"What are Folks Implying?"

A Prototype of a Consumer Reviews Information Revealing System for Quantification of Product-Level Differences

Group: Zhu_Li_Li

Members: Yuming Zhu, Yimin Li, Li Liu

Comparison Infographic by Amazon

Problems to solve

Limited in helping decisions

Differences in reviews are not considered

Goal

Algorithmic infographic which quantify the differences from reviews

Algorithm

Input:

1. Similar products in the consideration set (perfect substitutes)
2. Consumers' preferences

Data: product metadata and consumer reviews (sampling)

Output: summary visualization that quantify the differences of product within reviews

Methods

1. **Which one of them is the most expensive/cheapest/popular?**

   EDA

2. **What's in the reviews?**

   Topic Modeling

3. **How are the reviews different in semantic meaning?**

   Doc2Vec (distances between products)

4. **Do the product descriptions align with the reviews?**

   Scoring Function (matching between description and reviews)

Our Data: Amazon Review Data (2018)

Scraped from the Amazon website in Nov 2018 by UCSD researchers (Available [Online](#))

Two parts:
- Consumer reviews (ratings, headline, text, helpfulness votes)
- product metadata (descriptions, price, brand, and image features)

Our Sample

Redragon K502 RGB Gaming Keyboard RGB LED Backlit Illuminated 104 Key Silent Keyboard with Wrist Rest for Windows PC Games

by Redragon
★★★★☆ | 2,591 ratings
| 230 answered questions

Amazon's Choice for "quiet gaming k..."

Price: **$28.99** ✓prime & FREE Returns

Thank you for being a Prime member. Get $70 off instantly: Pay $0.00 upon approval for the Amazon Prime Rewards Visa Card. No annual fee.

- QUIET GAMING KEYBOARD; 104 Key Gaming Keyboard with quiet Island-style Chiclet keys designed for longevity, durability and

Roll over image to zoom in

Click image to open expanded view

HP Wired USB Keyboard K1500 (Black) (H3C52AA#ABA)

by HP
★★★★☆ | 1,467 ratings
| 114 answered questions

Amazon's Choice for "hp wired keybo..."

Price: **$13.48** ✓prime & FREE Returns

Get $70 off instantly: Pay $0.00 upon approval for the Amazon Prime Rewards Visa Card. No annual fee.

- Get-more-done productivity: Achieve more with the HP Keyboard K1500: 3 indicator lights, built-in number pad and full-size keyboard.
- Improved and updated features: Spill-resistant design, adjustable legs, quiet key strokes and plug-and-play USB connection
- Premium HP standards
- Compatible with Windows 7/8/10

Azio Vision Backlit USB Keyboard with Large Print keys and 5 Interchangeable Backlight Colors (KB506) - Wired

by Azio
★★★★☆ | 5,939 ratings
| 364 answered questions

Amazon's Choice for "azio vision bac..."

List Price: $49.95
Price: **$34.99** ✓prime
& FREE Returns
You Save: **$14.96 (30%)**

Get $70 off instantly: Pay $0.00 $34.99 upon approval for the Amazon Prime Rewards Visa Card. No annual fee.

Style: **5 Color**

Roll over image to zoom in

Wireless Keyboard and Mouse - Jelly Comb K025 Compact 2.4Ghz Wireless Keyboard Mouse - Whisper Quiet Keyboard and Mouse Combo-Compatible with PC Laptop Windows 7/8/10-Updated (Yellow)

by Jelly Comb
★★★☆☆ | 1,358 ratings
| 165 answered questions

Currently unavailable.
We don't know when or if this item will be back in stock.

- Reliable 2.4 GHz wireless connection: one USB receiver for both keyboard and mouse;
- Sleek keyboard and mouse combo with low profile whisper-quiet keys delivering comfortable and smooth typing;

Roll over image to zoom in

Microsoft Natural Ergonomic Keyboard 4000, Retail

by Microsoft
★★★★☆ | 5,423 ratings
| 378 answered questions

Price: **$49.95** & FREE Shipping

Thank you for being a Prime member. Get $70 off instantly: Pay $0.00 upon approval for the Amazon Prime Rewards Visa Card.

Not eligible for Amazon Prime. Available with free Prime shipping from other sellers on Amazon.

