



ACQuA: Answering Comparative Questions with Arguments

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Alexander Bondarenko (Sasha) and Matthias Hagen

Martin-Luther-Universität Halle-Wittenberg

alexander.bondarenko@informatik.uni-halle.de

[@albondarenko2](#)

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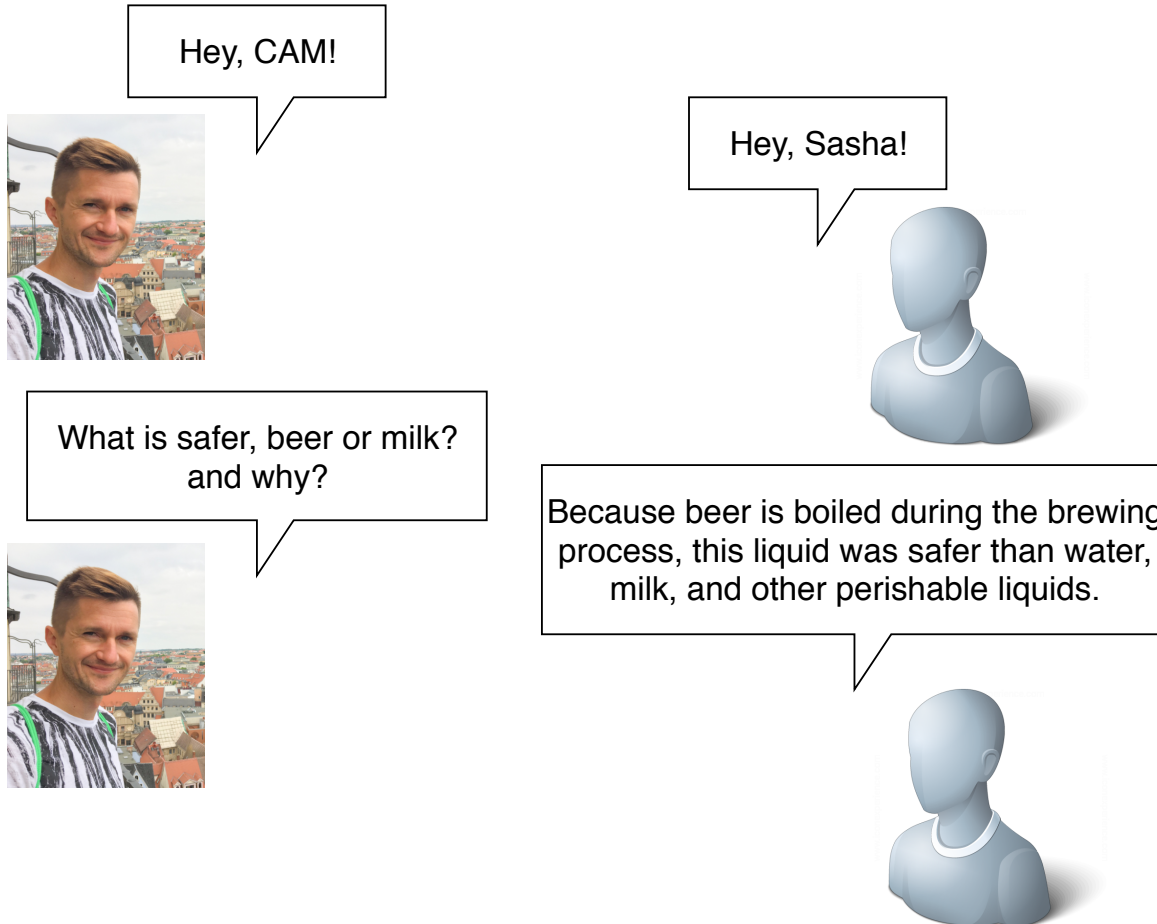


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ACQuA: Answering Comparative Questions with Arguments

- Every day people make choices through comparison

Comparative argumentation machine (CAM): our expectation



- Every day people make choices through comparison

The image shows a Google search interface. The search bar contains the text "what is safer beer or milk? and why?". Below the search bar, there are navigation options: All, Images, News, Shopping, Videos, More, Settings, and Tools. The search results show "About 8.580.000 results (0,89 seconds)". A featured snippet is displayed, quoting a statement from PETA: "It's official: **Beer** is better for you than **milk**. Studies show that **beer** can strengthen bones and extend life, while **milk** is linked to obesity, diabetes, and cancer." The snippet is dated Dec 7, 2019, and is attributed to timesofindia.indiatimes.com. Below the snippet, there are links to "About featured snippets" and "Feedback".

