ArguAna

A Review Corpus
for Argumentation Analysis

Henning Wachsmuth, Martin Trenkmann,
Benno Stein, Gregor Engels, Tsvetomira Palakarska

April 11, 2014

s-lab
Software Quality Lab

UNIVERSITÄT PADERBORN
Die Universität der Informationsgesellschaft

Bauhaus-Universität
Weimar

Reviews and argumentation

ArguAna

- **Argumentation:** The identification and comparison of a series of assumptions, pros, and cons for an intended conclusion or decision (Besnard & Hunter, 2008).

from hccfl.edu

- **(Web user) Reviews:** Monological, positional argumentation

from tripadvisor.com

> *We spent one night at that hotel. Staff at the front desk was very nice, the room looked clean and cozy, and the hotel lies in the city center... but all this never justifies the price!*

- **Review argumentation:** A series of facts and opinions about different aspects that is used to justify some (possibly implicit) overall sentiment on a product or the like

from roblox.com

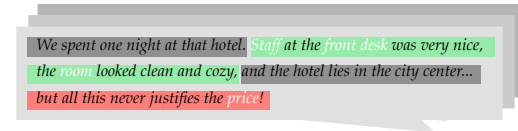# Problem and contributions

ArguAna

- **Argumentation-related information** is analyzed in different approaches to sentiment analysis

- **No text corpus available** for a combination of such analyses

- **Contributions** of our paper:

 1. **Design of an annotated corpus** for a shallow analysis of review argumentation.

  2. **Analysis of common argumentation patterns** of web users in (hotel) reviews

Designing the corpus

- **The ArguAna TripAdvisor corpus:** An English text corpus for the development and evaluation of statistical analyses of review argumentation

Balanced corpus compilation
of web user reviews
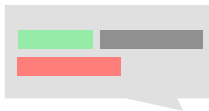
Tailored annotation scheme
for review argumentation

Manual annotation process
performed by experts and web users

from fillmymoneybox.com

- **The corpus is available at** http://www.arguana.com, free for scientific use

  - Usage instructions and sample Java code provided

Balanced corpus compilation
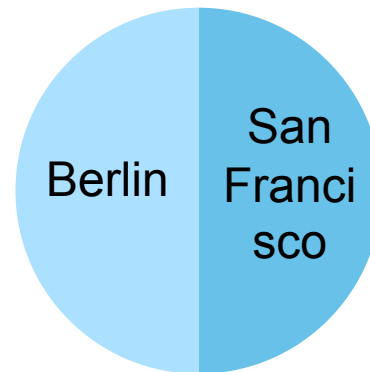
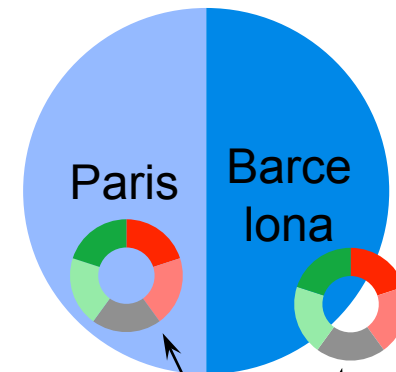- **Compilation of a subset of 2,100 hotel reviews** of the existing LARA TripAdvisor dataset from Wang (2010)
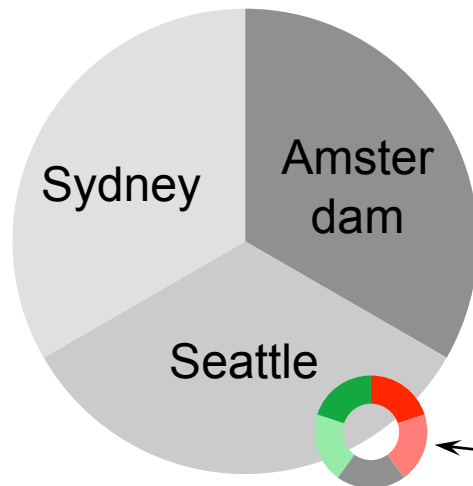
- **At least 10 hotels per location,** but as few as possible

