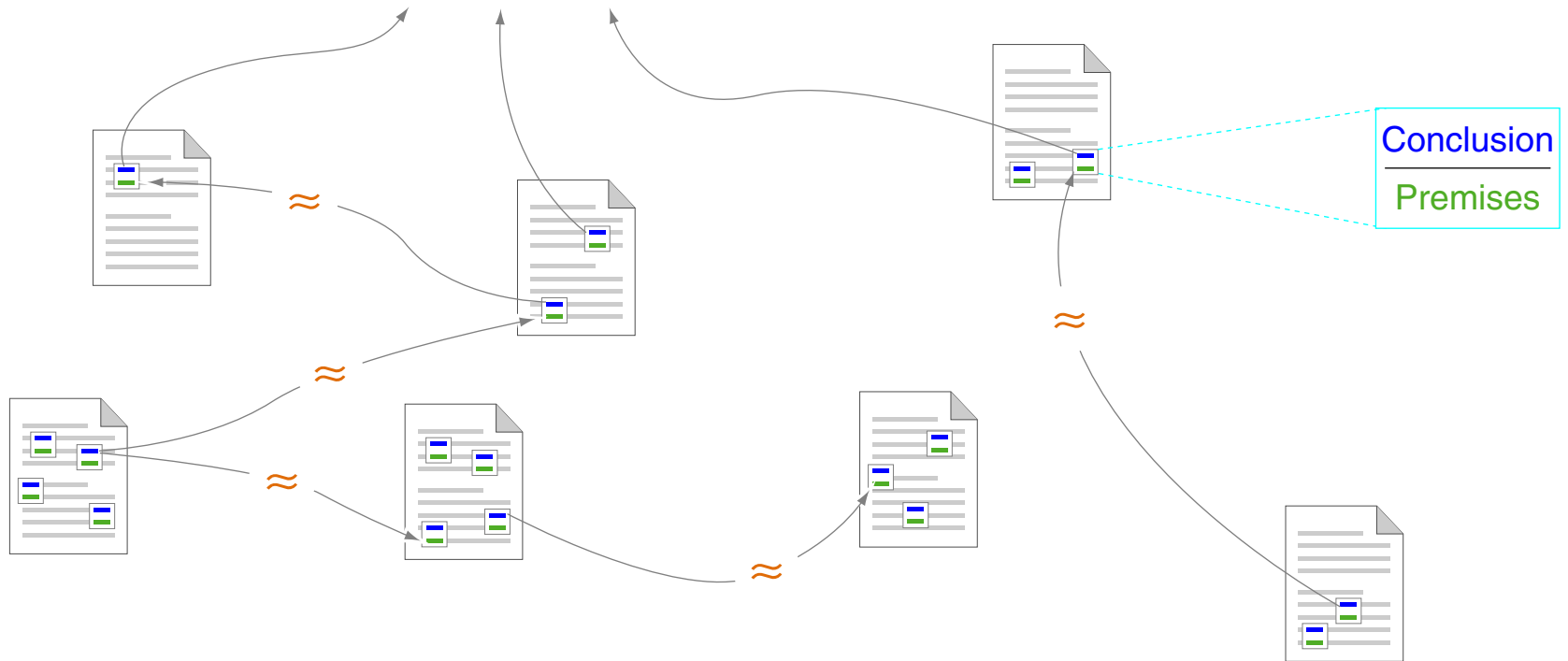
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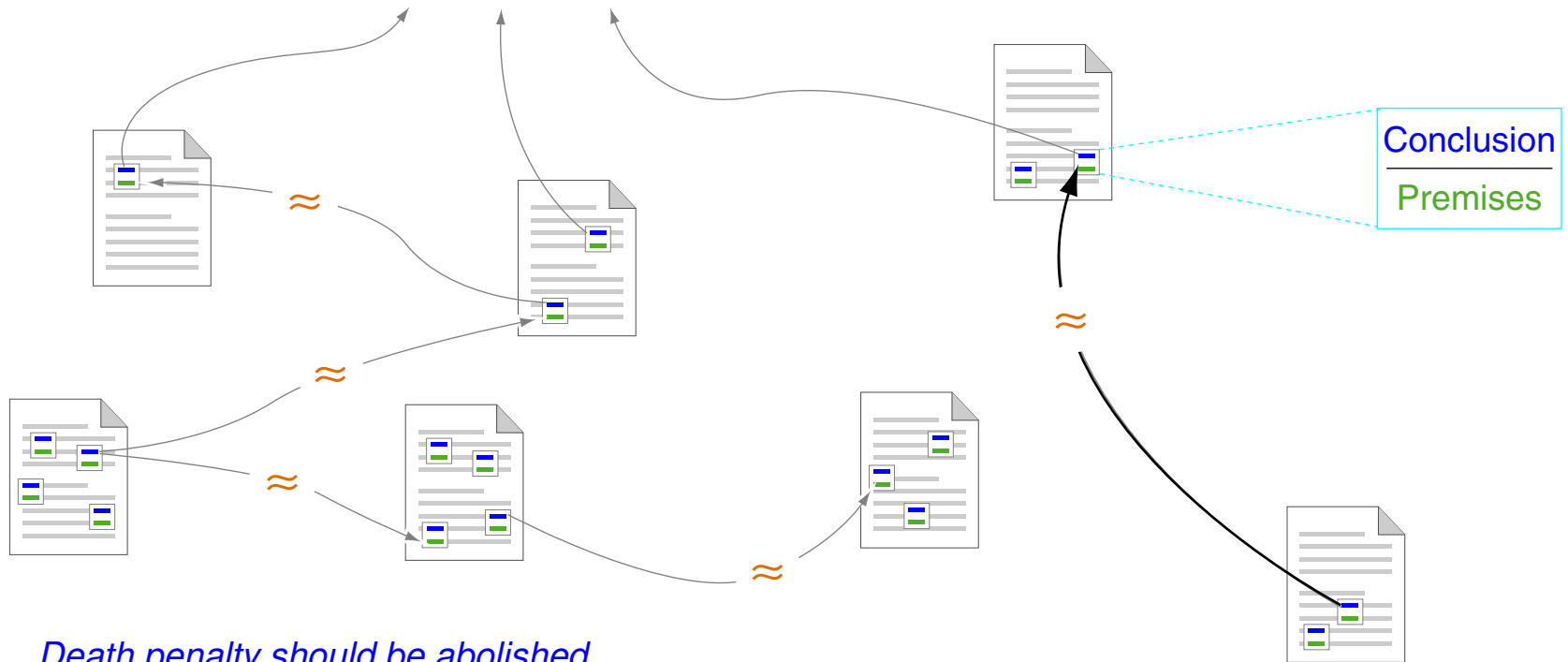
Argument Ranking I

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Argument Ranking I

Query *Reintroduce death penalty?*



Death penalty should be abolished.

*It does not prevent people
from committing crimes.*

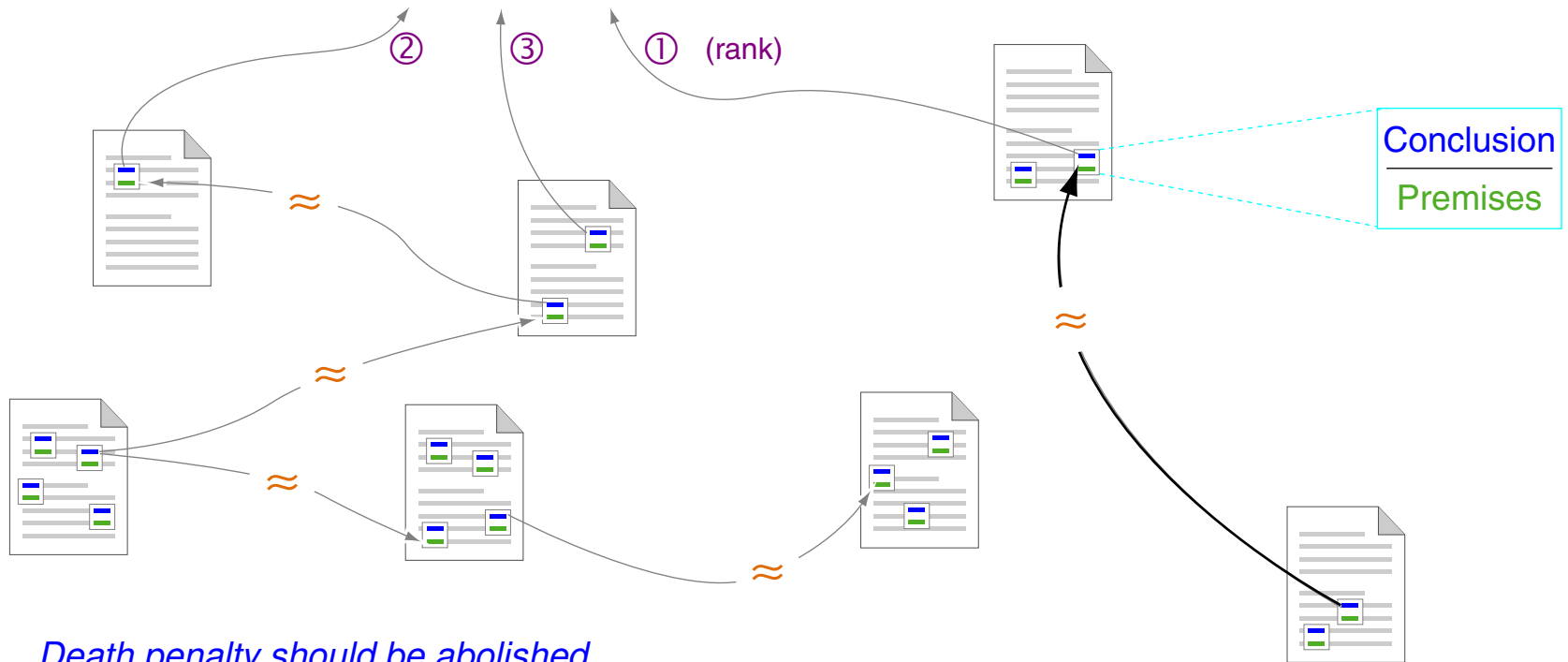


*The death penalty doesn't deter people
from committing serious violent crimes.*

*A survey of the UN on the relation between
the death penalty and homicide rates gave
no support to the deterrent hypothesis.*

Argument Ranking I

Query *Reintroduce death penalty?*



Death penalty should be abolished.

*It does not prevent people
from committing crimes.*

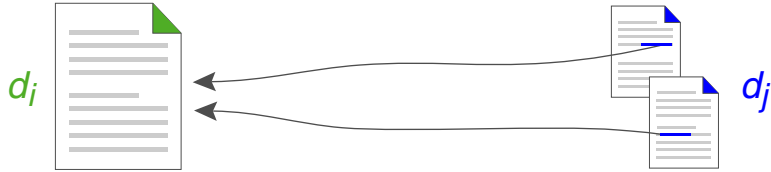


The death penalty doesn't deter people
from committing serious violent crimes.

*A survey of the UN on the relation between
the death penalty and homicide rates gave
no support to the deterrent hypothesis.*

Argument Ranking I

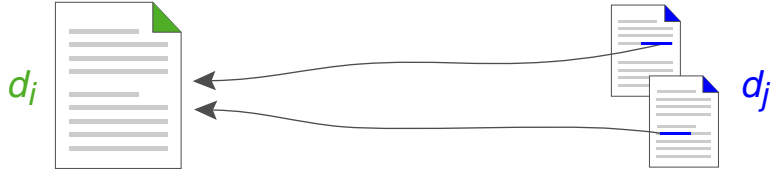
$$p(d_i) = (1 - \alpha) \cdot \frac{1}{|D|} + \alpha \cdot \sum_j \frac{p(d_j)}{|D_j|}$$



Original PageRank [[Page et al. 1999](#)]

Argument Ranking I

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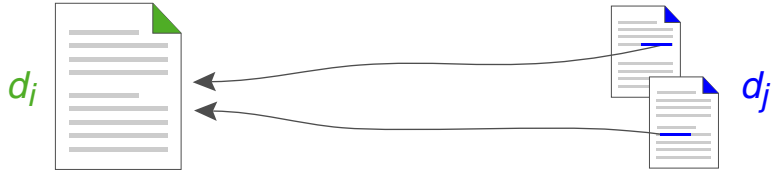


Original PageRank [\[Page et al. 1999\]](#)

1. ground relevance + recursive relevance

Argument Ranking I

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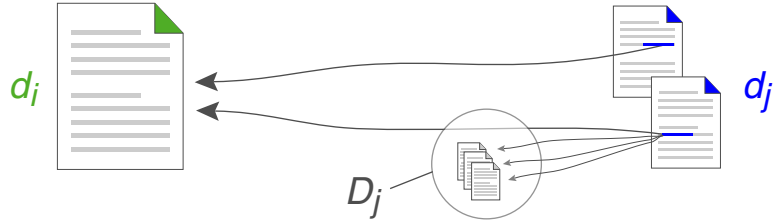


Original PageRank [\[Page et al. 1999\]](#)

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2. d_j links to $d_i \leadsto$ increase $\text{PageRank}(d_i)$