02/7The research. In an official statement, PETA said, "It's official: **Beer** is better for you than **milk**. Studies show that **beer** can strengthen bones and extend life, while **milk** is linked to obesity, diabetes, and cancer. Dec 7, 2019

timesofindia.indiatimes.com › Lifestyle › Food News

[Beer is better for you than milk, says PETA | The Times of India](#)

About featured snippets Feedback

People also ask

- Is beer better for you than milk?
- Is beer healthy or harmful?
- Why you should not drink beer?
- Is milk with beer bad?

Feedback

www.vice.com › Home › Food

[Is Beer Actually Healthier Than Milk? - Vice](#)

Sep 18, 2016 — The ad continues, "It's official: **Beer** is better for you than **milk**. Studies show that **beer** can strengthen bones and extend life, while **milk** is linked to ...

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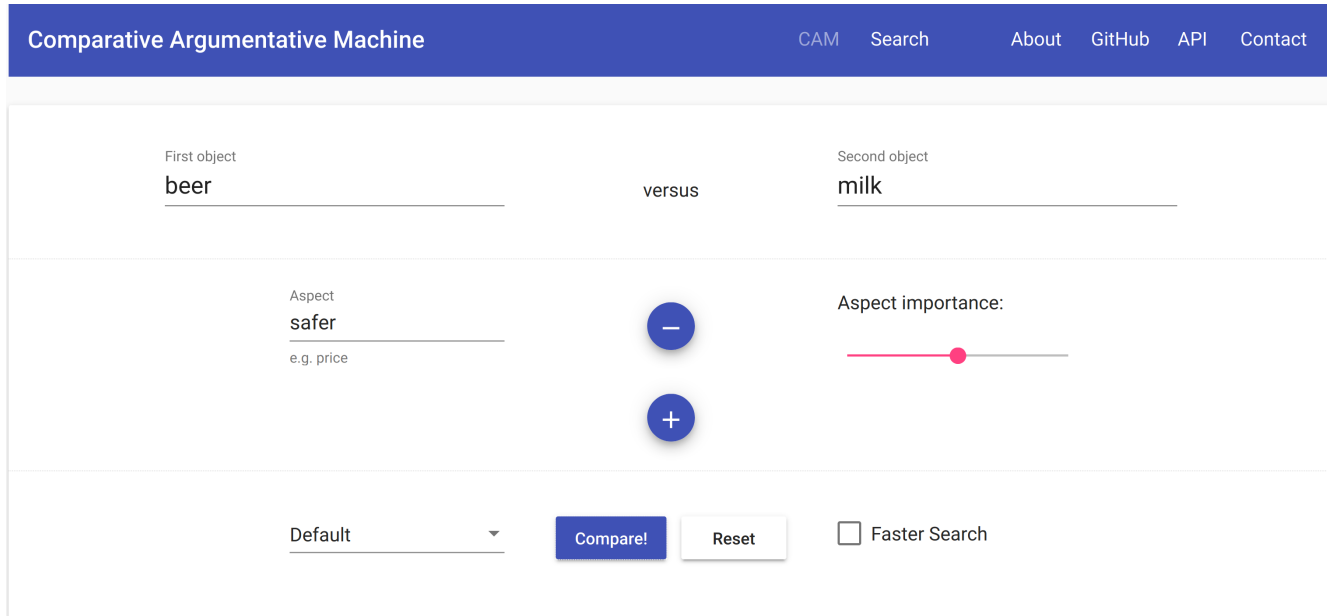
- ❑ Every day people make choices through comparison



- ❑ Decision making: simple and life-changing
- ❑ Is there a “good” pro / con argumentation?
- ❑ Do you trust the source of information?
- ❑ Are the results diverse or skewed?

- Every day people make choices through comparison

[Schildwächter et al. Answering Comparative Questions: Better than Ten-Blue-Links?. CHIIR'19]