Color: **Black**

Exploratory Data Analysis (EDA)

Mean of Overall Score, Votes and Verified Comments among Different Products
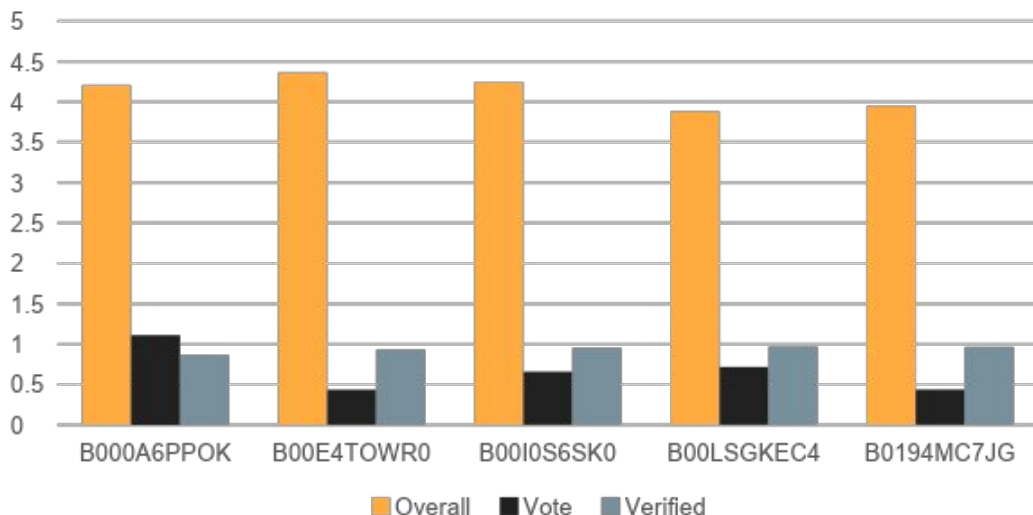
- **B has the highest overall score but with lowest popular votes**
- **Different User portraits**

	Brand	Price (USD)
A	Microsoft	48.54
B	Azio	2.54
C	HP	14.99
D	Redragon	28.99
E	Jelly Comb	2.52

EDA: Word Cloud with Word Counts

Word	Counts
keyboard	2333
keys	1100
key	509
like	505
great	463
…	…

Conclusion

- **Make Sense for these word**

- **A general positive attitude**

(Problem, bad << great, good)

- **Highly-functional**

(Use, typing)

EDA: Distancing
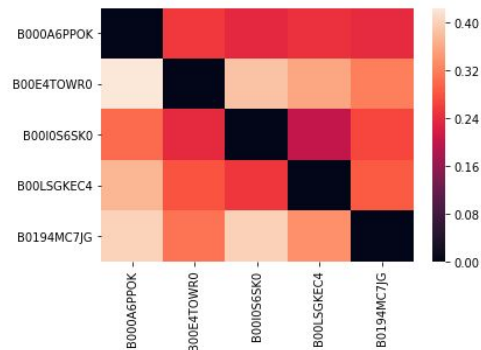
KL Divergence
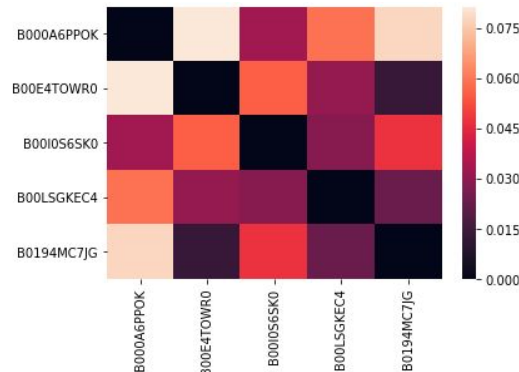
KS Distance

Multidimensional Scaling

χ^2 Divergence

Wasserstein Distance
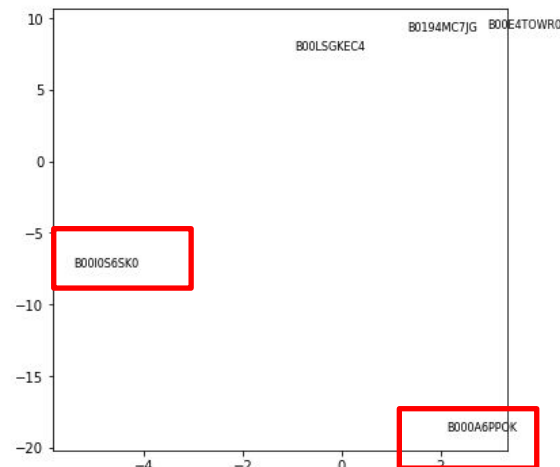
Excellent Distance and Classification! (three categories)

