

Text Summarization of Review Sentiments

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Summize, Inc.

S U M M I Z E

Home Trends Sign In

Search

BETA

We've summarized **44,336,409** opinions across the web

Find reviews and sentiments on millions of items

Enter a band, actor, author, game, camera, printer...

Summize

Discover what people **like** and **dislike**



Trending books by...

Andrew Peterson
Larry Smith
Dante
Michael Masterson
Jack Kerouac
Joseph E. Stiglitz
Stefanie Wilder-Taylor
Joshilyn Jackson
Michael Connelly
Sarah Addison Allen

Trending music by...

Counting Crows
The B-52's
Destroyers
Lindsey Buckingham
Muses
Panic at the Disco
Ghostface Killah
Toby Keith
Great Northern
Adam Green

Trending movies by...

Megumi Okina
Thomas Jane
Will Arnett
Tyler Perry
Jerry O'Connell
Leslie Mann
Stephen Sommers
Tommy Lee Jones
Michael Chiklis
Pierce Brosnan

Overall Opinion

Total sentiments across our entire site



44,336,409 sentiments

on 20,878,187 products
by 4,345,674 people

What is Summize?

Summize connects you with the **opinions** of millions of people on zillions of products.

We scour the web for the latest user reviews and blogger discussions, surmise their **sentiments**, and summarize them here. [Learn more.](#)

Now on the iPhone!



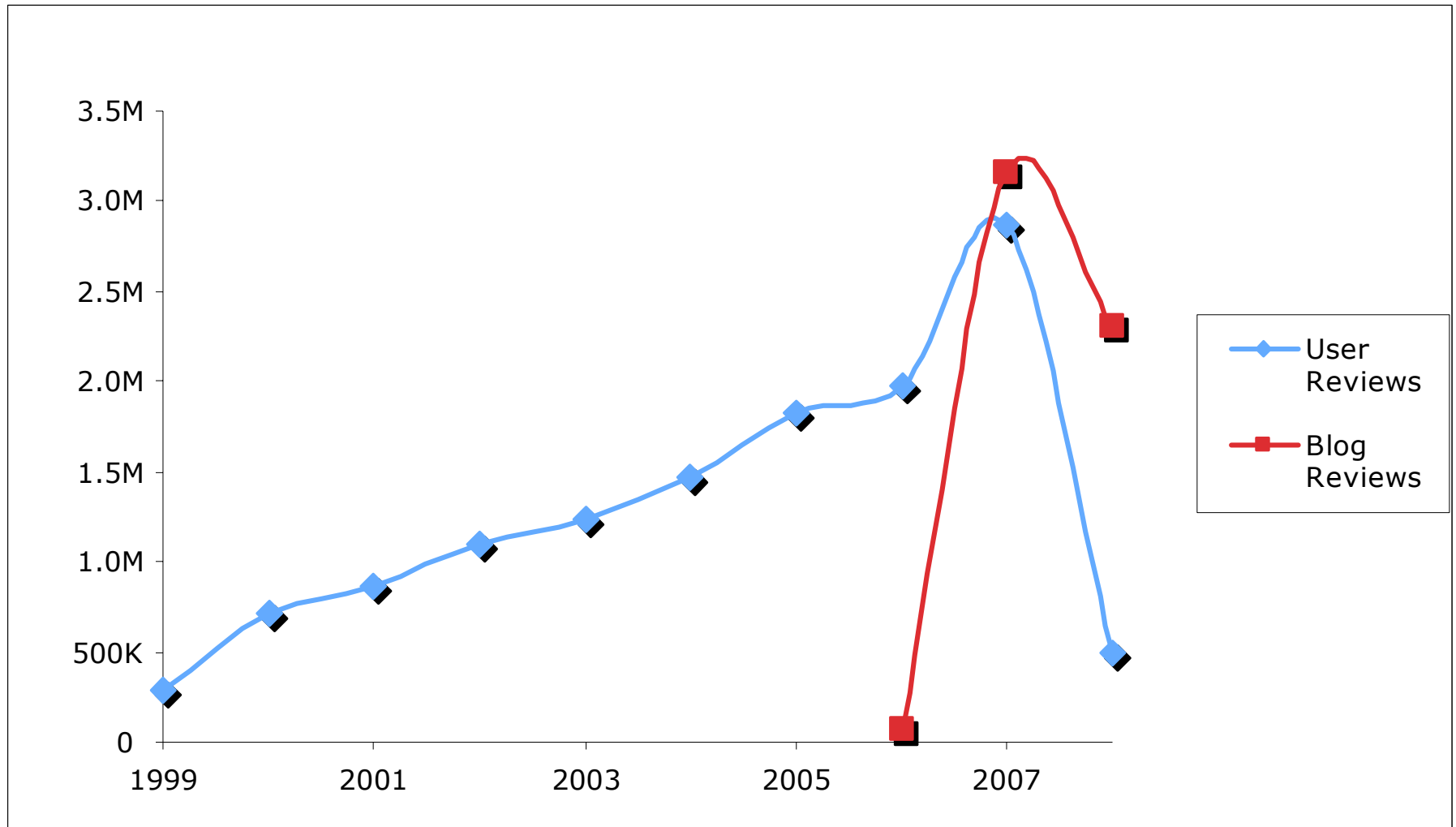
Get reviews on the go with our new Summize webapp.