Comparative Argumentative Machine

CAM Search About GitHub API Contact

First object
beer

versus

Second object
milk

Aspect
safer
e.g. price

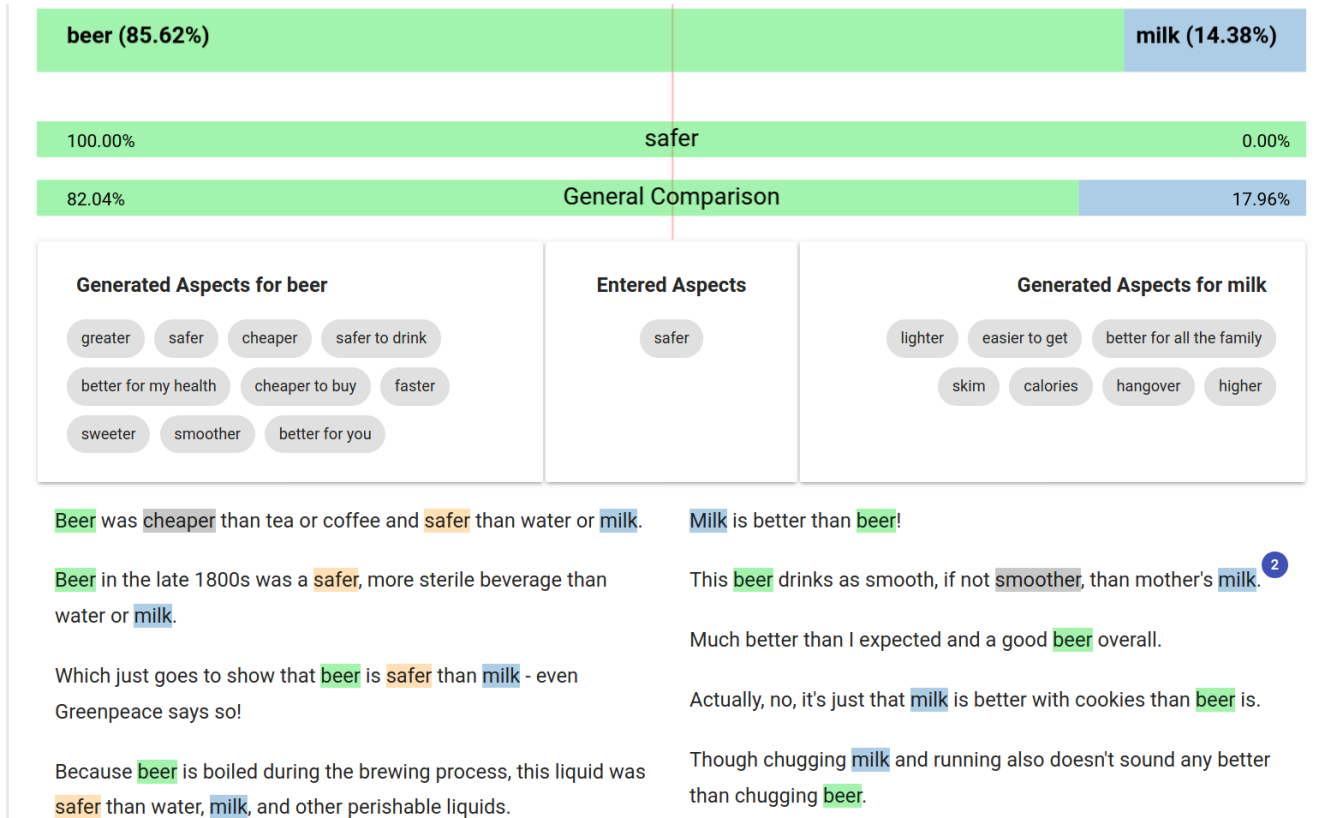
Aspect importance:

Default Faster Search

<http://ltdemos.informatik.uni-hamburg.de/cam/> + API

□ Every day people make choices through comparison

[Schildwächter et al. Answering Comparative Questions: Better than Ten-Blue-Links?. CHIIR'19]



□ Every day people make choices through comparison

[Schildwächter et al. Answering Comparative Questions: Better than Ten-Blue-Links?. CHIIR'19]

[Panchenko et al. Categorizing Comparative Sentences. ArgMining'19]

The screenshot displays the ACQuA interface. At the top, a progress bar shows '100.00%' for 'safer' and '0.00%' for 'milk'. Below this, a central text box contains the following argument for 'safer':

[...] Drinking and driving-and underage drinking, at that! Years ago, the beer environment was completely different. In the mid-1800s, the United States was being populated by immigrants from Germany and other countries of central Europe where beer was considered a life-sustaining beverage with a number of healthy benefits. Because beer is boiled during the brewing process, this liquid was safer than water, milk, and other perishable liquids. As a great German proverb said, "In wine there is wisdom, in beer there is strength, and in water there is bacteria." When breweries began to spring up at a prolific rate in the mid- to late-1800s, much of their advertising featured children and infants. Not until the Prohibition effort

Below the text is a link: <http://allaboutbeer.com/article/not-kidding-around-any-more/>

The interface also shows 'Generated Aspects for beer' (greater, safer, cheaper, better for my health, sweeter, smoother) and 'Generated Aspects for milk' (to get, better for all the family, calories, hangover, higher). Other text in the interface includes: 'Beer was cheaper than tea or...', 'Beer in the late 1800s was a s... water or milk.', 'Which just goes to show that Greenpeace says so!', 'Because beer is boiled during safer than water, milk, and ot...', 'Due to the brewing process when making beer, it was actually...', 'Aroma is better than the flavor, but still a good beer overall.', and '...other, than mother's milk.', '...od beer overall.', '...with cookies than beer is.', '...so doesn't sound any better'.