Argument Ranking I

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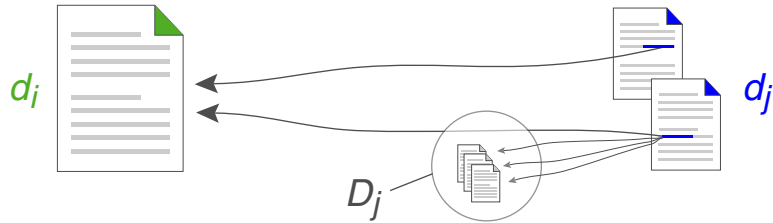


Original PageRank [\[Page et al. 1999\]](#)

1. ground relevance + recursive relevance
2. d_j links to $d_i \leadsto$ increase $\text{PageRank}(d_i)$
3. reward exclusive links

Argument Ranking I

$$p(d_i) = (1 - \alpha) \cdot \boxed{\frac{1}{|D|}} + \alpha \cdot \sum_j \frac{p(d_j)}{|D_j|}$$

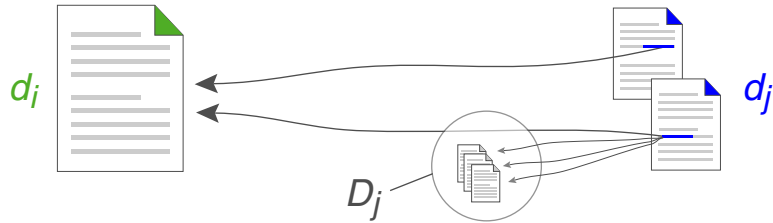


Original PageRank [\[Page et al. 1999\]](#)

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3. reward exclusive links
4. uniform ground relevances (sum to 1)

Argument Ranking I

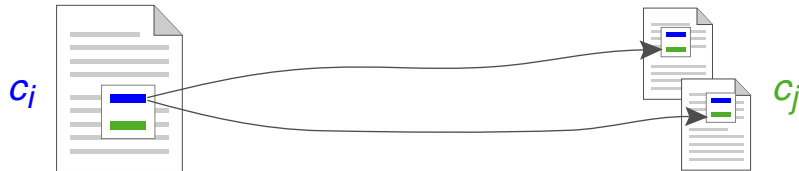
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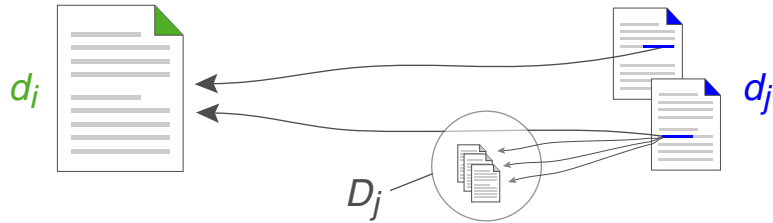
$$\hat{p}(c_i) = (1 - \alpha) \cdot \frac{p(d_i) \cdot |D|}{|A|} + \alpha \cdot \sum_j \frac{\hat{p}(c_j)}{|P_j|}$$



ArgRank [\[Wachsmuth/Stein 2017\]](#)

Argument Ranking I

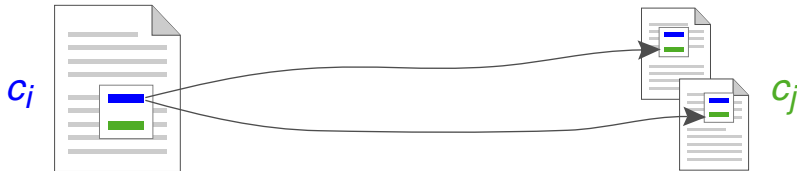
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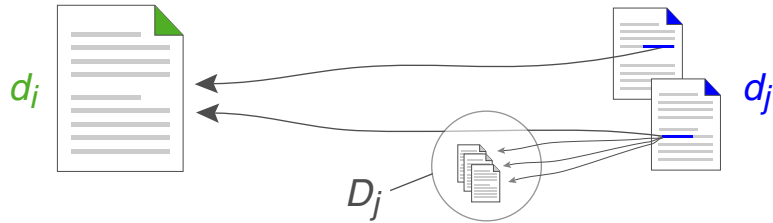


ArgRank [\[Wachsmuth/Stein 2017\]](#)

1. ground strength + recursive relevance

Argument Ranking I

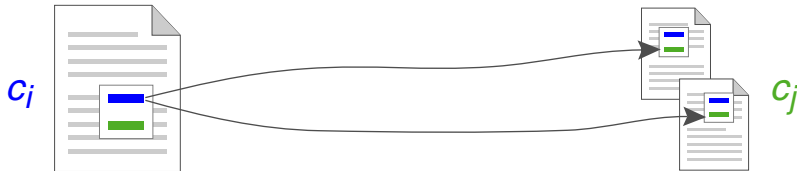
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Original PageRank [\[Page et al. 1999\]](#)

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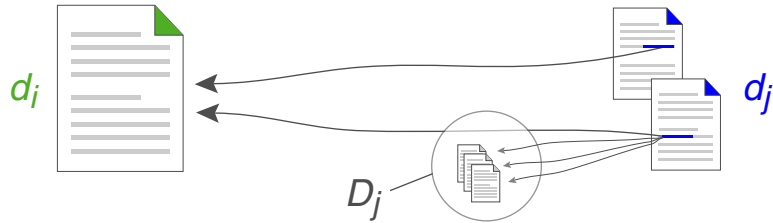


ArgRank [\[Wachsmuth/Stein 2017\]](#)

1. ground strength + recursive relevance
2. c_i premise for $c_j \leadsto$ increase $\text{ArgRank}(c_i)$

Argument Ranking I

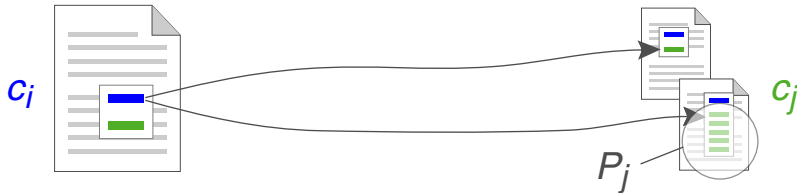
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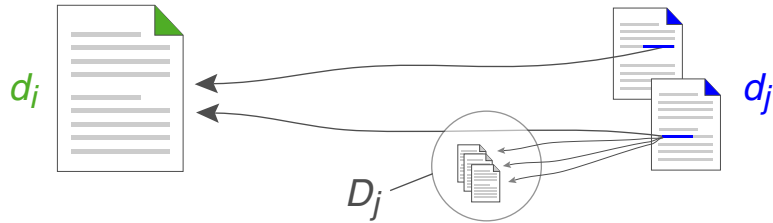


ArgRank [\[Wachsmuth/Stein 2017\]](#)

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3. reward exclusive premises

Argument Ranking I

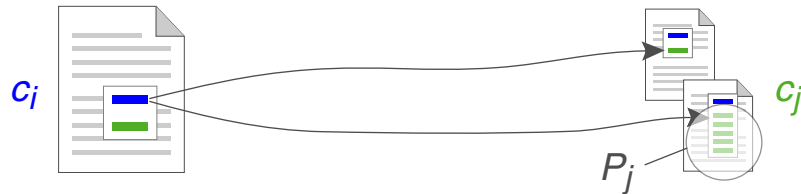
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Original PageRank [\[Page et al. 1999\]](#)

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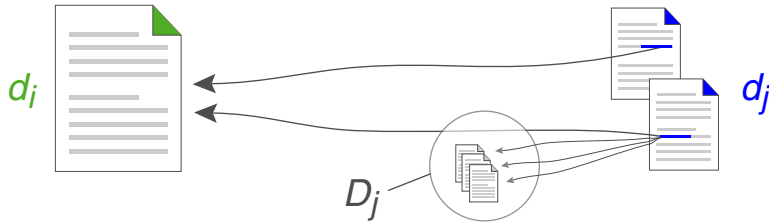


ArgRank [\[Wachsmuth/Stein 2017\]](#)

1. ground strength + recursive relevance
2. c_i premise for $c_j \leadsto$ increase $\text{ArgRank}(c_i)$
3. reward exclusive premises
4. ground strength \sim PageRank

Argument Ranking I

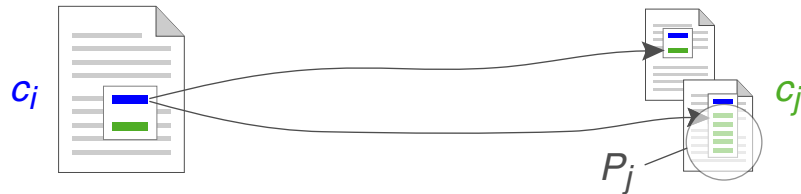
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Original PageRank [\[Page et al. 1999\]](#)

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ArgRank [\[Wachsmuth/Stein 2017\]](#)

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2. c_i premise for $c_j \leadsto$ increase $\text{ArgRank}(c_i)$
3. reward exclusive premises
4. ground strength \sim PageRank

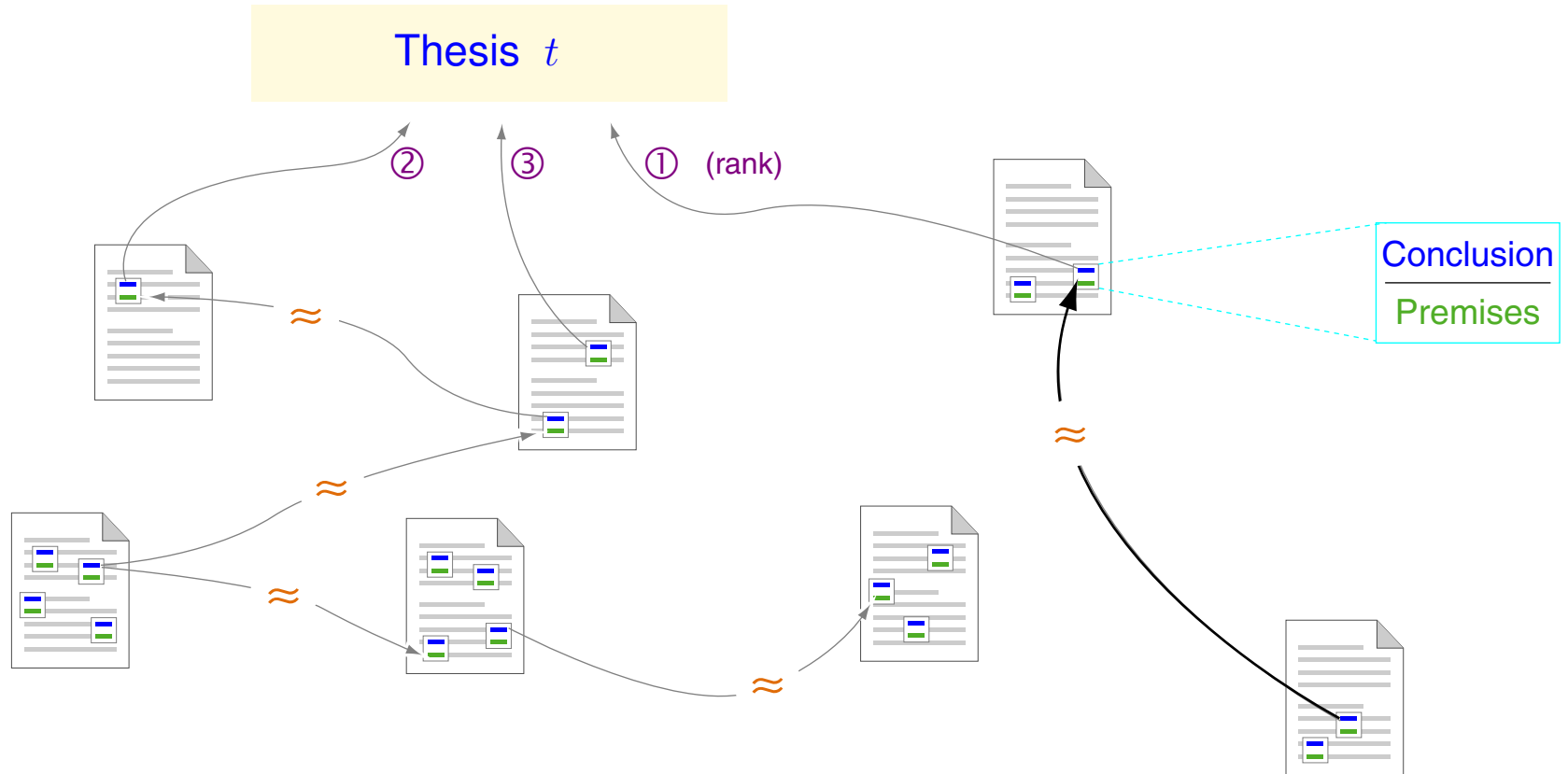
“Reversal of Evidence”

PageRank: Author cannot enforce links to their web page.

ArgRank: Author cannot enforce use of their argument.