- **The balance provides an optimal starting point** for statistical analyses of argumentation-related sentiment

Tailored annotation scheme

ArguAna

- **Manual annotations** in each review text

  - **Local sentiment:** facts, positive opinions, negative opinions

  - **Product features:** hotel aspects and amenities

> *We spent one night at that hotel. Staff at the front desk was very nice, the room looked clean and cozy, and the hotel lies in the city center... but all this never justifies the price!*

Username: henningw
Creation date: 2014-04-11

Poor

from tripadvisor.com

- **Ground-truth TripAdvisor data** for each review

  - **Metadata:** username, creation date, hotel ID, hotel location

  - **Sentiment scores:** overall rating and seven optional aspect ratings

Manual annotation process

We spent one night at that hotel. *Staff at the front desk was very nice, the room looked clean and cozy, and the hotel lies in the city center...* *but all this never justifies the price!*

Local sentiment annotation
through crowdsourcing

all local sentiment
classified three times
κ = 0.67

Product feature annotation
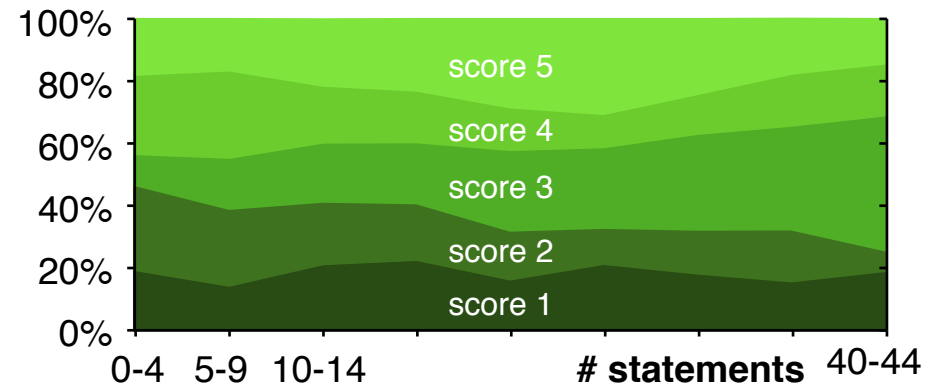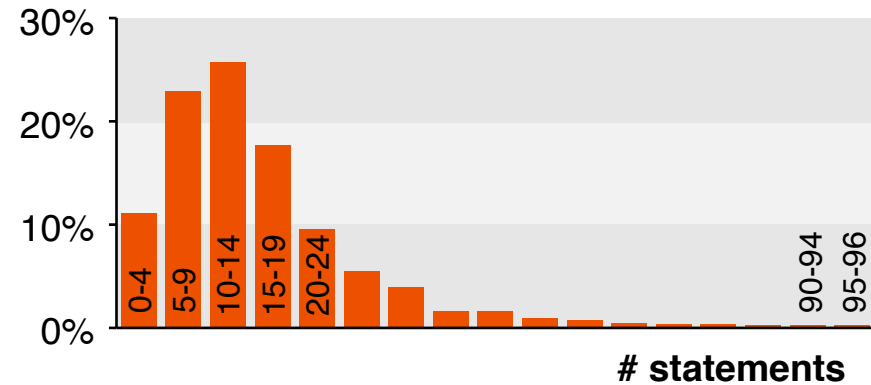through two experts

before annotation   **after** annotation

subset of texts
annotated by two experts
κ = 0.73

Corpus size and distributions

ArguAna

| Type	Total
Texts	**2,100**
Tokens	442,615
Sentences	24,162
Statements	**31,006**
Facts	6,303
Positive opinions	11,786
Negative opinions	12,917
Product features	**24,596**

statements

statements

- **All reviews preformatted** for Apache UIMA

- **Nearly 200,000 additional reviews** without manual annotations provided in the same format for semi-supervised learning or large-scale evaluations