Outline

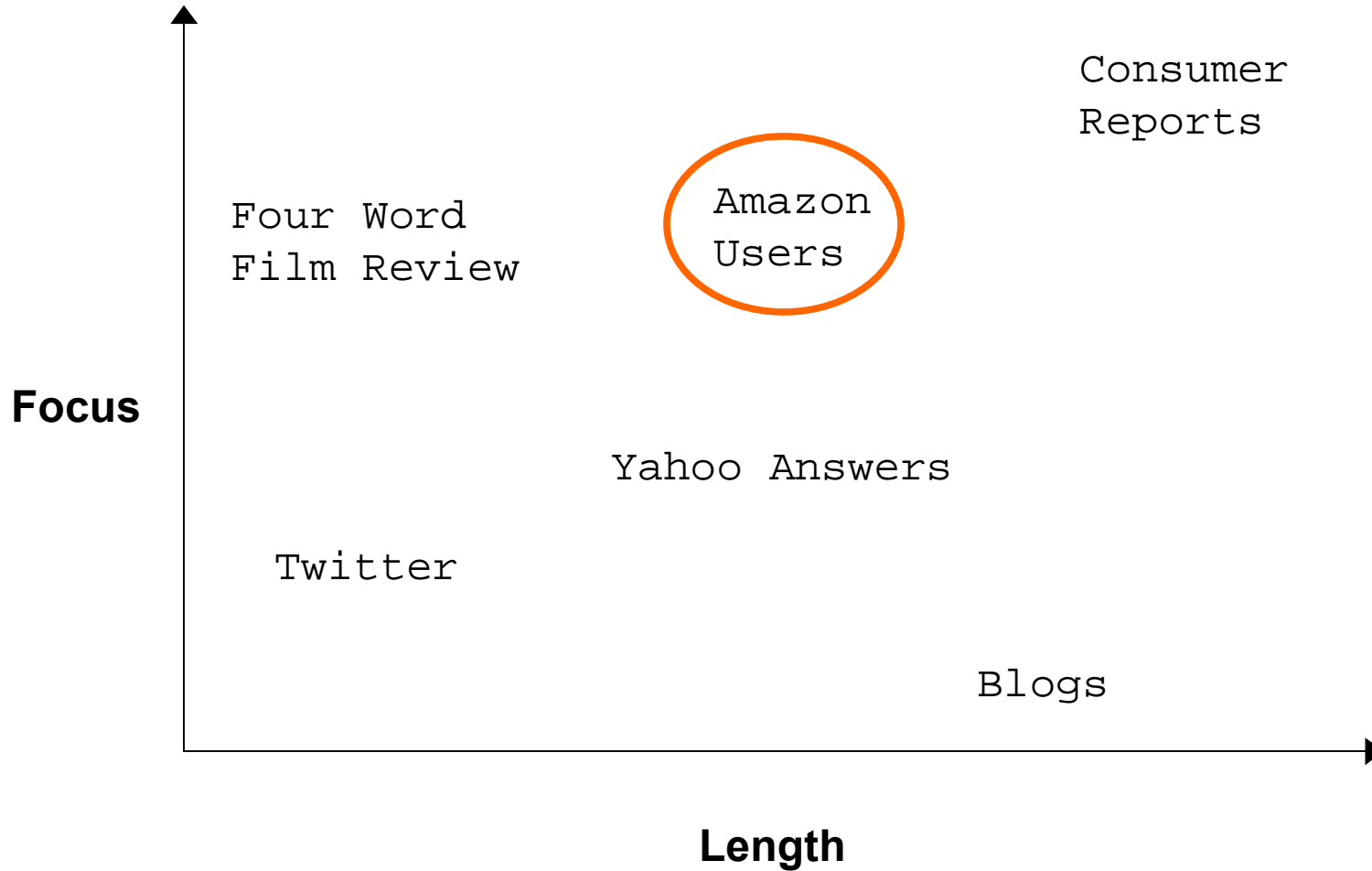


- Opinions on the web
- Opinion mining
- Text summarization
 - The problem
 - Proposed algorithm