What's in the reviews? - Topic Modelling (Week 5)

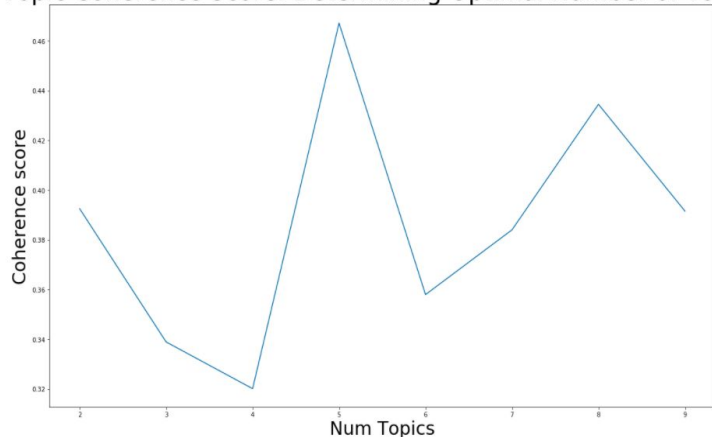**Input:** reviews of all considering products

Output: ratios of topics -> aggregate by product

Usage: If in the future we define the topics with keywords, we may be able to see what properties does each product have to the perspective of customers.

	Topic 1 (Functionality)	Topic 2 (Brand)	...
Product A	0.2	0.6	
Product B	0.5	0.3	
...			

Topic and Topic Number

Optimal Topic Number: 5

	Topic_0	Topic_1	Topic_2	Topic_3	Topic_4
0	keyboard	keyboard	keyboard	keyboard	keyboard
1	keys	keys	keys	keys	keys
2	use	key	key	use	like
3	like	use	like	key	key
4	great	great	great	like	use
5	keyboards	keyboards	work	work	great
6	good	work	use	keyboards	typing
7	key	like	good	great	good
8	love	typing	love	typing	nice
9	time	years	keyboards	m	type

Apparently, Topic 5 has strong favorable preference than others although difference is not so prevalent.

Topic Model: Visualization and Conclusion

Topics in Different Products
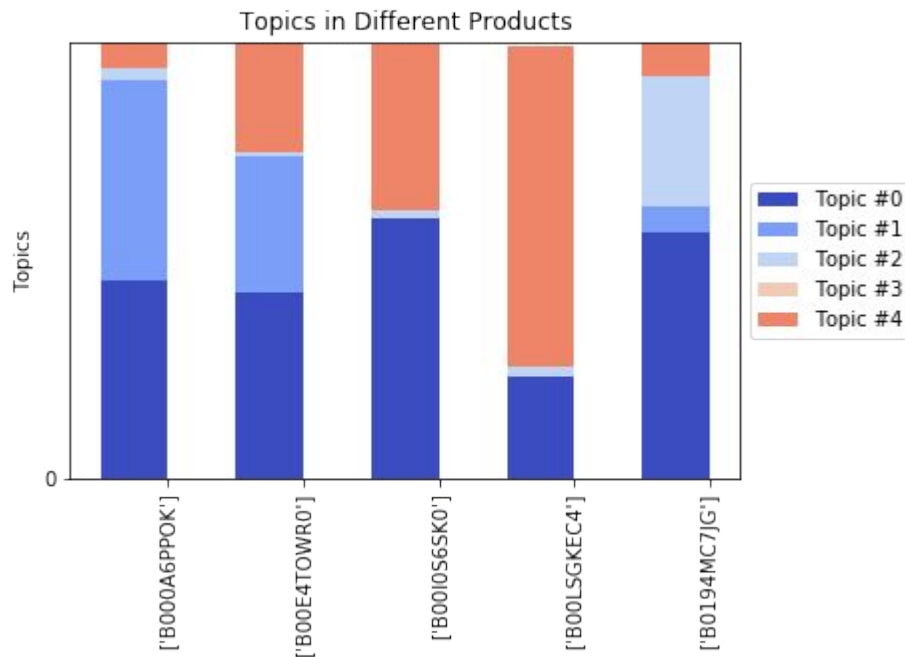
- **Difference among different topic is not so prevalent (Understandable!)**