Analyzing the corpus

- **Investigation of 4 hypotheses** about the impact of local sentiment in a review text on the review's global sentiment:

(1) **The ratio of positive and negative opinions** correlates with the global sentiment score.
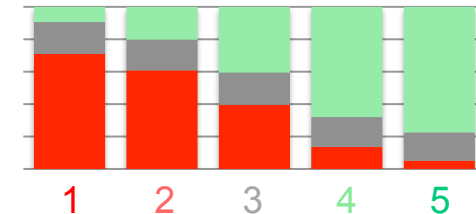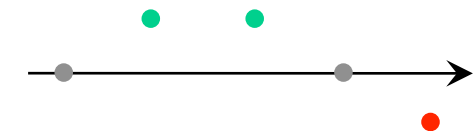
(2) **The polarity of opinions at certain positions** correlates with the global sentiment score.
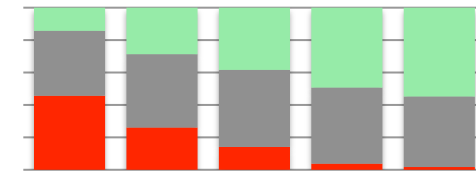
(both in the paper!)

(3) **The flow of local sentiment in the text** impacts the global sentiment score.

(4) **The polarity of opinions on certain aspects** correlates with the global sentiment score.

from nederlandvve.nl   from roblox.com

(3) Impact of the flow

> *We spent one night at that hotel. Staff at the front desk was very nice, the room looked clean and cozy, and the hotel lies in the city center... but all this never justifies the price!*