 - Results
- Conclusions

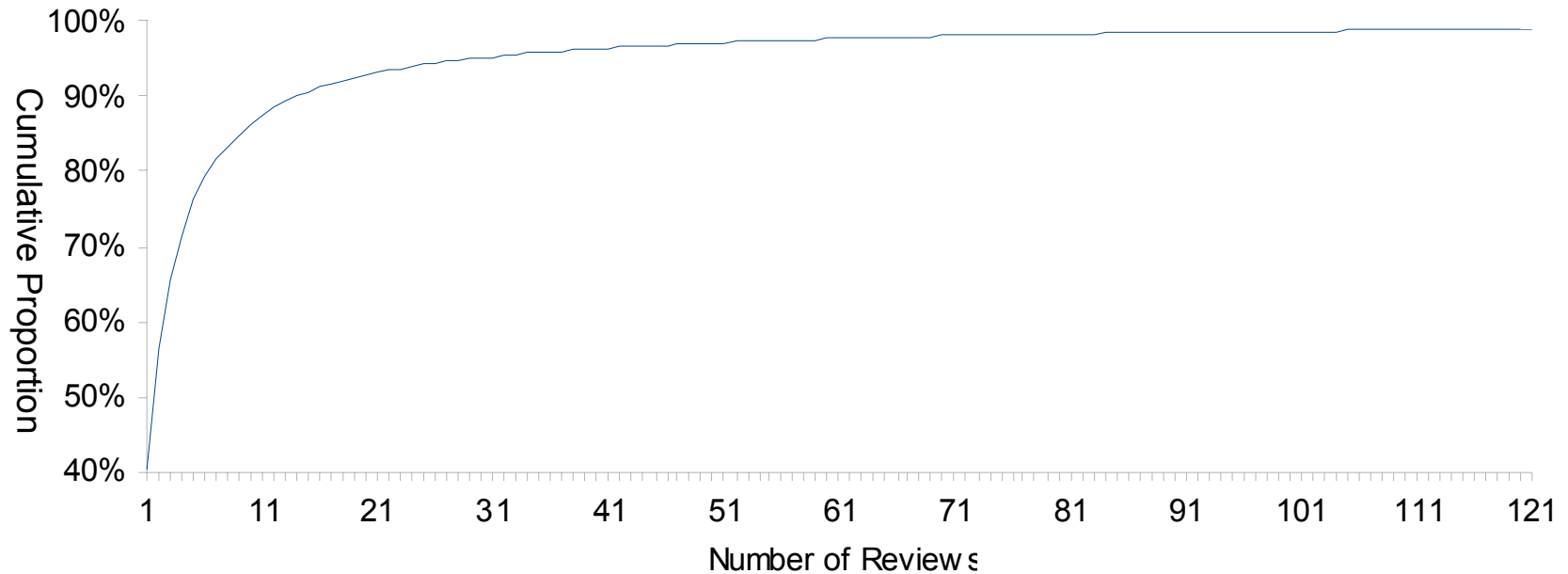
Growth of Amazon, IMDB, and Blogs



Opinions on the web



Support (or lack of?)