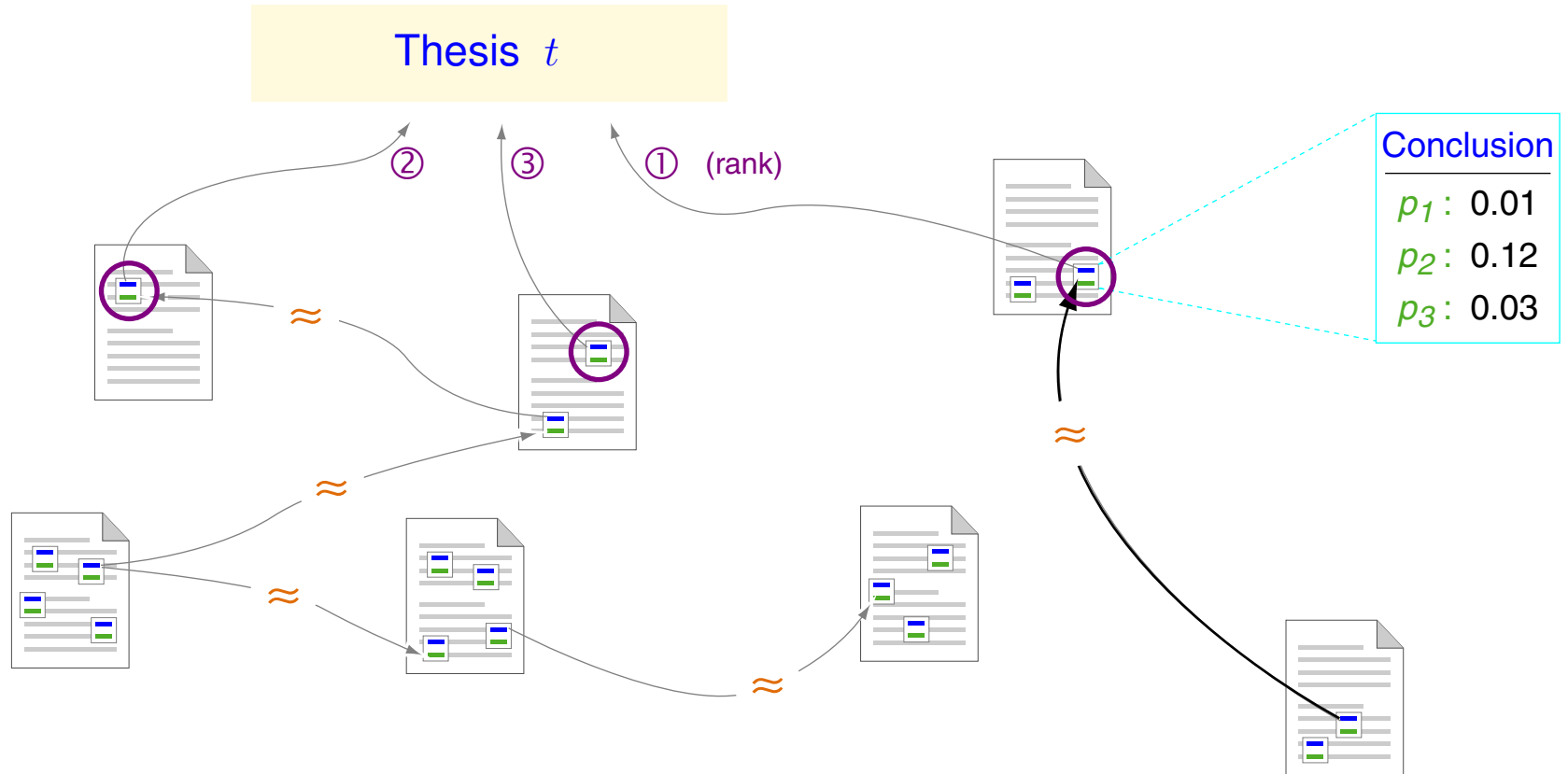
Argument Ranking I

From Premise Scores to Argument Ranks



Argument Ranking I

From Premise Scores to Argument Ranks



How to weigh the premise scores of the matching arguments?

(maximum, average, etc.)

Argument Ranking I

Case Study: Graph Construction

Construction of a raw graph using 57 corpora from the [Argument Web](#) :

	28 875 Argument units, used in ...
	17 877 Arguments

Processing steps towards an argument graph:

	3 113 Conclusions with ≥ 1 argument, where ...
	498 have multiple premises, from which ...
	70 have a relevant claim, from which ...
	32 are used in 110 intelligible arguments.

Argument Ranking I

Case Study: Graph Construction

Construction of a raw graph using 57 corpora from the [Argument Web](#) :

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Processing steps towards an argument graph:

	3 113 Conclusions with ≥ 1 argument, where ...
	498 have multiple premises, from which ...
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	32 are used in 110 intelligible arguments.

Acquisition of a ranking ground truth:

- 7 experts from NLP and IR ranked all arguments (110) for each conclusion (32)
- $\tau = 0.59$ as highest agreement between two experts (mean: $\tau = 0.36$)

Argument Ranking I

Case Study: Results

Ranking approach	Premise score computation				Best τ
	Minimum	Average	Maximum	Sum	
	τ	τ	τ	τ	
1. ArgRank	0.01	0.02	0.11	0.28	0.28
2. Frequency	-0.10	-0.03	-0.01	0.10	0.10
3. Similarity	-0.13	-0.05	0.01	0.02	0.02
4. Sentiment	0.01	0.11	0.12	0.12	0.12
5. Most premises	-	-	-	-	0.19
6. Random	-	-	-	-	0.00

Approach 1: An argument's relevance corresponds to the ArgRank of its premises.

Argument Ranking I

Case Study: Results

Ranking approach	Premise score computation				Best τ
	Minimum	Average	Maximum	Sum	
	τ	τ	τ	τ	
1. ArgRank	0.01	0.02	0.11	0.28	0.28
2. Frequency	-0.10	-0.03	-0.01	0.10	0.10
3. Similarity	-0.13	-0.05	0.01	0.02	0.02
4. Sentiment	0.01	0.11	0.12	0.12	0.12
5. Most premises	-	-	-	-	0.19
6. Random	-	-	-	-	0.00

Approach 2: An argument's relevance corresponds to the frequency of its premises in the graph.

Argument Ranking I

Case Study: Results

Ranking approach	Premise score computation				Best τ
	Minimum	Average	Maximum	Sum	
	τ	τ	τ	τ	
1. ArgRank	0.01	0.02	0.11	0.28	0.28
2. Frequency	-0.10	-0.03	-0.01	0.10	0.10
3. Similarity	-0.13	-0.05	0.01	0.02	0.02
4. Sentiment	0.01	0.11	0.12	0.12	0.12
5. Most premises	-	-	-	-	0.19
6. Random	-	-	-	-	0.00

Approach 3: An argument's relevance corresponds to the Jaccard similarity of its premises to its conclusion.

Argument Ranking I

Case Study: Results

Ranking approach	Premise score computation				Best τ
	Minimum	Average	Maximum	Sum	
	τ	τ	τ	τ	
1. ArgRank	0.01	0.02	0.11	0.28	0.28
2. Frequency	-0.10	-0.03	-0.01	0.10	0.10
3. Similarity	-0.13	-0.05	0.01	0.02	0.02
4. Sentiment	0.01	0.11	0.12	0.12	0.12
5. Most premises	-	-	-	-	0.19
6. Random	-	-	-	-	0.00

Approach 4: An argument's relevance corresponds to the positivity of its words in the premises according to SentiWordNet.

Argument Ranking I

Case Study: Results

Ranking approach	Premise score computation				Best τ
	Minimum	Average	Maximum	Sum	
	τ	τ	τ	τ	
1. ArgRank	0.01	0.02	0.11	0.28	0.28
2. Frequency	-0.10	-0.03	-0.01	0.10	0.10
3. Similarity	-0.13	-0.05	0.01	0.02	0.02
4. Sentiment	0.01	0.11	0.12	0.12	0.12
5. Most premises	-	-	-	-	0.19
6. Random	-	-	-	-	0.00

Approach 5: An argument's relevance corresponds to its number of premises.

Argument Ranking I

Case Study: Results

Ranking approach	Premise score computation				Best τ
	Minimum	Average	Maximum	Sum	
	τ	τ	τ	τ	
1. ArgRank	0.01	0.02	0.11	0.28	0.28
2. Frequency	-0.10	-0.03	-0.01	0.10	0.10
3. Similarity	-0.13	-0.05	0.01	0.02	0.02
4. Sentiment	0.01	0.11	0.12	0.12	0.12
5. Most premises	-	-	-	-	0.19
6. Random	-	-	-	-	0.00

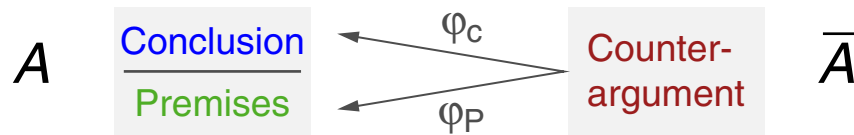
Approach 6: The relevance is decided randomly.

Argument Ranking II [\[idebate\]](#)

Argument Ranking II [\[idebate\]](#)

Idea: Given an argument A , the best counterargument \bar{A}^* employs premises that are **similar wrt. topic**, but takes the **opposite stance**.

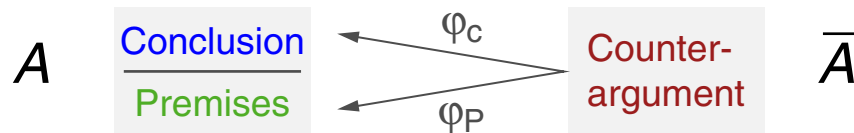
→ Consider both similarities to the premises and conclusion [\[Walton 2009\]](#):



Argument Ranking II

Idea: Given an argument A , the best counterargument \bar{A}^* employs premises that are **similar wrt. topic**, but takes the **opposite stance**.

→ Consider both similarities to the premises and conclusion [\[Walton 2009\]](#):



How to compute these similarities?

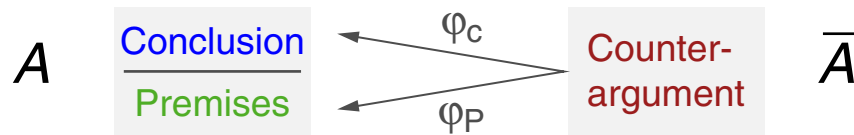
How to combine these similarities?

(= What is a sensible hypothesis space of promising model functions?)

Argument Ranking II

Idea: Given an argument A , the best counterargument \bar{A}^* employs premises that are **similar wrt. topic**, but takes the **opposite stance**.

→ Consider both similarities to the premises and conclusion [Walton 2009]:



Proposed model function to rank counterarguments [Wachsmuth et al., 2018]:

$$R(A, \bar{A}) = \underbrace{\alpha \cdot \left(\varphi_{\text{conclusion}} \circ \varphi_{\text{Premises}} \right)}_{\text{topic similarity} \rightarrow \text{max}} - \underbrace{(1 - \alpha) \cdot \left(\varphi_{\text{conclusion}} \circ \varphi_{\text{Premises}} \right)}_{\text{stance similarity} \rightarrow \text{min}}$$

where

φ combines both word and embedding similarities

$\circ \in \{\min, \max, +, *\}$

$\alpha \in [0; 1]$

Argument Ranking II

Corpus and Analysis

Theme	Debates	Points	Counters
Culture	46	278	278
Digital freedoms	48	341	341
Economy	95	590	588
⋮			
Sport	23	130	130
Σ	1069	6779	6753

Corpus:

- ❑ based on the [iDebate.org](https://www.idebate.org) portal
- ❑ Download: [ArguAna Counterargs](#)

Argument Ranking II

Corpus and Analysis

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Retrieval experiments (selected results) :

Find the best counterargument within ...	True-to-false ratio	Accuracy [*]
all counters of the same debate	1 : 3	0.75
all counters of the same theme	1 : 136	0.54
all arguments of the entire portal	1 : 2 800	0.32

^{*} The parameters for $R(A, \overline{A})$ were determined by a systematic ranking analysis.

Chapter IR:VI

VI. IR Applications

- ❑ Web Technology
- ❑ Web Graph
- ❑ Web Crawling
- ❑ Web Archiving
- ❑ Web Content Extraction
- ❑ Near-duplicate Detection
- ❑ Link Analysis

- ❑ The Treachery of Answers
- ❑ Argument Retrieval Problems
- ❑ Argument Ranking I
- ❑ Argument Ranking II
- ❑ Argumentation-Related Resources
- ❑ Argument Search Engines
- ❑ Argument Search Evaluation I
- ❑ Argument Search Evaluation II

Argumentation-Related Resources



argüman

argument interchange
Home of the AIF: Infrastructure for the argument web

CreateDebate

TRUTH MAPPING



convince me
start a debate



*intelligence*²
DEBATES

Argumentation-Related Resources

Leverage effort*	Resource type	Examples
very low	Technology	
low	Corpora	
medium	Debate portals	
high	Discussion pages	
very high	Articles	

* Estimated effort / expertise to exploit a resource of the respective type within own research.

Argumentation-Related Resources

Leverage effort*	Resource type		Examples
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very low	Technology	Visual inspection	Argument Web
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low	Corpora	Argumentative structure analysis	AIFdb data
		Argumentation quality analysis	IBM Debater data
		Stance detection	UKP data
			Webis data
medium	Debate portals		
high	Discussion pages		
very high	Articles		

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		German	idebate
			Debatepedia
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medium	Debate portals	English	Kialo
		German	idebate
			Debatepedia
high	Discussion pages	Focus on persuasion	Argumentia
		Controversial issues	changemyview
		Focus on deliberation	reddit
very high	Articles		WikiTalk

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Argumentation-Related Resources

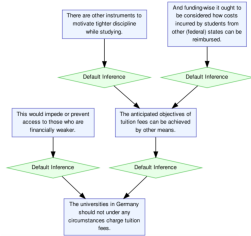
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			Debatepedia
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		Controversial issues	changemyview
		Focus on deliberation	reddit
very high	Articles	Editorials, Essays	WikiTalk
		Legal	New York Times
		Scientific publications	ACL anthology

* Estimated effort / expertise to exploit a resource of the respective type within own research.