Sentiment flows: Consider sequence of all statement sentiments of the text
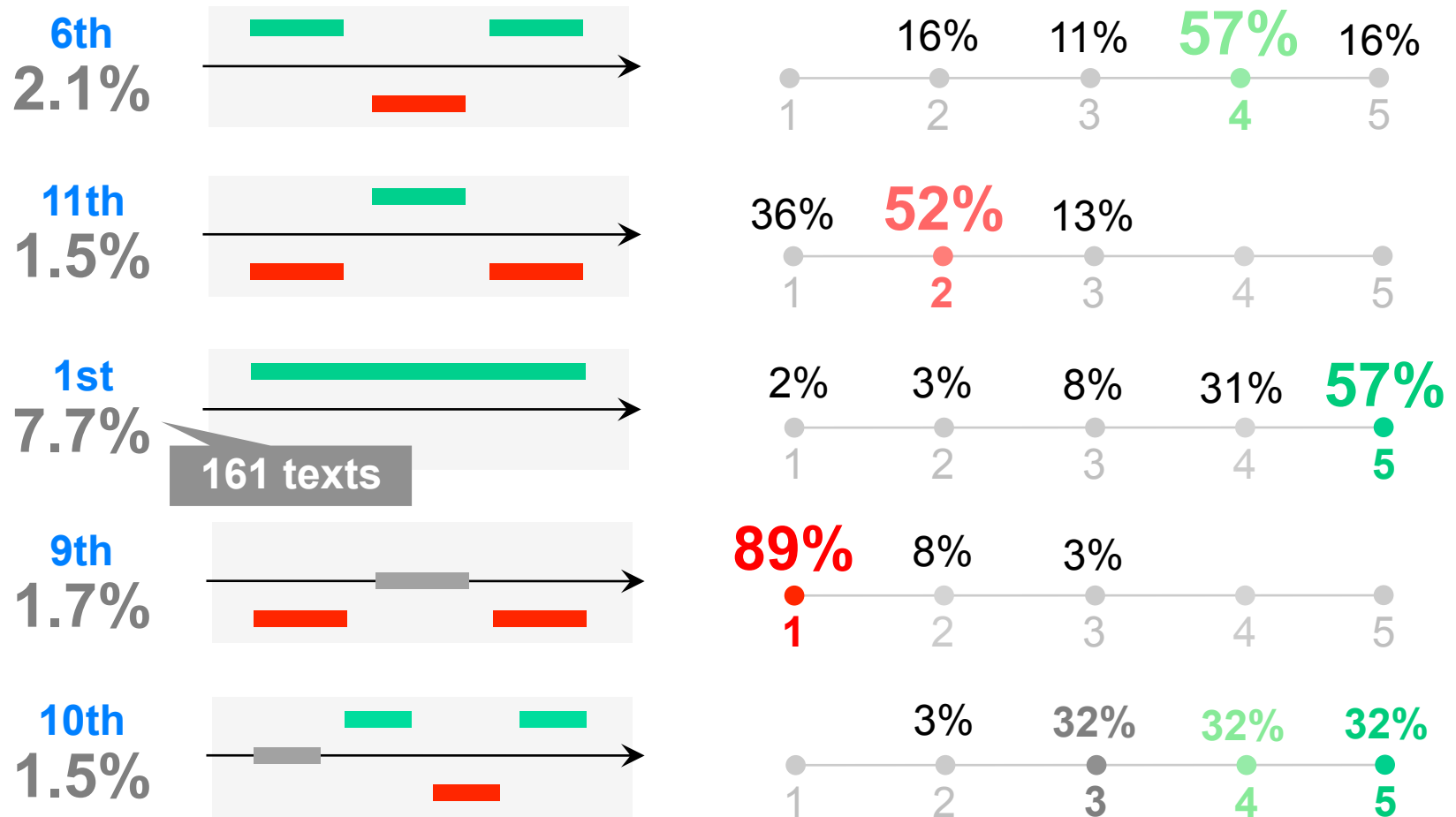
too much variance in the corpus
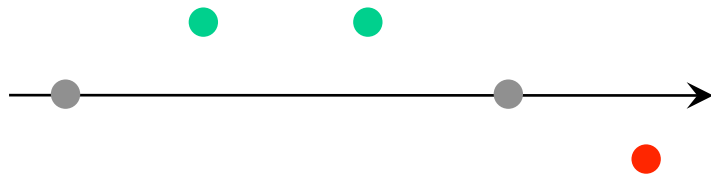
Argumentation flows: Consider only changes of statement sentiments

13 patterns cover 34% of the corpus
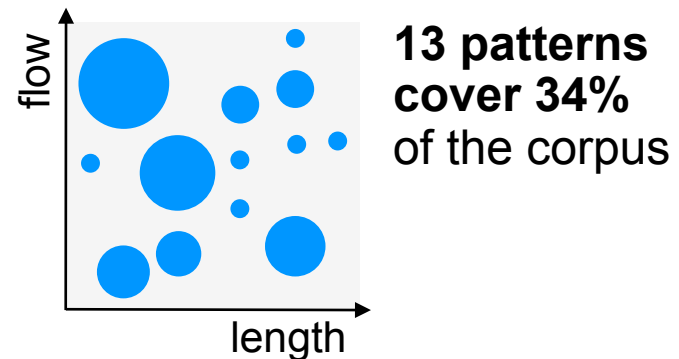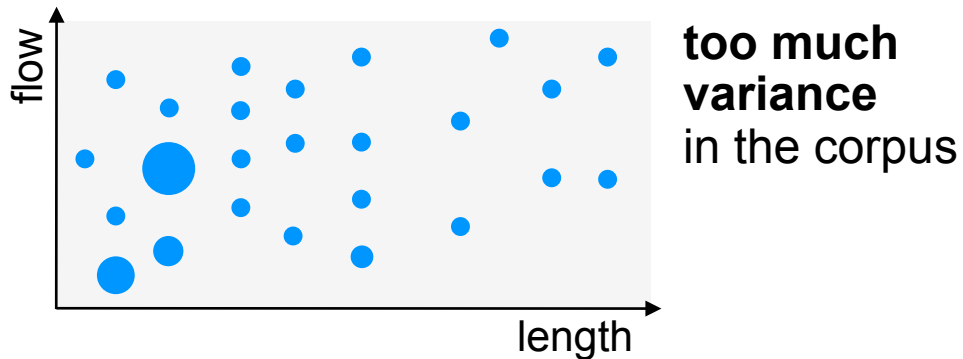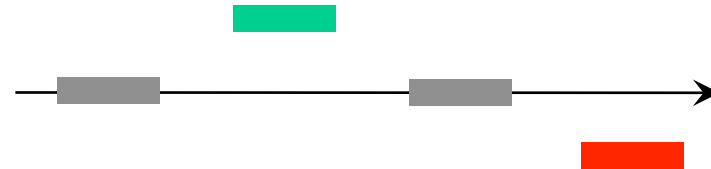
(3) Impact of the flow (cont'd)