- **They still gather to two topics (Topic 1 and 4) out of five, meaning the success prediction of topic extraction**

Topic Model: Visualization and Discussion
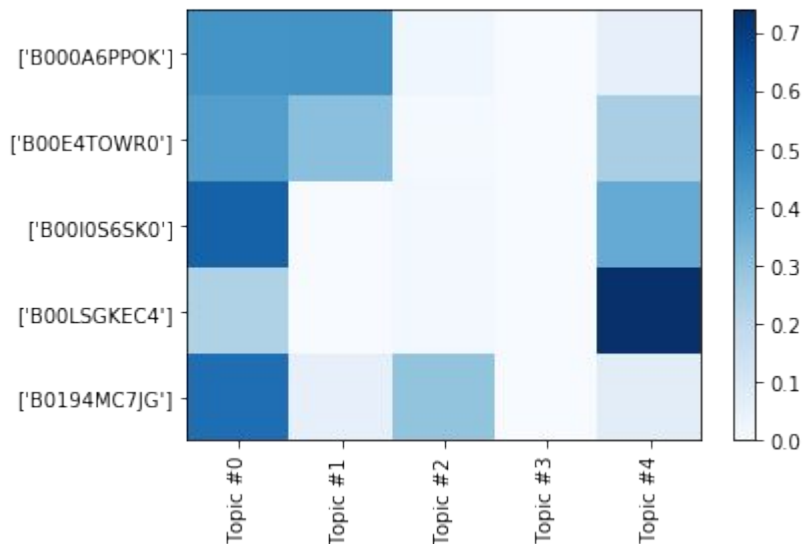
	Topic 1 (Functionality)	Topic 2 (Brand)
Product A	**0.2**	**0.6**
Product B	**0.5**	**0.3**

Implications

- **Might be applied to differentiate and extract topics from different reviews**

- **Might classify different products into different categories in a quantitative way**

How do reviews differ in semantic space?

how the different documents relate to each other within the semantic space

Robert J. Newell **VINE VOICE**

★★★★★ **Good compatibility, overall good utility, almost flawless after 2 1/2 years of use**
Reviewed in the United States on May 21, 2016
Color: Black   Verified Purchase

Overall I'm happy with this keyboard, although there are a couple of issues.

It was about 90% plug and play on my Linux system. On Windows, there's a special driver to make sure everything works, but no such thing for Linux. Still, almost all the keys worked and it was completely usable. With a few relatively easy configuration changes I was able to get 100% of the keys working as they should. That's very satisfactory. I put maybe 20 minutes into it, compared with the 5 minutes I would have spent installing a driver on Windows. So overall, Microsoft has played fair here and there are no show-stopping incompatibilities, in fact really none at all.

The keyboard has a rich set of functions and features. It takes a little getting used to if you want to get the most out of it, but you can do this "as you go." The keyboard is usable as a simple keyboard right from the get-go.

Also on the positive side is that the keyboard is relatively quiet. It's not as quiet as some super-silent keyboards that I've used, but I like the idea that there's just enough audible feedback, which, combined with excellent tactile feedback, leads to more accurate typing.
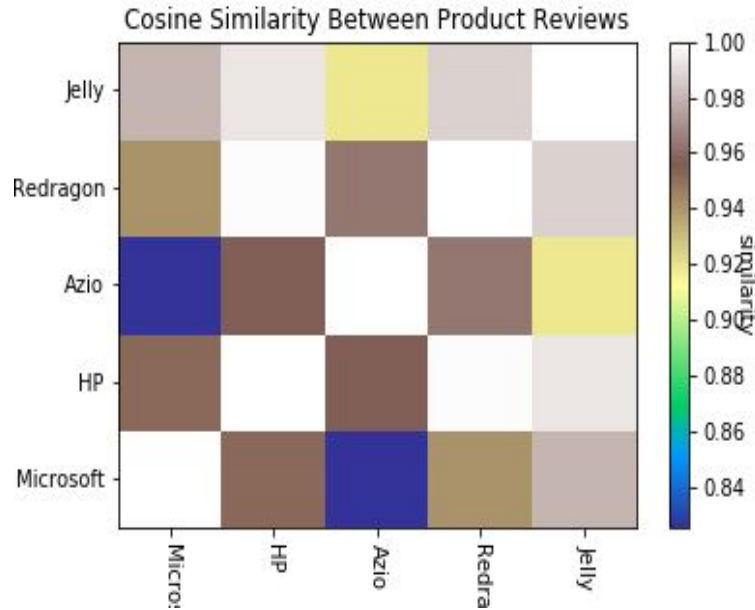
⌄ Read more

68 people found this helpful

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Doc2vec:Cosine Similarity Between Product Reviews

Heatmap for Pairwise Cosine Similarity

	Product	similarities	diff
0	Microsoft	1.00	0.00
1	HP	0.95	-0.05
2	Azio	0.83	-0.17
3	Redragon	0.94	-0.06
4	Jelly	0.98	-0.02

Relative differences with the baseline product

Do the product descriptions align with the reviews?