Argumentation-Related Resources

The Argument Web [Library]

AIFdb Corpora



Structured argument data
in uniform format

AIFdb Search

Search interface
for argument resources

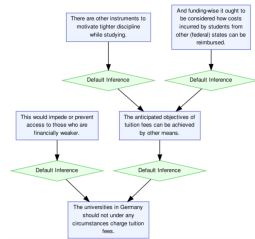
ARG-tech API

Several argument
web services

Argumentation-Related Resources

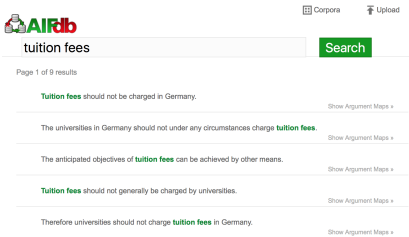
The Argument Web [Library]

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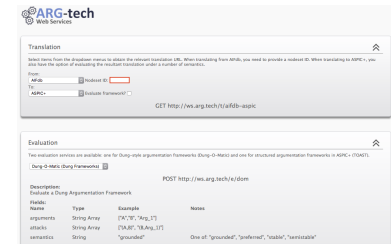
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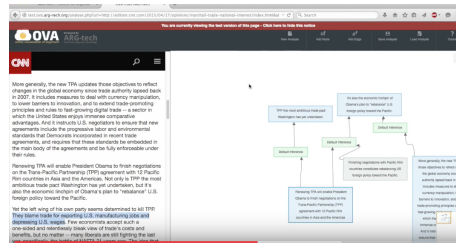
Several argument
web services

Argublogging



Widget for argument
annotation in blogs

OVA



Online visualization and
analysis of arguments

Arvina



Dialogue platform
based on AIFdb

Argument Search Engines

Vision of Argument Search

About 1.480.000.000 results (0,43 seconds)

[Is time travel possible? - NASA Space Place](#)
<https://spaceplace.nasa.gov> › [review](#) › [dr-marc-space](#) › [time-travel](#) ▼
Time travel is one of my favorite topics! I wrote some **time travel** stories in junior high school that used a machine of my own invention to travel backwards in time, ...

People also ask

Is time travel backwards possible? ▼

Is time travel a paradox? ▼

Are wormholes possible? ▼

Can we travel close to the speed of light? ▼

[Feedback](#)

['We can build a real time machine' - BBC News - BBC.com](#)
<https://www.bbc.com> › [news](#) › [science-environment-44771942](#) ▼
Jul 11, 2018 - Travelling in time might sound like a flight of fancy, but some physicists think it might really be **possible**. BBC Horizon looked at some of the ...

[Is Time Travel Possible?| Explore | physics.org](#)
www.physics.org › [article-questions](#) ▼
Travelling forwards in time is surprisingly easy. Einstein's special theory of relativity, developed in 1905, shows that time passes at different rates for people who ...

[Is time travel possible? | Tomorrow Today - The Science ... - DW](#)
<https://www.dw.com> › [is-time-travel-possible](#) ▼
5 hours ago - This week's viewer question comes from Richard Mack'oloo in Dar es Salaam, Tanzania.

[Time travel - Wikipedia](#)
<https://en.wikipedia.org> › [wiki](#) › [Time travel](#) ▼

Argument Search Engines*

Vision of Argument Search

Arguments in future web search:

- ❑ support forming opinions
- ❑ make it easy to find relevant arguments
- ❑ deliberation: learn about other views
- ❑ education: learn to debate

Search results should ...

- ❑ rank the best arguments highest
- ❑ cover diverse aspects
- ❑ cover reliable and heterogeneous sources
- ❑ be up-to-the-minute
- ❑ be traceable and evaluable

The screenshot shows a search engine interface with the query "Is time travel possible" in the search bar. Below the search bar, it indicates "About 1.480.000.000 results (0,43 seconds)". The first search result is from NASA Space Place, titled "Is time travel possible? - NASA Space Place", with a URL and a snippet about the author's interest in time travel. Below this is a section titled "People also ask" with four related questions: "Is time travel backwards possible?", "Is time travel a paradox?", "Are wormholes possible?", and "Can we travel close to the speed of light?". Below this section is a "Feedback" link. The next search result is from BBC News, titled "'We can build a real time machine' - BBC News - BBC.com", with a URL and a snippet about a BBC Horizon article. Below this is another search result from physics.org, titled "Is Time Travel Possible? | Explore | physics.org", with a URL and a snippet about Einstein's theory of relativity. The final search result is from DW, titled "me travel possible? | Tomorrow Today - The Science ... - DW", with a URL and a snippet about a viewer question from Tanzania. The last search result is from Wikipedia, titled "Time travel - Wikipedia", with a URL.

Is time travel possible

About 1.480.000.000 results (0,43 seconds)

[Is time travel possible? - NASA Space Place](#)
<https://spaceplace.nasa.gov> › [review](#) › [dr-marc-space](#) › [time-travel](#) ▼
Time travel is one of my favorite topics! I wrote some **time travel** stories in junior high school that used a machine of my own invention to travel backwards in time, ...

People also ask

Is time travel backwards possible? ▼

Is time travel a paradox? ▼

Are wormholes possible? ▼

Can we travel close to the speed of light? ▼

[Feedback](#)

['We can build a real time machine' - BBC News - BBC.com](#)
<https://www.bbc.com> › [news](#) › [science-environment-44771942](#) ▼
Jul 11, 2018 - Travelling in **time** might sound like a flight of fancy, but some physicists think it might really be **possible**. BBC Horizon looked at some of the ...

[Is Time Travel Possible? | Explore | physics.org](#)
www.physics.org › [article-questions](#) ▼
Travelling forwards in **time** is surprisingly easy. Einstein's special theory of relativity, developed in 1905, shows that **time** passes at different rates for people who ...

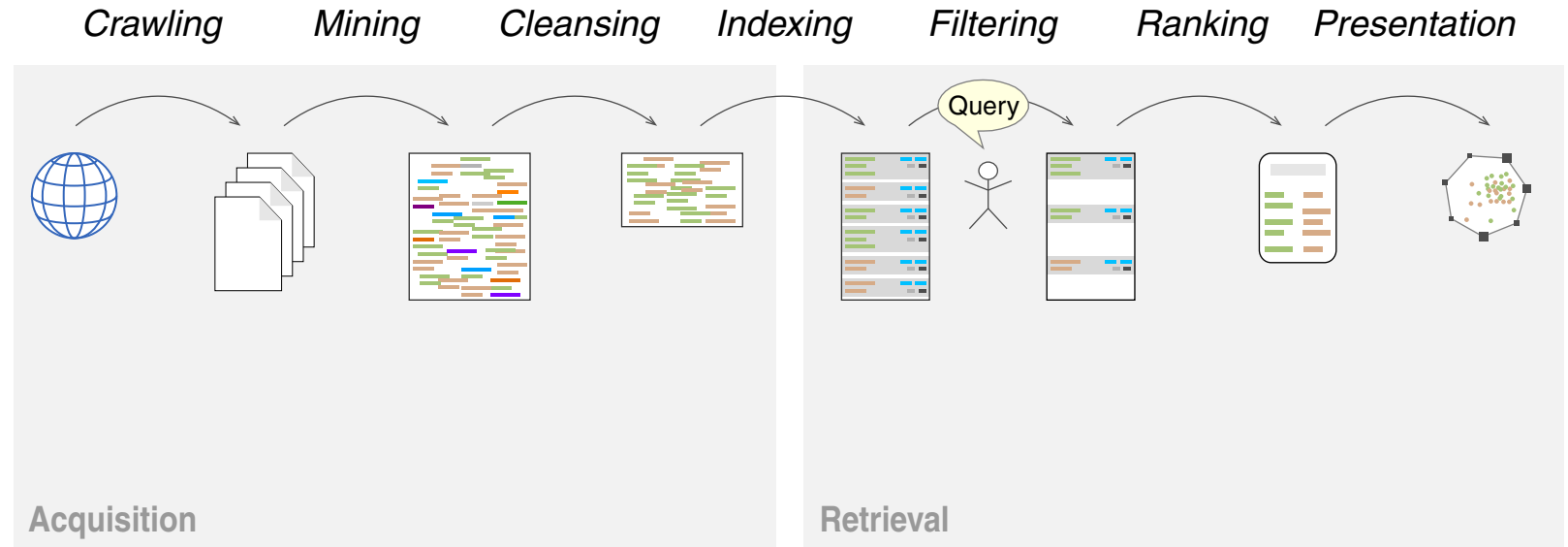
[me travel possible? | Tomorrow Today - The Science ... - DW](#)
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[Time travel - Wikipedia](#)
<https://en.wikipedia.org> › [wiki](#) › [Time_travel](#) ▼

* Wachsmuth: Argumentation Retrieval and Analysis. IR Autumn School ASIRF (2018).