How many are you willing to read?

S U M M I Z E Home Trends Sign In digital cameras Search **BETA**

6,208 results for digital cameras
snips | stars

550
sentiments

Canon Digital Rebel XTi 10.1MP Digital SLR ...
Discussed by [26 bloggers](#), [523 users](#), [1 expert](#) - [Add your review](#)
Looking for an entry class SLR gives me a quite headache :) The Body itself it's cheap (from \$450 to \$800), but the following stuff that i need to buy, its amazes me. ... **Canon** — [Dian](#)

\$589.88

130
sentiments

Sony Cybershot DSC-N2 10.1MP Digital Camera ...
Discussed by [1 blogger](#), [128 users](#), [1 expert](#) - [Add your review](#)
In a previous article, I promised to provide you with information about technology for travelling. I have now written an article for you. I decided to post it on my technical website. To read ... — [doug](#)

\$449.00

1,298
sentiments

Canon Digital Rebel XT 8MP Digital SLR Camera ...
Discussed by [21 bloggers](#), [1,276 users](#), [1 expert](#) - [Add your review](#)
... **Canon Digital Rebel XT 8MP Digital SLR Camera with EF-S 18-55mm f3.5-5.6 Lens (Black): Camera & Photo B&H Photo Video** | Digital Cameras, Camcorders Offering photographic and ... — [Administrator](#)

\$429.95

584
sentiments

Canon PowerShot SD1000 7.1MP Digital Elph ...
Discussed by [9 bloggers](#), [574 users](#), [1 expert](#) - [Add your review](#)
... Which means it's time for you to get an old Elph and save some money. ... All you have to do is look at how many customer reviews the Elph has on Amazon compared to other ... — [Murphy](#)

\$158.00

Overall Opinion
Reviews and sentiments for this query

120,282 sentiments
on 6,208 results

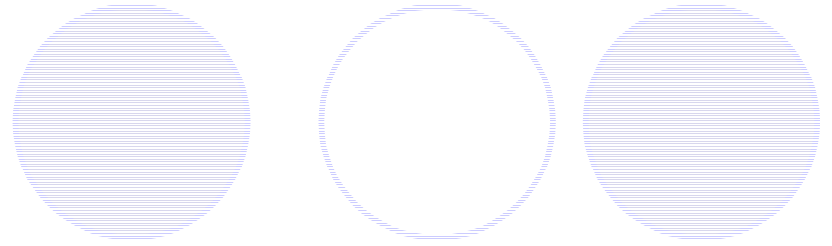
Too Many Results?
See just the products people:

- like
- dislike
- disagree on

Where Are My Reviews?
Click [Add your review](#) to add your blog review for any product.

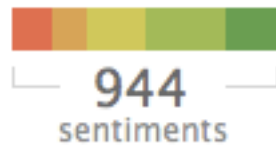
What Am I Looking At?
You are looking at the **sentiments** of bloggers and users that discussed products related to your query.
[Learn more.](#)

Opinion mining



- Sentiment analysis
- Facet mining
- **Text summarization**

Sentiment analysis! (Pang EMNLP 2002, Dave, et. al WWW 2003)



I Am Legend

“I won't review the movie because this has already been done. What I will rate is the 2-disc 'Special Edition' of this movie...Overall, I feel this 2-disc edition is not worth the extra money it costs.”

Facet mining (Hu and Liu KDD 2004,
Popescu and Etzioni EMNLP 2005, Titov and
McDonald WWW 2008)

- Digital camera

- ★★★★★ Resolution

- ★★★★★ Zoom

- ★★★★★ User interface

- I Am Legend

- Acting

- Special effects

- *2-disc special edition?*

Text summarization

The problem: understand the prevailing sentiments as quickly as possible

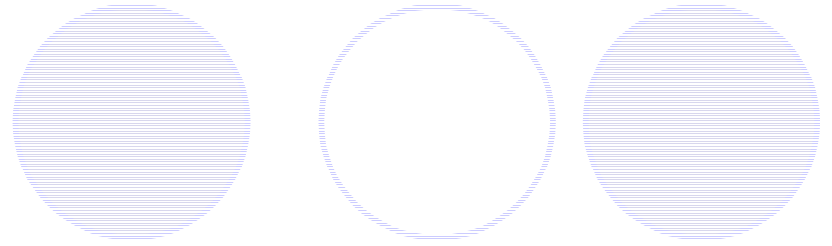
- Leverage the ratings users provide to produce *more* meaningful summaries
- Don't restrict to fixed categories/facets
- *Why* did the users rate it this way