Microsoft Natural Ergonomic Keyboard 4000, Retail

by Microsoft

★★★★☆ ⌄   5,423 ratings | 378 answered questions

Price: **$49.95** & **FREE Shipping**

Get $60 off instantly: Pay $0.00 upon approval of the Amazon.com Store Card.

Color: **Black**

$49.95 $59.99

- Split ergonomic design encourages natural hand, wrist, and forearm positions
- Cushioned palm rest provides support and promotes a neutral wrist position
- Palm lift promotes a relaxed, natural angle for your wrist
- Media keys for music and video control

Product description by **Seller**

Robert J. Newell   **VINE VOICE**

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Product reviews by **Consumers**

Method: Scoring Function

Problem: How does the product description match with the reviews?
(For consumers, how trustworthy is the seller's words?)

Method:
1. Train a word2vec model with reviews for one product
2. Calculate the likelihood that the product description would have been generated by that model

Output: relative differences of the trustworthiness

Result: Scoring Function

	Product	Likelihood	Trustworthiness
0	Microsoft	-18.53	0.00
1	HP	-18.03	0.03
2	Azio	-19.20	-0.04
3	Redragon	-20.65	-0.11
4	Jelly	-20.08	-0.08

Likelihood scores and
Measure of trustworthiness

Percentage Difference of Trustworthiness
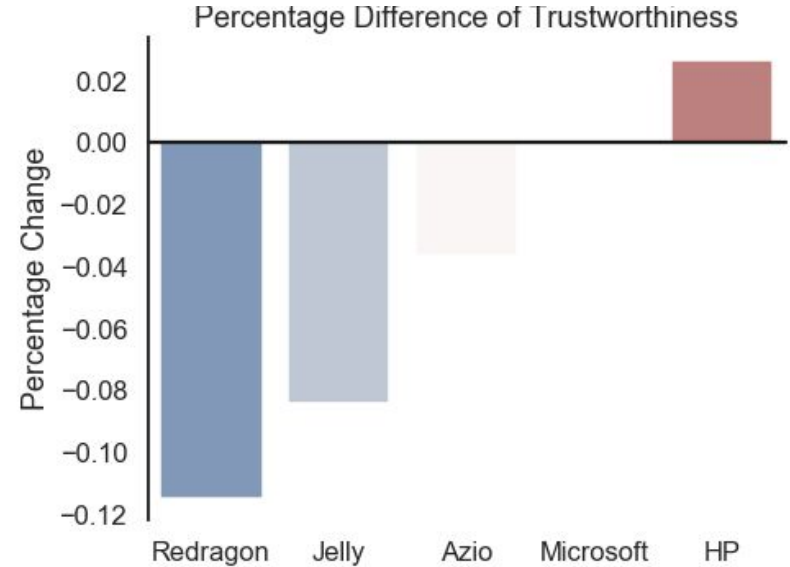
Visualizing the
trustworthiness scores

Comparing five keyboards

Features	Microsoft Natural Ergonomic Keyboard 4000	Azio Vision Backlit USB Keyboard	HP Wired USB Keyboard K1500	Redragon K502 Gaming Keyboard	Jelly Comb K025 Wireless Keyboard and Mouse
Rating	4.2	4.4	4.2	3.9	4.0
Popularity	✓	✓			
Sentiment	✓	✓			
Topic - Functionality	✓				✓
Topic - Brand		✓		✓	
Semantic Distance	/	95%	83%	94%	98%
Trustworthiness of Seller	/.	3%	-4%	-11%	-8%

Algorithmic infographic

- quantify the differences from reviews
- help consumers make easier decisions

Discussion

1. Only a static system, not dynamic with consumers' interaction
2. Trade off between speed and accuracy by sampling the reviews
3. Results might not be significantly different for very similar products