ArguAna

- **Some frequent argumentation flow patterns** (more in the paper!):

6th
2.1%

16% 11% **57%** 16%

1 2 3 **4** 5

11th
1.5%

36% **52%** 13%

1 **2** 3 4 5

1st
7.7%

161 texts

2% 3% 8% 31% **57%**

1 2 3 4 **5**

9th
1.7%

89% 8% 3%

1 2 3 4 5

10th
1.5%

3% 32% 32% 32%

1 2 **3** **4** **5**

(4) Impact of opinions on aspects $Argu/Ana$

- **Analysis of the impact** of the most often named aspects and amenities

1st room	**3rd** location	**8th** service	**20th** towels	**24th** parking
 from cgtrader.com	 from 123rf.com	 from nederlandvve.nl	 from amazon.com	 from colchester.gov.uk
mentioned in **80%** of all reviews	positive in **85%** of all mentions	if negative, score 5 in **0%** of all cases	negative in **67%** of all mentions	if negative, still score 5 in **12%** of all cases...
 from medkomm.de	 from plus.google.com	 from medkomm.de	 from coocoonhome.com	 from plus.google.com

... but if positive, score 1 in **0%** of all cases

- **Further nice insights** can be found in our paper...
- ... and many more in the corpus

Take away messages

- **Review argumentation** comprises a series of facts and opinions used to justify a certain overall sentiment.

- **We provide an annotated corpus** for the analysis of review argumentation.

  - Freely available at http://www.arguana.com

  - By now, only one domain and one language

- **The corpus gives new insights** into the way web users argue in (hotel) reviews.

- **There's much more that YOU can do** with the corpus!

  - Learn about review argumentation

  - Develop novel sentiment analysis approaches
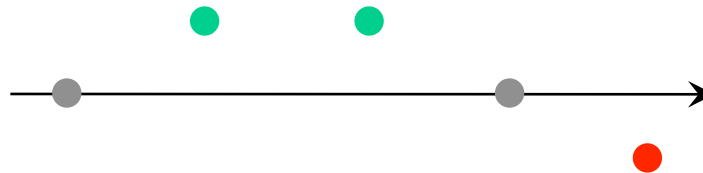
  - Evaluate existing approaches
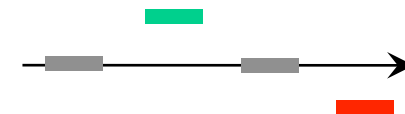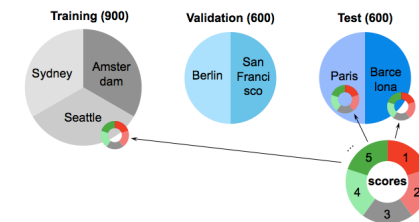
Thank you for your attention!
Questions?

Henning Wachsmuth
hwachsmuth@s-lab.upb.de

University of Paderborn, s-lab – Software Quality Lab
Zukunftsmeile 1, 33102 Paderborn, Germany

http://is.upb.de/?id=wachsmuth