Example

I Am Legend

riveting **movie** •
hollywood **ending** •
amazing **story** • **excellent**
character • **riveting** **performance**
• **dark sci-fi** • **grotesque** **film**

Experimentation



- Dataset
- Evaluation
- Baseline
- Results
- Consensus Building

Experimentation: Dataset



- Amazon and IMDB
- 10 million user reviews
- 3.6 million products
- Books, movies, music, and others

Evaluation

- Sampled 30 products
 - Stratified by category
 - Minimum of 10 reviews each
- Task: ideal 10-word summary of the prevailing sentiments about that product
 - Mix positive and negative in appropriate ratio
 - Arbitrary length phrases
- E.g. **vacuum cleaner**: high suction,
heavy, do not buy

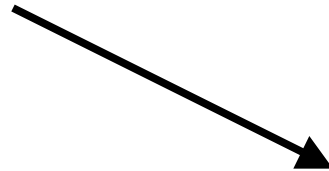
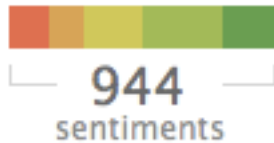
Evaluation: Metrics

- Text Analysis Conference (formerly DUC)
- Overlap of reference summaries highly correlated with manual evaluation (Lin & Hovy HLT-NAACL 2003)

$$ROUGE - N = \frac{\sum_{gram_n \in reference} Count_{match}(gram_n)}{\sum_{gram_n \in reference} Count(gram_n)}$$

Framework

Input



Output

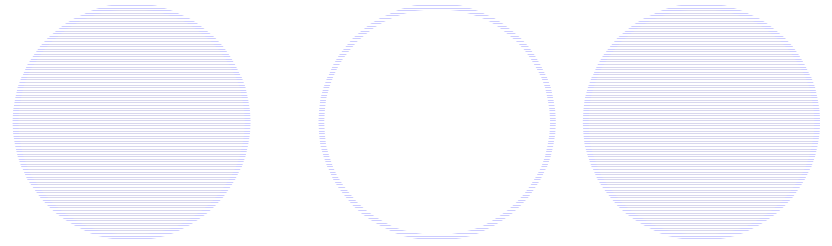
riveting **movie** •
hollywood **ending** •
amazing **story** • **excellent**
character • **riveting** performance
• **dark sci-fi** • **grotesque** film

Baseline: Adapted facet-oriented mining (Hu and Liu KDD 2004)

1. Identify noun phrases and treat adjacent adjectives as opinion words
2. Rank noun phrases by TFxIDF
3. *Choose top opinion word by frequency*
4. *Choose top summary phrases by frequency*