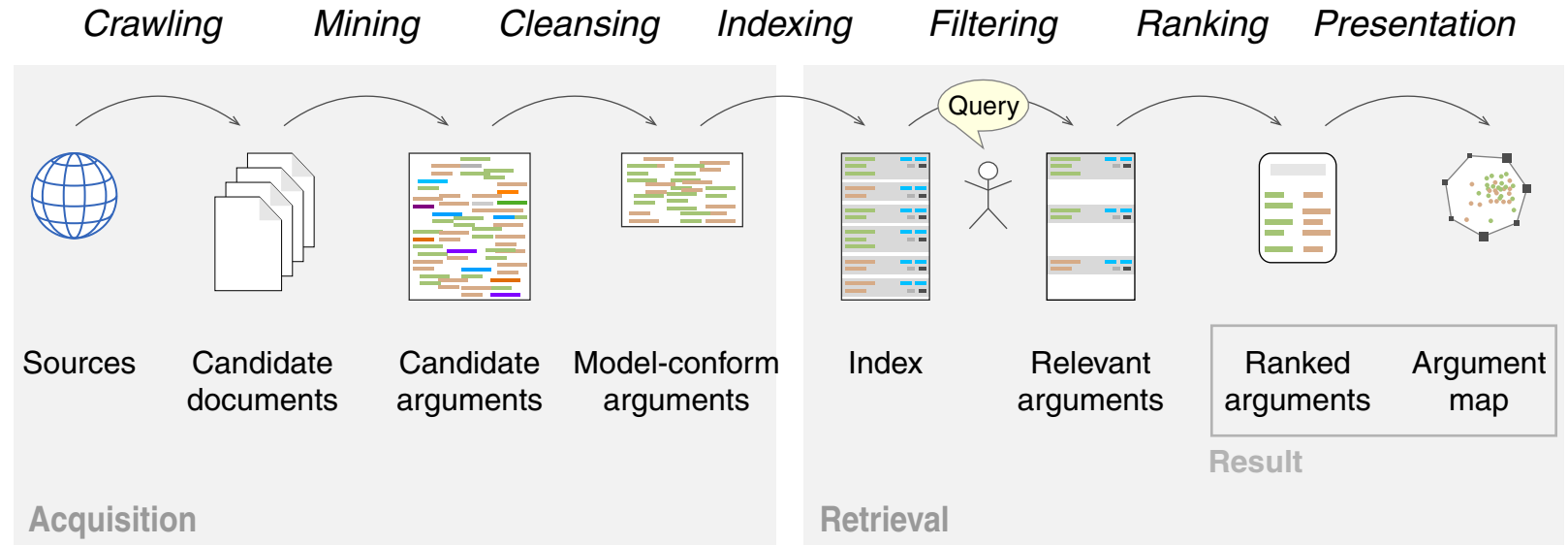
Argument Search Engines

Basic Elements and Process



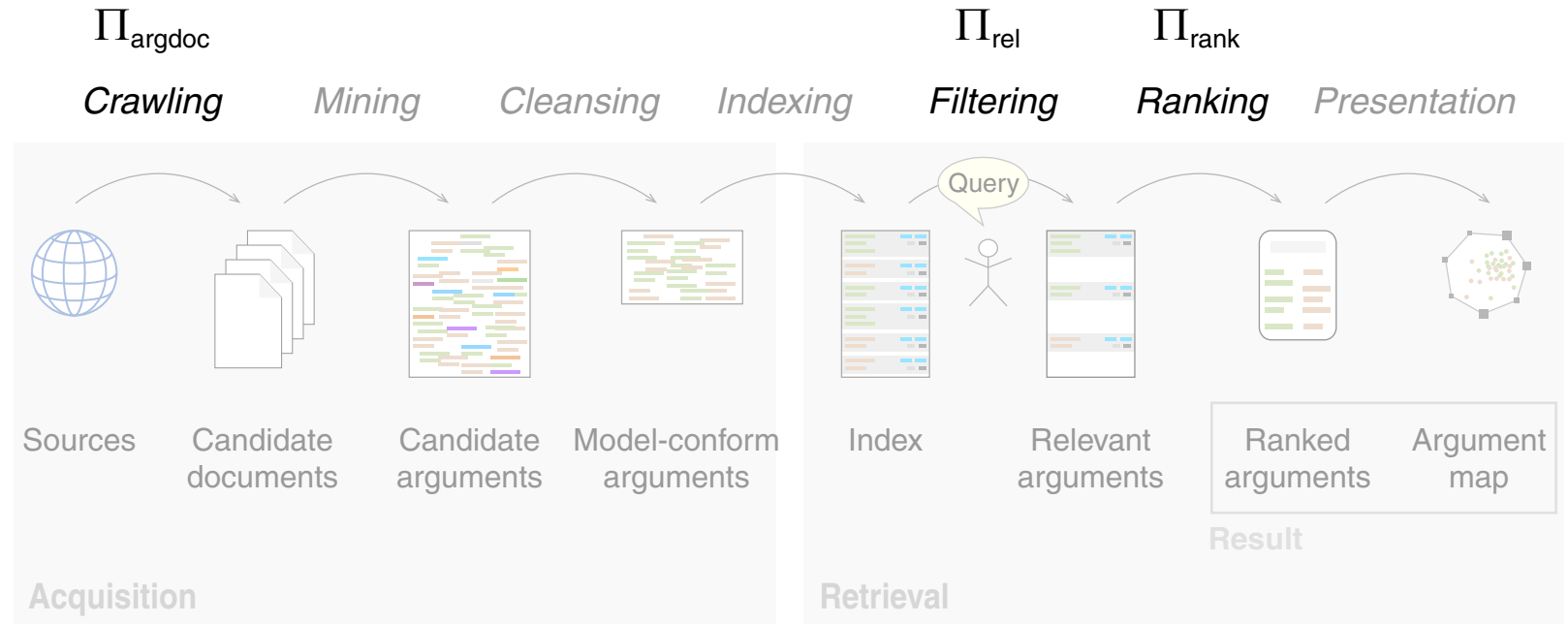
Argument Search Engines

Basic Elements and Process



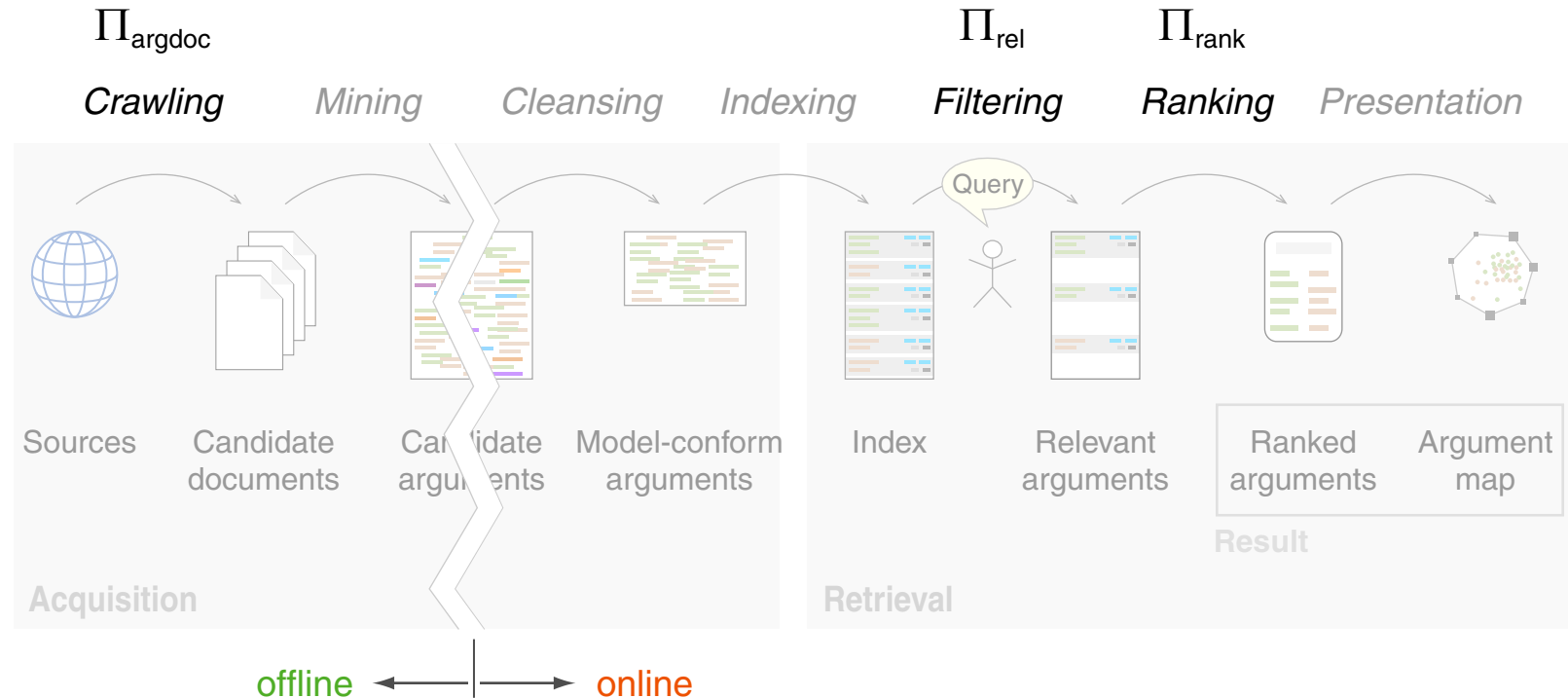
Argument Search Engines

Basic Elements and Process



Argument Search Engines

Basic Elements and Process

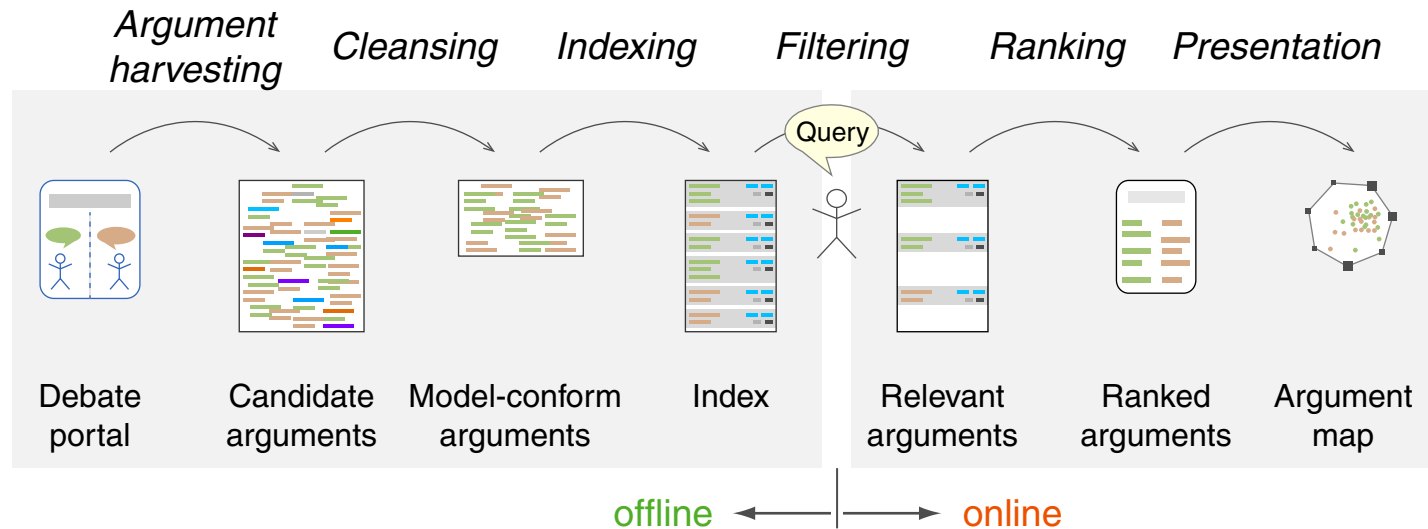


Acquisition paradigm [Ajjour et al. 2019]:

- ❑ distribution of processing steps regarding offline time and online time
- ❑ tradeoff between precision, recall, and topicality

Argument Search Engines

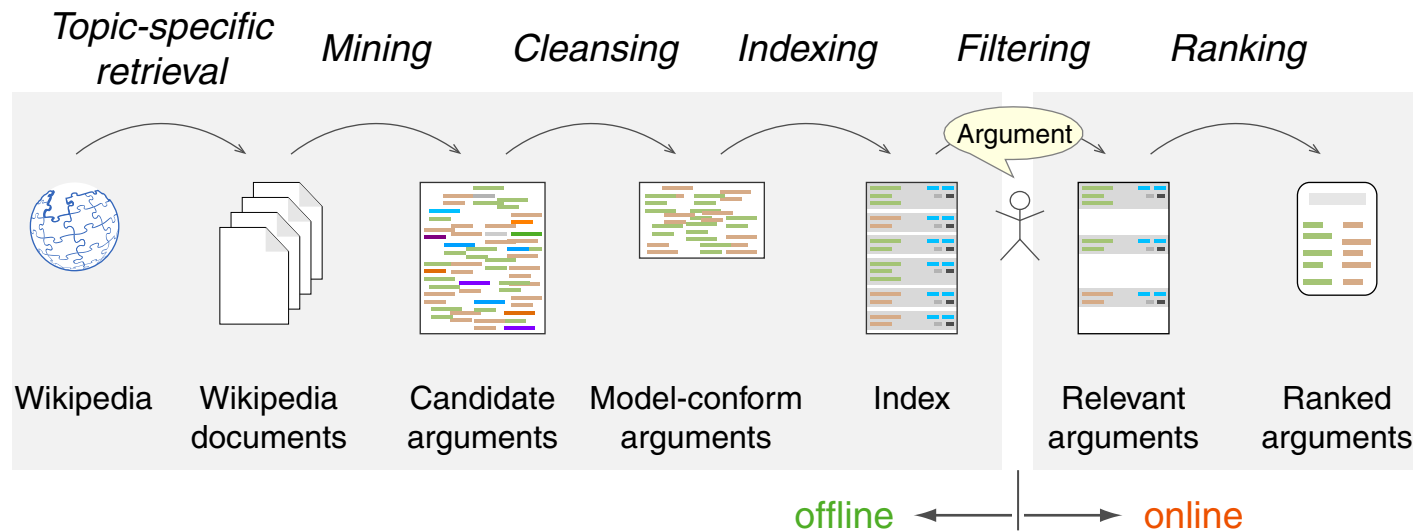
Acquisition Paradigms: (a) args.me [\[Demo\]](#)



- ❑ Research focus: argument ranking
- ❑ Supervision level: medium (distantly supervised)
- ➔ Effectiveness profile: high precision, low recall
- ➔ Stance balance: guaranteed
- ➔ Efficiency: high

Argument Search Engines

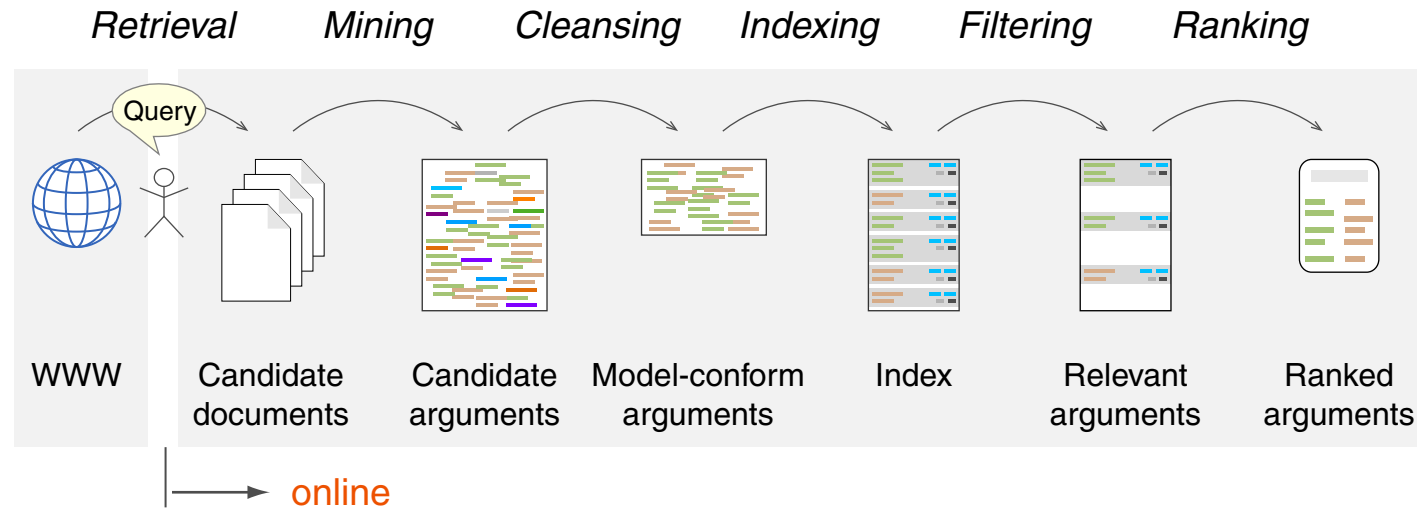
Acquisition Paradigms: (b) IBM Debater [Project]



- ❑ Research focus: debating technology
- ❑ Supervision level: medium (recognized source)
- ➔ Effectiveness profile: high precision, high recall on topic
- ➔ Stance balance: guaranteed
- ➔ Efficiency: high