Comparative Web Search Questions

- A year-long Yandex (Russian search engine) log (1.5 billion questions)
- 2.8% of the search questions are comparative (one every second)

[Bondarenko et al. Comparative Web Search Questions. WSDM'20]

Question category	Comp. %	Most frequently asked question
Consum. electronics	6.3	Which tablet is best to buy?
Cars & transport.	5.2	Anti-radar, which is best?
Home & garden	4.0	Which vacuum cleaner is best to buy?
Education	3.9	Which pilot first surpassed a supersonic speed?
Beauty & style	3.3	When is it best to cut hair?
...	...	

Comparative Web Search Questions

- ❑ Ensemble classifiers: Rules + CNN + Log. reg. recall 65% of comparative questions with precision of 1.0
- ❑ BERT to classify comparative questions into fine-grained categories: opinionated / argumentative or factoid, direct or indirect, etc.
- ❑ More than 60% of comparative questions are non-factoid
- ❑ Only 50% of the opinionated comparative questions can be answered using community question answering platforms such as Yahoo! Answers

Comparative Questions Parsing

- Automatically understand (parse) comparative questions.

What is safer, beer or milk? and why?
aspect obj.1 predicate obj.2

- Sequence tagging using Bi-LSTM-CRF and XLNet / BERT embeddings.
- Preliminary results (sorted by XLNet precision).

Token	XLNet		Bi-LSTM-CRF	
	Precision	Recall	Precision	Recall
Predicate	0.97	0.97	0.95	0.97
None	0.90	0.95	0.87	0.94
Object	0.84	0.92	0.83	0.85
Aspect	0.70	0.63	0.57	0.65

Argumentativeness and Credibility

- Axiomatic re-ranking: Argumentative and Credibility axioms

[Bondarenko et al. Webis at TREC 2018: Common Core Track. TREC'18]

[Bondarenko et al. Webis at TREC 2019: Decision Track. TREC'19]

- QTArg: Favor documents with the query terms close to argument. units
Given:

- One-term query $Q = \{q\}$

- Documents D_1, D_2 with $|D_1| \approx_{10\%} |D_2|$

- Arg_D : set of argumentative units of a document D

IF $q \in A_{D_1}$ for some $A_{D_1} \in Arg_{D_1}$ but $q \notin A_{D_2}$ for all $A_{D_2} \in Arg_{D_2}$

THEN $rank(D_1, Q) > rank(D_2, Q)$

Q  Arg 

D₁ 

D₂ 

□ TARGER

[Chernodub et al. TARGER: Neural Argument Mining at Your Fingertips. ACL'19]

Analyze Text [Search Arguments](#)

Argument Tagger

We should protect endangered species. Centaurea pinnata is an endangered species of plant present in this mountain range.

Model to label with
IBM (fastText)

Analyze

Argument Labels **Entity Labels**

PREMISE CLAIM PERSON PER NORP FACILITY ORG GPE LOC PRODUCT EVENT + more labels

We should protect endangered species CLAIM .

Centaurea LOC pinnata is an endangered species of plant present in this mountain range PREMISE .

<https://demo.webis.de/targer/> + API

ACQuA: Answering Comparative Questions with Arguments

Argument Mining / Retrieval

- ❑ Shared tasks Touché: Argument Retrieval
 - ❑ Task 1: Conversational Argument Retrieval
 - ❑ Task 2: Comparative Argument Retrieval
- [Bondarenko et al. Overview of Touché 2020: Argument Retrieval. CLEF'20]



<https://touche.webis.de>

Other Research Tasks

- ❑ Answer summarization / generation:
Templates, TextRank, GPT, CTRL
- ❑ Stance classification:
BERT, T5, Sentiment flow
- ❑ Dialogue and clarification
- ❑ Bias and fairness
- ❑ ... and many more



Alexander Bondarenko Uni Halle

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Alexander Bondarenko - Institut für Informatik - Uni Halle

Oct 22, 2020 — **Alexander** joined the Big Data Analytics group as a Research Assistant in Spring 2018. His research focuses on Natural Language ...

scholar.google.com > citations

Alexander Bondarenko - Google Scholar

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thank you!