- 3 & 4 our adaptation

Proposed algorithm

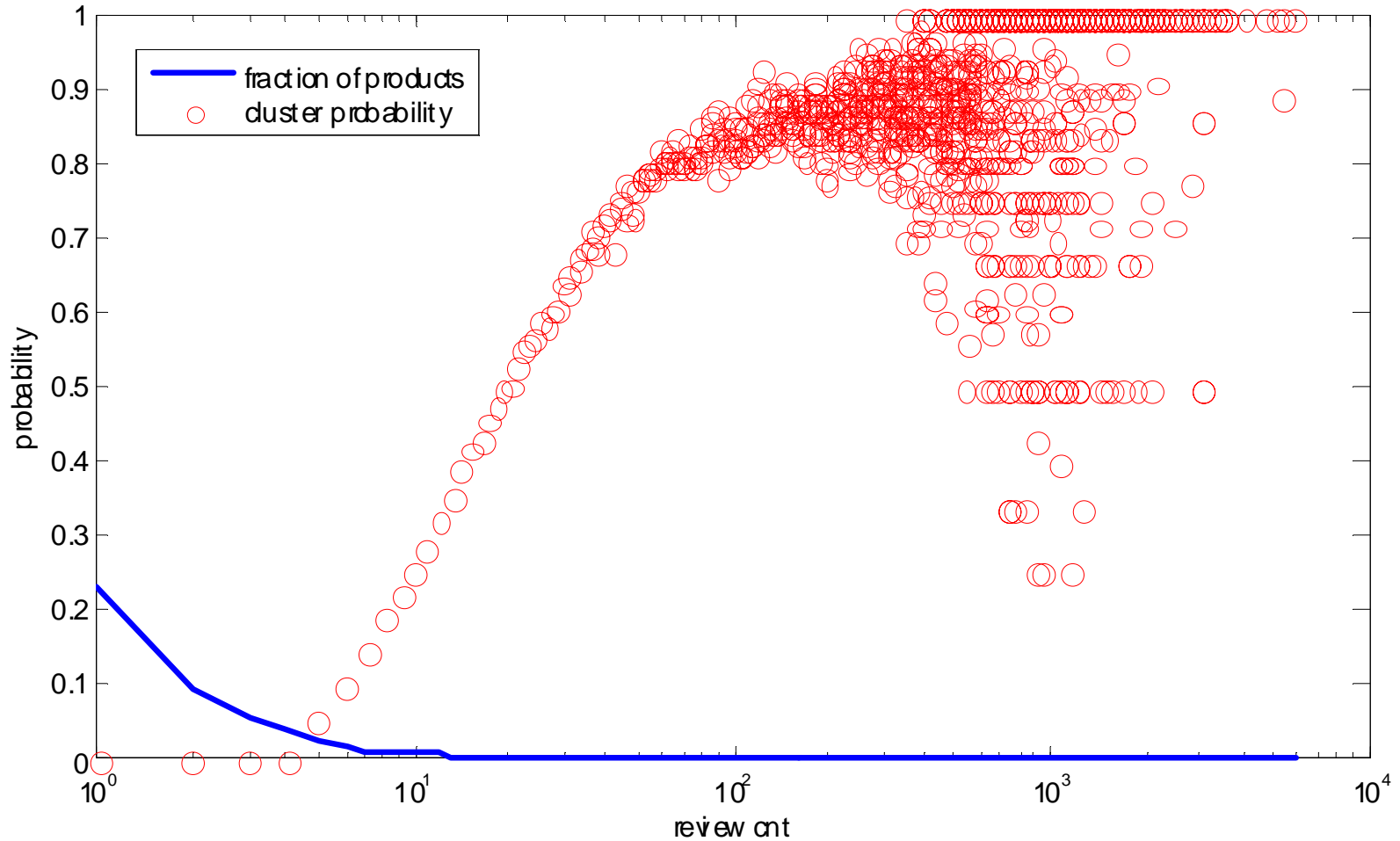


1. Identify each opinion word and treat the following word as a “facet” word
2. Rank facet words by frequency
3. Choose top opinion word by frequency
4. Choose top phrases by frequency

Results

Method / Metric	Precision	Recall	F _{0.5}
Facets ROUGE-1	0.329	0.189	0.215
Summize ROUGE-1	0.293	0.263	0.273
			+26.81%
Facets ROUGE-2	0.105	0.025	0.033
Summize ROUGE-2	0.050	0.044	0.045
			+36.25%
Facets ROUGE-SU4	0.161	0.054	0.059
Summize ROUGE-SU4	0.107	0.088	0.091
			+55.03%

Consensus Building



Conclusions

- Number of opinions on the web are growing faster than anyone wants to read
- Text summarization reveals the *why* behind the ratings
- Facets do not capture the ideal summaries (sentiment-oriented ones are 26% closer)
- **Scaling is both a problem and an opportunity**

Future Directions



- Scale to more and more reviews
- Analyze opinions from unstructured sources (blogs, twitters, etc.)

Plugging my other work



- Semi-automatic evaluation (ACM TOIS '07)
- Query classification (ACM TOIS '07)
- Query log analysis (SIGIR '04)