Argument Search Engines

Acquisition Paradigms: (c) ArgumenText [\[Demo\]](#)



- ❑ Research focus: argument mining
- ❑ Supervision level: low
- ➔ Effectiveness profile: low precision, high recall
- ➔ Stance balance: cannot be guaranteed
- ➔ Efficiency: low

Argument Search Engines

Ranking Paradigms in IR



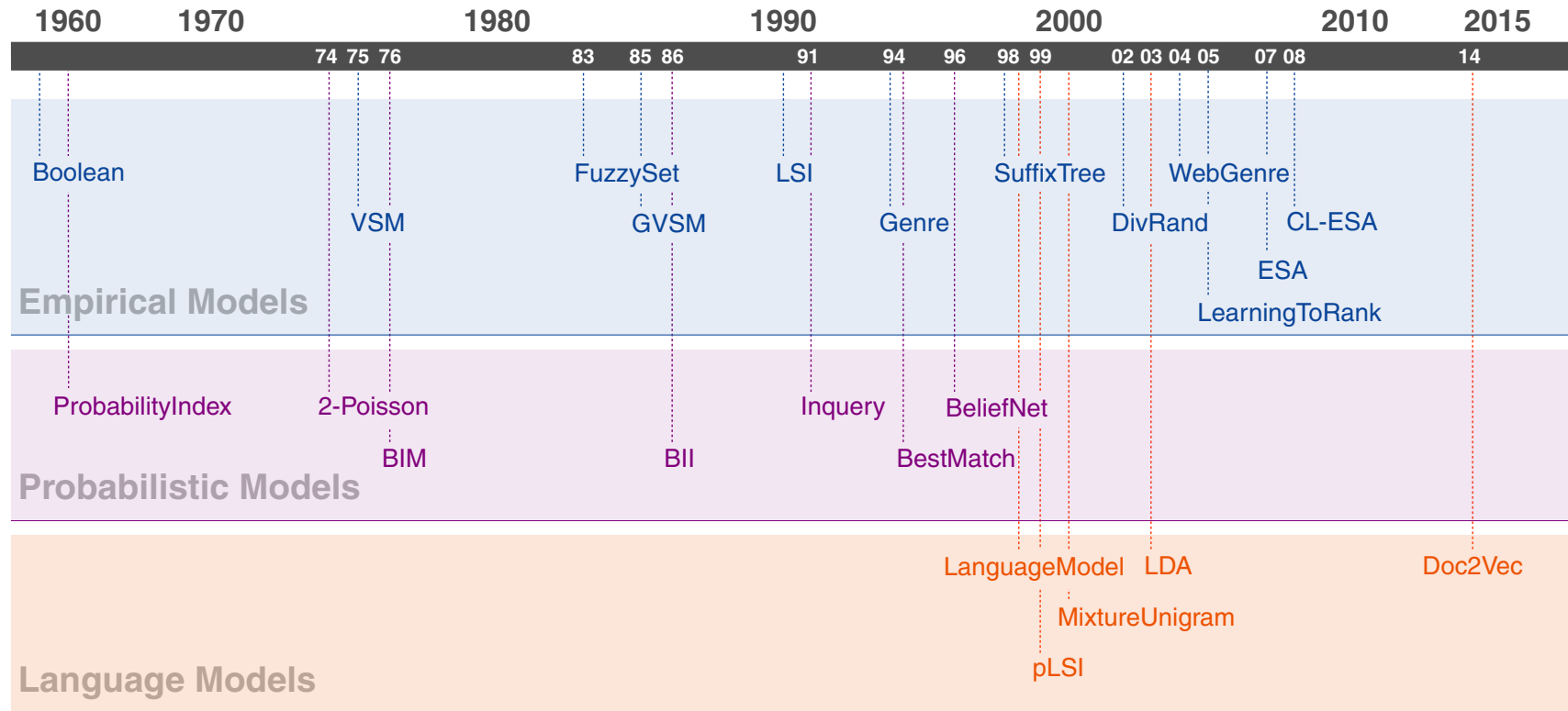
Designing a ranking algorithm:

- ❑ Analyze conclusions, premises, or both?
- ❑ Use fulltext or elite terms only?
- ❑ Exploit metadata and sentiment?
- ❑ Analyze relations between arguments?

...

Argument Search Engines

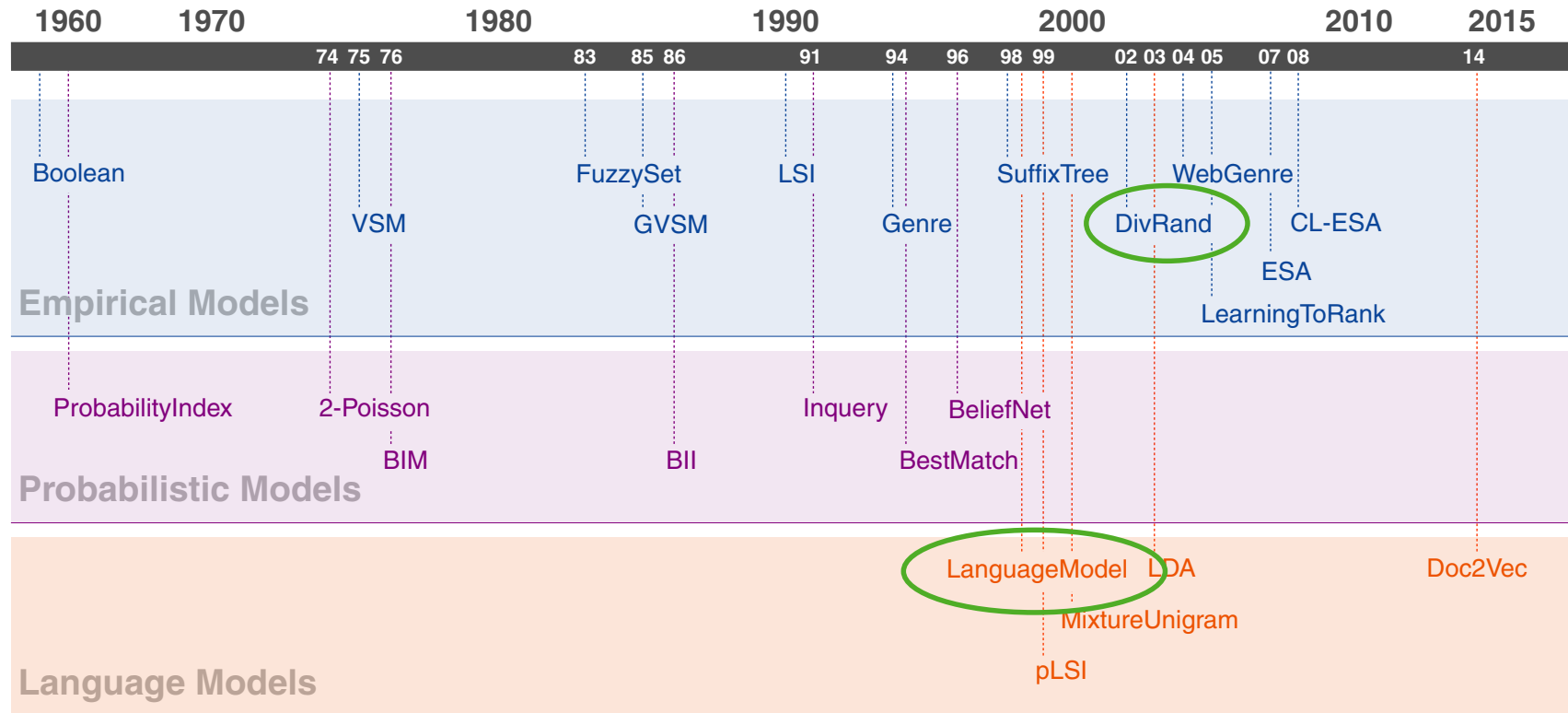
Ranking Paradigms in IR



[Stein et al. 2017]

Argument Search Engines

Ranking Paradigms in IR



- ❑ New research indicates that *Divergence from Randomness* and *Language Models* are the currently most effective retrieval models to address Π_{rank} .

[Pottast et al. 2019]

Argument Search Engines

More on Args [\[args.me\]](https://args.me)

Argument sources:

#	Debate Portal	Argument Units	Arguments	Debates
1	idebate.org	16 084	15 384	698
2	debatepedia.org	34 536	33 684	751
3	debatewise.org	39 576	33 950	2 252
4	debate.org	210 340	182 198	28 045
5	forandagainst.com	29 255	26 224	3 038
Σ		329 791	291 440	34 784

Design decisions:

- ❑ Argument model: conclusion + 1 premise with stance information
- ❑ Query: free text phrase, interpreted as AND query
- ❑ Retrieval: exact matching against conclusion
- ❑ Ranking: BM25F based on conclusion (1.0), premise (0.5), and debate (0.2)

Argument Search Engines

More on Args [\[args.me\]](https://args.me)

Top queries (Sep.'17 – Apr.'19) :


	Query	Absolute	Relative
1	climate change	251	3.5%
2	feminism	193	2.7%
3	abortion	158	2.2%
4	trump	146	2.0%
5	brexit	128	1.8%
6	death penalty	73	1.0%
7	google	58	0.8%
8	vegan	57	0.8%
9	nuclear energy	56	0.8%
10	donald trump	47	0.7%

Coverage of 1082 [Wikipedia controversial issues](#) :

- ❑ 78% match with ≥ 1 argument
- ❑ 42% match with ≥ 1 conclusion

Argument Search Engines

Presentation and Analytics



[All](#) [Discussions](#) [People](#)

Pro vs. con view 9238 arguments retrieved in 1.0ms

PRO

Abortion is the ending of pregnancy by the removal or...

► Show full argument

Abortion is the ending of pregnancy by the removal or forcing out from the womb of a fetus or embryo before it is able to survive on its own. An **abortion** can occur spontaneously, in which ...

<https://www.debate.org/debates/Abortion/350/> score ▼

CON

In 2011 there were about 730.322 abortions reported to...

► Show full argument

In 2011 there were about 730.322 abortions reported to the centers for disease control. There are about 1.7% of **abortion** of women's ages from 15-44 each year. Women who already had **abortion** ...

<https://www.debate.org/debates/Abortion/545/> score ▼

Great, another forfeiter. As someone who has debated...

► Show full argument

Great, another forfeiter. As someone who has debated **abortion** before, I will put a link to my original **abortion** debate right here: <http://www.debate.org...> I will be using arguments that ...

<https://www.debate.org/debates/Abortion/328/> score ▼

This should be fun :) The legalisation of abortion has...

► Show full argument

This should be fun :) The legalisation of **abortion** has been a big issue worldwide for a long period of time, not only politically but also on social and religious fronts. **Abortion** can be ...

<https://www.debate.org/debates/Abortion/156/> score ▼

There are many good and bad sides to abortion. But just...

► Show full argument

There are many good and bad sides to **abortion**. But just like everything, There is no black and white. Just a whole range of gray. **Abortion** is one way that poverty can decrease. Most unplanned ...

<https://www.debate.org/debates/Abortion/741/> score ▼

Although I oppose abortion in most cases, I accepted this...

► Show full argument

Although I oppose **abortion** in most cases, I accepted this debate because Con's position is that **abortion** "can never be justified regardless of circumstances." That is the point I want to ...

<https://www.debate.org/debates/Abortion/392/> score ▼

Abortion is needed to control the population so that the...

► Show full argument

Abortion is needed to control the population so that the population doesn't get too excess. By the 22 century, the population estimated to be 11.2 billion people and if **abortion** were illegal, ...

<https://www.debate.org/debates/Abortion/543/> score ▼

The greatest destroyer of peace is abortion because if a...

► Show full argument

"The greatest destroyer of peace is **abortion** because if a mother can kill her own child, what is left for me to kill you and you to kill me? There is nothing between," says Mother Teresa. ...

<https://www.debate.org/debates/Abortion/507/> score ▼

Yes the government has the obligation to protect the...

► Show full argument

Yes the government has the obligation to protect the rights of people, in general. Women have a right to decide whether and when to become a parent. But not **abortion**, it's an ending life ...

<https://www.debate.org/debates/abortion/348/> score ▼

Thank you, Pro. Negative CaseA1: False equivalence in the...

► Show full argument

Thank you, Pro. Negative CaseA1: False equivalence in the first round. In order to clarify the single word "**abortion**" into a resolution, my opponent elaborates: "If **abortion** is murder, so ...

<https://www.debate.org/debates/Abortion/392/> score ▼

Abortion is wrong! Abortion is gross! Abortion is...

Abortion is wrong! Abortion is gross! Abortion is MURDER!!!!

Attacks: Abortion

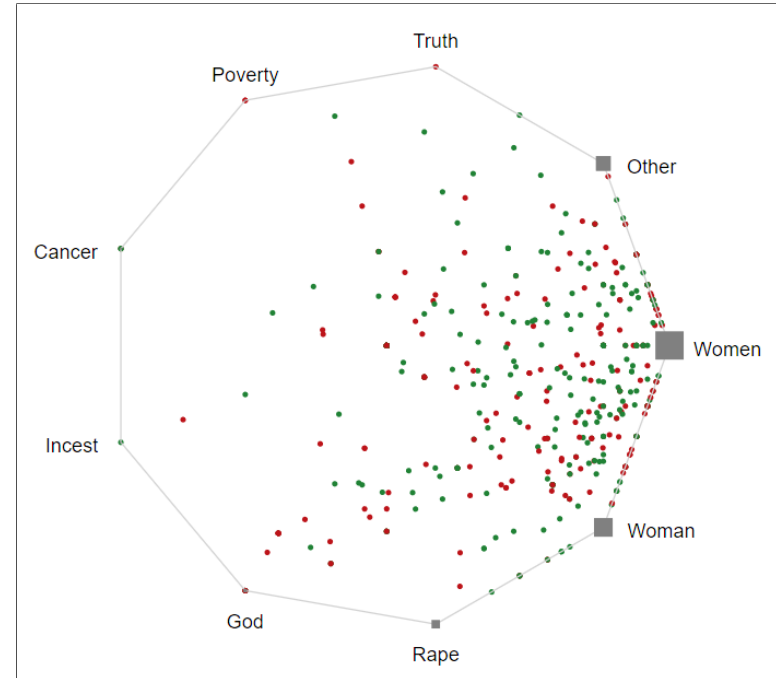
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Argument Search Engines

Presentation and Analytics

args

abortion

Q

All Discussions People

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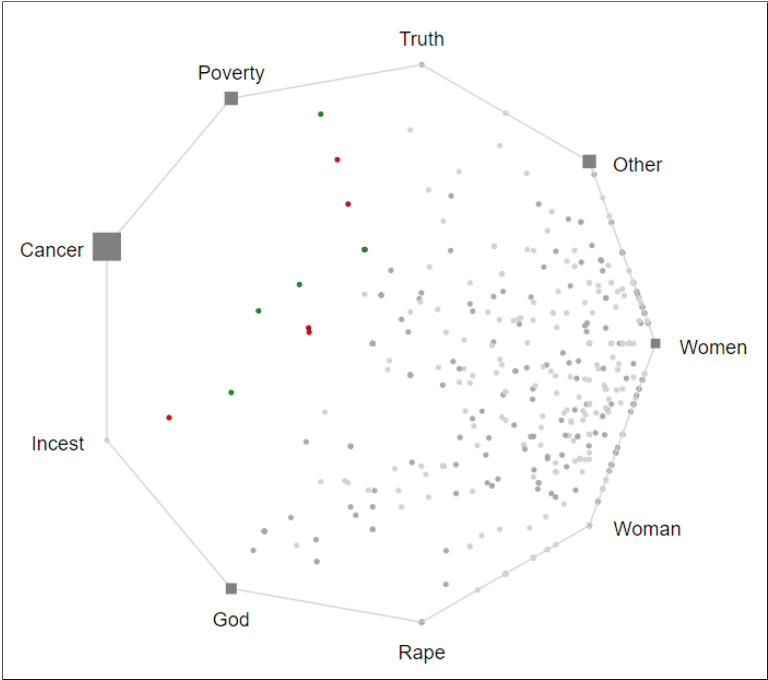
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Argument Search Engines

Presentation and Analytics



abortion


All Discussions People

Any age Any gender Any nationality Any reputation

Pro vs. con view 3 arguments retrieved in 1.0ms

PRO

This Friday, Canada will undergo its third universal...



Irene Mathysen • New Democratic Party


► Show full argument

This Friday, Canada will undergo its third universal periodic review at the United Nations. This is an important moment when Canada will be held accountable by other UN member states on ...

score ▼

CON

It has been 29 years since abortion was legalized in this...




Eric C. Lowther • Reform

► Show full argument

It has been 29 years since **abortion** was legalized in this country. In those days **abortion** was used only where a mother's life or health was endangered. But today I think it has gone too ...

score ▼

January 28 was the 20th anniversary of the Supreme Court...



Irene Mathysen • New Democratic Party

► Show full argument

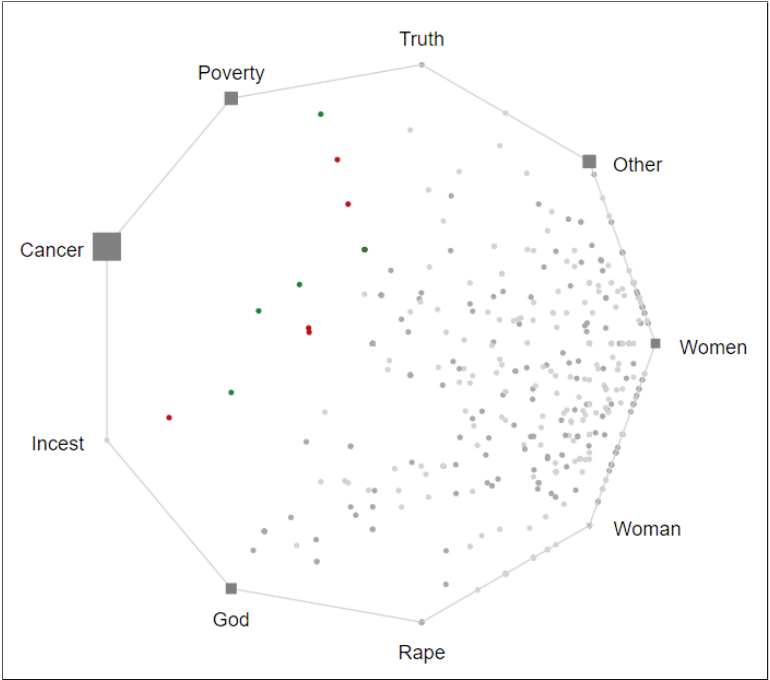
January 28 was the 20th anniversary of the Supreme Court of Canada's Morgentaier decision, which decriminalized **abortion** in Canada. The legal decision was a victory for Canadian women. ...

score ▼

1

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Chapter IR:VI

VI. IR Applications

- ☐ Web Technology
- ☐ Web Graph
- ☐ Web Crawling
- ☐ Web Archiving
- ☐ Web Content Extraction
- ☐ Near-duplicate Detection
- ☐ Link Analysis

- ☐ The Treachery of Answers
- ☐ Argument Retrieval Problems
- ☐ Argument Ranking I
- ☐ Argument Ranking II
- ☐ Argumentation-Related Resources
- ☐ Argument Search Engines
- ☐ **Argument Search Evaluation I**
- ☐ **Argument Search Evaluation II**

SameSide @ ArgMining 2019

1st Shared Task on Same Side Stance Classification

Roxanne El Baff

Yamen Ajjour

Khalid Al-Khatib

Henning Wachsmuth

Philipp Cimiano

Basil Ell

Benno Stein

[\[sameside.webis.de\]](http://sameside.webis.de)

Argument Search Evaluation I

Same Side Stance Classification [\[sameside.webis.de\]](https://sameside.webis.de)

Task: Given two arguments regarding a certain topic,
decide whether or not the two arguments have the same stance.

Topic: “Gay marriage should be legalized.”

Argument 1

Marriage is a commitment to love and care for your spouse till death. This is what is heard in all wedding vows. Gays can clearly qualify for marriage according to these vows, and any definition of marriage deduced from these vows.

Argument 2

Marriage is the institution that forms and upholds for society, its values and symbols are related to procreation. To change the definition of marriage to include same-sex couples would destroy its function.

Argument Search Evaluation I

Same Side Stance Classification [\[sameside.webis.de\]](https://sameside.webis.de)

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Argument 2

Gay marriage should be legalized since denying some people the option to marry is discriminatory and creates a second class of citizens.

Argument Search Evaluation I

Same Side Stance Classification [\[sameside.webis.de\]](https://sameside.webis.de)

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Argument 2

Marriage is the institution that forms and upholds for society, its values and symbols are related to procreation. To change the definition of marriage to include same-sex couples would destroy its function.

○≠○
different
side

Argument 1

Marriage is a commitment to love and care for your spouse till death. This is what is heard in all wedding vows. Gays can clearly qualify for marriage according to these vows, and any definition of marriage deduced from these vows.

Argument 2

Gay marriage should be legalized since denying some people the option to marry is discriminatory and creates a second class of citizens.

○=○
same
side

Argument Search Evaluation I

Same Side Stance Classification: Task Rationale

Same side classification needs not to distinguish topic-specific pro- / con-vocabulary.

- "Only" argument similarity within a stance needs to be assessed.
- Same side classification may be solved in a **topic-agnostic** fashion.

Applications:

- ❑ measure the bias strength within argumentation
- ❑ structure a discussion
- ❑ find out who or what is challenging me in a discussion
- ❑ filter wrongly labeled stances in a large argument corpus
- ❑ ...

Argument Search Evaluation I

Same Side Stance Classification: Tasks Details

Two topics (domains):

1. Should gay marriage be legalized?
2. Should abortion be legalized?

Within domain setting:

Training. Instances from both domains.

Test. Instances from both domains.

Cross domain setting:

Training. Instances from abortion.

Test. Instances from gay marriage.

Argument Search Evaluation I

Same Side Stance Classification: Tasks Details

Two topics (domains):

1. Should gay marriage be legalized?
2. Should abortion be legalized?

Within domain setting:

Training. Instances from both domains.

Test. Instances from both domains.

Cross domain setting:

Training. Instances from abortion.

Test. Instances from gay marriage.

Form of an instance:

1. Name of the topic (domain) d .
2. Argument 1 from \mathbf{A}_d .
3. Argument 2 from \mathbf{A}_d .
4. One of $\{ \bigcirc = \bigcirc, \bigcirc \neq \bigcirc \}$.

Timeline:

- 8.6. 2019: Training data online.
- 14.6. 2019: Submission open.
- 21.7. 2019: Submission closed.
- 1.8. 2019: 6th ArgMining workshop.

Argument Search Evaluation I

Same Side Stance Classification: Results “Within Domain”

Team	Gay marriage			Abortion			All		
	Pre	Rec	Acc	Pre	Rec	Acc	Pre	Rec	Acc
Trier University	0.90	0.73	0.83	0.79	0.59	0.71	0.85	0.66	0.77
Leipzig University	0.80	0.78	0.79	0.78	0.68	0.75	0.79	0.73	0.77
IBM Research	0.73	0.63	0.70	0.64	0.54	0.62	0.69	0.59	0.66
TU Darmstadt	0.74	0.56	0.68	0.63	0.48	0.60	0.68	0.52	0.64
Düsseldorf University	0.76	0.35	0.62	0.65	0.32	0.57	0.70	0.33	0.60
LMU	0.53	1.00	0.55	0.53	1.00	0.55	0.53	1.00	0.55
...									

Argument Search Evaluation I

Same Side Stance Classification: Results “Within Domain”

Team	Gay marriage			Abortion			All		
	Pre	Rec	Acc	Pre	Rec	Acc	Pre	Rec	Acc
Trier University	0.90	0.73	0.83	0.79	0.59	0.71	0.85	0.66	0.77
Leipzig University	0.80	0.78	0.79	0.78	0.68	0.75	0.79	0.73	0.77
IBM Research	0.73	0.63	0.70	0.64	0.54	0.62	0.69	0.59	0.66
TU Darmstadt	0.74	0.56	0.68	0.63	0.48	0.60	0.68	0.52	0.64
Düsseldorf University	0.76	0.35	0.62	0.65	0.32	0.57	0.70	0.33	0.60
LMU	0.53	1.00	0.55	0.53	1.00	0.55	0.53	1.00	0.55
...									

Argument Search Evaluation I

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IBM Research	0.73	0.63	0.70	0.64	0.54	0.62	0.69	0.59	0.66
TU Darmstadt	0.74	0.56	0.68	0.63	0.48	0.60	0.68	0.52	0.64
Düsseldorf University	0.76	0.35	0.62	0.65	0.32	0.57	0.70	0.33	0.60
LMU	0.53	1.00	0.55	0.53	1.00	0.55	0.53	1.00	0.55
...									

Argument Search Evaluation I

Same Side Stance Classification: Results “Within Domain”

Team	Gay marriage			Abortion			All		
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Leipzig University	0.80	0.78	0.79	0.78	0.68	0.75	0.79	0.73	0.77
IBM Research	0.73	0.63	0.70	0.64	0.54	0.62	0.69	0.59	0.66
TU Darmstadt	0.74	0.56	0.68	0.63	0.48	0.60	0.68	0.52	0.64
Düsseldorf University	0.76	0.35	0.62	0.65	0.32	0.57	0.70	0.33	0.60
LMU	0.53	1.00	0.55	0.53	1.00	0.55	0.53	1.00	0.55
...									

Argument Search Evaluation I

Same Side Stance Classification: Results “Within Domain”

Team	Gay marriage			Abortion			All		
	Pre	Rec	Acc	Pre	Rec	Acc	Pre	Rec	Acc
Trier University	0.90	0.73	0.83	0.79	0.59	0.71	0.85	0.66	0.77
Leipzig University	0.80	0.78	0.79	0.78	0.68	0.75	0.79	0.73	0.77
IBM Research	0.73	0.63	0.70	0.64	0.54	0.62	0.69	0.59	0.66
TU Darmstadt	0.74	0.56	0.68	0.63	0.48	0.60	0.68	0.52	0.64
Düsseldorf University	0.76	0.35	0.62	0.65	0.32	0.57	0.70	0.33	0.60
LMU	0.53	1.00	0.55	0.53	1.00	0.55	0.53	1.00	0.55
...									

Trier University. BERT (large, uncased, sequence length 512), tuning for 3 epochs.

Argument Search Evaluation I

Same Side Stance Classification: Results “Within Domain”

Team	Gay marriage			Abortion			All		
	Pre	Rec	Acc	Pre	Rec	Acc	Pre	Rec	Acc
Trier University	0.90	0.73	0.83	0.79	0.59	0.71	0.85	0.66	0.77
Leipzig University	0.80	0.78	0.79	0.78	0.68	0.75	0.79	0.73	0.77
IBM Research	0.73	0.63	0.70	0.64	0.54	0.62	0.69	0.59	0.66
TU Darmstadt	0.74	0.56	0.68	0.63	0.48	0.60	0.68	0.52	0.64
Düsseldorf University	0.76	0.35	0.62	0.65	0.32	0.57	0.70	0.33	0.60
LMU	0.53	1.00	0.55	0.53	1.00	0.55	0.53	1.00	0.55
...									

Leipzig University. BERT (uncased, sequence length 512, tuning for 5 epochs), loss function: sigmoid_binary_crossentropy.

Argument Search Evaluation I

Same Side Stance Classification: Results “Within Domain”

Team	Gay marriage			Abortion			All		
	Pre	Rec	Acc	Pre	Rec	Acc	Pre	Rec	Acc
Trier University	0.90	0.73	0.83	0.79	0.59	0.71	0.85	0.66	0.77
Leipzig University	0.80	0.78	0.79	0.78	0.68	0.75	0.79	0.73	0.77
IBM Research	0.73	0.63	0.70	0.64	0.54	0.62	0.69	0.59	0.66
TU Darmstadt	0.74	0.56	0.68	0.63	0.48	0.60	0.68	0.52	0.64
Düsseldorf University	0.76	0.35	0.62	0.65	0.32	0.57	0.70	0.33	0.60
LMU	0.53	1.00	0.55	0.53	1.00	0.55	0.53	1.00	0.55
...									

IBM Research. Two BERT models fine-tuned in cascade starting from the vanilla BERT model.

Argument Search Evaluation I

Same Side Stance Classification: Results “Within Domain”

Team	Gay marriage			Abortion			All		
	Pre	Rec	Acc	Pre	Rec	Acc	Pre	Rec	Acc
Trier University	0.90	0.73	0.83	0.79	0.59	0.71	0.85	0.66	0.77
Leipzig University	0.80	0.78	0.79	0.78	0.68	0.75	0.79	0.73	0.77
IBM Research	0.73	0.63	0.70	0.64	0.54	0.62	0.69	0.59	0.66
TU Darmstadt	0.74	0.56	0.68	0.63	0.48	0.60	0.68	0.52	0.64
Düsseldorf University	0.76	0.35	0.62	0.65	0.32	0.57	0.70	0.33	0.60
LMU	0.53	1.00	0.55	0.53	1.00	0.55	0.53	1.00	0.55
...									

TU Darmstadt. Microsoft’s Multi-Task Deep Neural Network mt-dnn. Basis for the mt-dnn is BERT (large). No hyper-parameter tuning, 4 epochs.

Argument Search Evaluation I

Same Side Stance Classification: Results “Within Domain”

Team	Gay marriage			Abortion			All		
	Pre	Rec	Acc	Pre	Rec	Acc	Pre	Rec	Acc
Trier University	0.90	0.73	0.83	0.79	0.59	0.71	0.85	0.66	0.77
Leipzig University	0.80	0.78	0.79	0.78	0.68	0.75	0.79	0.73	0.77
IBM Research	0.73	0.63	0.70	0.64	0.54	0.62	0.69	0.59	0.66
TU Darmstadt	0.74	0.56	0.68	0.63	0.48	0.60	0.68	0.52	0.64
Düsseldorf University	0.76	0.35	0.62	0.65	0.32	0.57	0.70	0.33	0.60
LMU	0.53	1.00	0.55	0.53	1.00	0.55	0.53	1.00	0.55
...									

Düsseldorf University. Manhattan LSTM – a siamese network – which measures the similarity of both arguments. Document embeddings via BERT (base, uncased, not fine-tuned, sequence length 512 tokens).

Argument Search Evaluation I

Same Side Stance Classification: Results “Within Domain”

Team	Gay marriage			Abortion			All		
	Pre	Rec	Acc	Pre	Rec	Acc	Pre	Rec	Acc
Trier University	0.90	0.73	0.83	0.79	0.59	0.71	0.85	0.66	0.77
Leipzig University	0.80	0.78	0.79	0.78	0.68	0.75	0.79	0.73	0.77
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TU Darmstadt	0.74	0.56	0.68	0.63	0.48	0.60	0.68	0.52	0.64
Düsseldorf University	0.76	0.35	0.62	0.65	0.32	0.57	0.70	0.33	0.60
LMU	0.53	1.00	0.55	0.53	1.00	0.55	0.53	1.00	0.55
...									

LMU. Bert (base). Arguments organized as graph: edges are weighted with the confidence that arguments agree and confidence that they disagree. If known from training set that the arguments agree or disagree the confidence is 0 and 1 or 1 and 0 accordingly.

Argument Search Evaluation I

Same Side Stance Classification: Results “Cross Domain”

Team	Gay marriage (large)			Gay marriage (small)		
	Pre	Rec	Acc	Pre	Rec	Acc
LMU	0.67	0.53	0.63	0.78	0.61	0.72
TU Darmstadt	0.64	0.59	0.63	0.71	0.63	0.68
IBM Research	0.62	0.49	0.60	0.74	0.43	0.64
Paderborn University	0.60	0.38	0.56	0.79	0.33	0.62
Trier University	0.69	0.16	0.54	1.00	0.20	0.60
Düsseldorf University	0.72	0.53	0.66	0.68	0.37	0.60
...						

Argument Search Evaluation I

Same Side Stance Classification: Results “Cross Domain”

Team	Gay marriage (large)			Gay marriage (small)		
	Pre	Rec	Acc	Pre	Rec	Acc
LMU	0.67	0.53	0.63	0.78	0.61	0.72
TU Darmstadt	0.64	0.59	0.63	0.71	0.63	0.68
IBM Research	0.62	0.49	0.60	0.74	0.43	0.64
Paderborn University	0.60	0.38	0.56	0.79	0.33	0.62
Trier University	0.69	0.16	0.54	1.00	0.20	0.60
Düsseldorf University	0.72	0.53	0.66	0.68	0.37	0.60
...						

Argument Search Evaluation I

Same Side Stance Classification: Results “Cross Domain”

Team	Gay marriage (large)			Gay marriage (small)		
	Pre	Rec	Acc	Pre	Rec	Acc
LMU	0.67	0.53	0.63	0.78	0.61	0.72
TU Darmstadt	0.64	0.59	0.63	0.71	0.63	0.68
IBM Research	0.62	0.49	0.60	0.74	0.43	0.64
Paderborn University	0.60	0.38	0.56	0.79	0.33	0.62
Trier University	0.69	0.16	0.54	1.00	0.20	0.60
Düsseldorf University	0.72	0.53	0.66	0.68	0.37	0.60
...						

Argument Search Evaluation I

Same Side Stance Classification: Results “Cross Domain”

Team	Gay marriage (large)			Gay marriage (small)		
	Pre	Rec	Acc	Pre	Rec	Acc
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Trier University	0.69	0.16	0.54	1.00	0.20	0.60
Düsseldorf University	0.72	0.53	0.66	0.68	0.37	0.60
...						

Most of the submitted classifiers are robust regarding:

- ☐ imbalances between domain proportions in training and test
- ☐ imbalances between domain proportions within test
- ☐ imbalances between same side / different side proportions

Touché @ CLEF 2020

1st Shared Task on Argument Retrieval

Alexander Bondarenko
Matthias Hagen
Martin Potthast
Henning Wachsmuth
Meriem Beloucif
Chris Biemann
Alexander Panchenko
Benno Stein



[touche.webis.de]

Argument Search Evaluation II

Argument Retrieval Task @ CLEF 2020 [\[touche.webis.de\]](http://touche.webis.de)

Task 1: Supporting argumentative conversations

- ❑ Scenario: Users search for arguments on controversial topics
- ❑ Task: Retrieve “strong” pro/con arguments on the topic
- ❑ Data: 300,000 “arguments” (short text passages)

Argument Search Evaluation II

Argument Retrieval Task @ CLEF 2020 [\[touche.webis.de\]](http://touche.webis.de)

Task 1: Supporting argumentative conversations

- ❑ Scenario: Users search for arguments on controversial topics
- ❑ Task: Retrieve “strong” pro/con arguments on the topic
- ❑ Data: 300,000 “arguments” (short text passages)

Task 2: Answering comparative questions with arguments

- ❑ Scenario: Users face personal decisions from everyday life
 - ❑ Task: Retrieve arguments for “Is X better than Y for Z?”
 - ❑ Data: ClueWeb12 or ChatNoir [\[chatnoir.eu\]](http://chatnoir.eu)
-
- ❑ Run submissions similar to “classical” TREC tracks
 - ❑ Software submissions via TIRA [\[tira.io\]](http://tira.io)

Argument Search Evaluation II

Supporting Argumentative Conversations: Results

Team	Run	nDCG@5
Dread Pirate Roberts	1	0.808
Swordsman (Baseline)	-	0.756
Dread Pirate Roberts	2	0.755
Aragorn	1	0.684
Dread Pirate Roberts	3	0.598
Zorro	-	0.573
...		

Argument Search Evaluation II

Supporting Argumentative Conversations: Results

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...		

Dread Pirate Roberts. Retrieval: DirichletLM/Similarity-based. Augmentation: Language modeling.

Argument Search Evaluation II

Supporting Argumentative Conversations: Results

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Aragorn	1	0.684
Dread Pirate Roberts	3	0.598
Zorro	-	0.573
...		

Swordsman (Baseline). Retrieval: DirichletLM.

Argument Search Evaluation II

Supporting Argumentative Conversations: Results

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Argument Search Evaluation II

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Dread Pirate Roberts	3	0.598
Zorro	-	0.573
...		

Aragorn: Retrieval. BM25. (Re)ranking Feature: Premise prediction.

Argument Search Evaluation II

Supporting Argumentative Conversations: Results

Team	Run	nDCG@5
Dread Pirate Roberts	1	0.808
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Dread Pirate Roberts	2	0.755
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Dread Pirate Roberts	3	0.598
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...		

Dread Pirate Roberts. Retrieval: DirichletLM/Similarity-based. Augmentation: Language modeling.

Argument Search Evaluation II

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Swordsman (Baseline)	-	0.756
Dread Pirate Roberts	2	0.755
Aragorn	1	0.684
Dread Pirate Roberts	3	0.598
Zorro	-	0.573
...		

Zorro: Retrieval. BM25. (Re)ranking Feature: Quality + NER.

Argument Search Evaluation II

Answering Comparative Questions with Arguments: Results

Team	Run	nDCG@5
Bilbo Baggins	-	0.580
Puss in Boots (ChatNoir)	-	0.568
Inigo Montoya	-	0.567
Katana	1	0.564
Katana	2	0.553
Katana	3	0.464
...		

Argument Search Evaluation II

Answering Comparative Questions with Arguments: Results

Team	Run	nDCG@5
Bilbo Baggins	-	0.580
Puss in Boots (ChatNoir)	-	0.568
Inigo Montoya	-	0.567
Katana	1	0.564
Katana	2	0.553
Katana	3	0.464
...		

Bilbo Baggins. Representation: Bag of words. Query processing: Named entities, comp. aspects.
(Re-)Ranking features: Credibility, support.

Argument Search Evaluation II

Answering Comparative Questions with Arguments: Results

Team	Run	nDCG@5
Bilbo Baggins	-	0.580
Puss in Boots (ChatNoir)	-	0.568
Inigo Montoya	-	0.567
Katana	1	0.564
Katana	2	0.553
Katana	3	0.464
...		

Puss in Boots (ChatNoir). Representation: Bag of words. (Re-)Ranking features: BM25F, SpamRank.

Argument Search Evaluation II

Answering Comparative Questions with Arguments: Results

Team	Run	nDCG@5
Bilbo Baggins	-	0.580
Puss in Boots (ChatNoir)	-	0.568
Inigo Montoya	-	0.567
Katana	1	0.564
Katana	2	0.553
Katana	3	0.464
...		

Inigo Montoya. Representation: Bag of words. Query processing: Tokens & logic. OR. (Re-)Ranking features: Argum. units (TARGER).

Argument Search Evaluation II

Answering Comparative Questions with Arguments: Results

Team	Run	nDCG@5
Bilbo Baggins	-	0.580
Puss in Boots (ChatNoir)	-	0.568
Inigo Montoya	-	0.567
Katana	1	0.564
Katana	2	0.553
Katana	3	0.464
...		

Katana. Representation: Diff. language models. Query processing: Diff. language models.
(Re-)Ranking features: Comparativeness score.

Argument Search Evaluation II

Answering Comparative Questions with Arguments: Results

Team	Run	nDCG@5
Bilbo Baggins	-	0.580
Puss in Boots (ChatNoir)	-	0.568
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...		

Katana. Representation: Diff. language models. Query processing: Diff. language models.
(Re-)Ranking features: Comparativeness score.

Argument Search Evaluation II

Answering Comparative Questions with Arguments: Results

Team	Run	nDCG@5
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Katana. Representation: Diff. language models. Query processing: Diff. language models.
(Re-)Ranking features: Comparativeness score.