Towards Easy Comparison of Local Businesses Using Online Reviews

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Background
Review Platforms

Yelp

Airbnb

TripAdvisor
Online Reviews vs Purchase Decisions

Three-quarters of travelers have considered online reviews when planning their trips [1]

Online Reviews

Best Restaurants in New York, NY

1. Amélie
   - 2032 reviews
   - Greenwich Village
   - 22 W 8th St
   - “Hands down my favorite wine bar in the city! There are of course tons and tons of wine bars in NYC, but this place is the best. Happy hour is until 7, and…”

2. Thai Villa
   - 1554 reviews
   - Flatiron
   - 5 E 19th St, G Floor
   - “Thai Villa didn’t disappoint! Some of the best Thai food I’ve ever had, and the menu is huge. I can’t wait to come back and try more of their options. The…”

3. Upstairs
   - 1536 reviews
   - East Village
   - 95 1st Ave
   - “Just thinking about this place makes my mouth water... Came here for Happy Hour Oysters which was great but ended up falling in love with two dishes here. “Unic…”

Reviews

Very bad than 5 star hotel
I'm book 2 room and request connecting room since booking. Come to check in since 12.00, staff said will set up room come back to pick up 15.00. I'm come back 17.00 but no connecting room for me and will separate to different floor, i reserve 2... More

Response from DalipSingh, General Manager at Marco Polo Hongkong Hotel
Dear ninonename, Greetings from the Marco Polo Hongkong Hotel. Thank you for taking the time to share your experience with us during your recent stay. Please accept our sincere apologies for not being able to assign you to two connecting rooms per your preference. Much... More

Amazing location - great hotel
Although a very busy hotel, staff were attentive, good sized room and perfect location with harbour and shopping being literally on the doorstep. The surrounding area was very busy (you are in major shopping area) however it felt very safe and I often... More

Response from DalipSingh, General Manager at Marco Polo Hongkong Hotel
Dear JHTH6566, Greetings from the Marco Polo Hongkong Hotel. Thank you for taking the time to share your experience with us during your recent stay. Your comments are indeed valuable to us, as they help us in our committed effort to exceed guest expectations and... More

Not bad if you want to go non stop shopping
Pros: Location, location, location Spacious rooms Overall good value for money for prebooking fakes effective staff in most cases close to the star ferry Cons: Slow check-in process The bathroom sink was outside the bathroom Outdated bathrooms - the bath actually had 2 separate faucets... More

Response from DalipSingh, General Manager at Marco Polo Hongkong Hotel
Dear Robbie R, Greetings from the Marco Polo Hongkong Hotel. Thank you for taking the time to share your experience with us during your recent stay. Your comments are indeed valuable to us, as they help us in our committed effort to exceed guest expectations and... More
Challenges

• There are usually many candidates satisfying users’ requirements

• The online reviews are dynamically changing

• The information overload due to the large volume of review texts, different review focuses, etc.

• The possible standard inconsistency across different customers
How can we achieve easy comparison of local businesses using online reviews?
Our Approach: **E-Comp**
Design Requirements

• General exploration procedures:

  Preliminary Comparison ➔ Detailed Comparison

  R1. Quick overview for filtering out candidates

  R2: reliable comparison between businesses

  R3: temporal analysis of user reviews

  R4: insightful details of important features

  R5: detailed review text on demand

  R6: intuitive visual designs
Our Approach: *E-Comp*
Our Approach: **E-Comp**

- **Detailed Comparison**
- **Common Customer View**
- **Temporal View**
- **Augmented Word Cloud View**
Preliminary Comparison – Glyph Design
Preliminary Comparison – Glyph Design

- Price Level
- Overall Rating
- Review Number of Each Rating
- Total Review Number

Rating Scale:
- 1
- 2
- 3
- 4
- 5

Sequential color scheme
Diverging color scheme

Review Number of Each Rating
Preliminary Comparison – Glyph Design

Alternative Designs
Preliminary Comparison

Interactive Filtering

The link width encodes the number of common customers
Detailed Comparison

• Common customer comparison view
  - The review standards by the same customers are relatively stable
Detailed Comparison

• Common customer comparison view

Interactive Exploration
Detailed Comparison

• Common customer comparison view

Alternative Designs
Detailed Comparison

• Temporal view
  - Temporal trend of reviews
Detailed Comparison

• Temporal view
  - Temporal trend of reviews
Detailed Comparison

- Temporal view
  - Review helpfulness

\[ H = \alpha \cdot R_e + \beta \cdot R_d + \gamma \cdot R_v \]

- Review depth

- Review extremity
  \[ R_e = 3 - |r - 3| \]

Detailed Comparison

• Temporal view
  - Review helpfulness

\[ H = \alpha \cdot R_e + \beta \cdot R_d + \gamma \cdot R_v \]

Helpfulness votes

Review depth

Review extremity

\[ R_e = 3 - |r - 3| \]

Detailed Comparison

• Augmented word cloud view

What kind of place?
How is the service?
What is great?

Detailed Comparison

• Augmented word cloud view
Detailed Comparison

• Augmented word cloud view
  - Extract adjective+noun word pairs

  1. Use part-of-speech (POS) tagger in NLTK

  2. A heuristic approach to keep the noun and the corresponding adjective that modifies it
    (Specifically process the case of negative expressions)
Detailed Comparison

• Augmented word cloud view
  - Extract adj+noun word pairs
  - Classify word pairs into meaningful categories

  1. Manually label a set of representative words for each category

  2. Classify new words by computing the similarity between them and the labeled words using word2vec
Detailed Comparison

• Augmented word cloud view
  - Extract adj+noun word pairs
  - Classify word pairs into meaningful categories
  - Group the word pairs and do the layout of clustered word pairs

1. Group the word pairs with the same noun into a cluster

2. Use standard NLTK library to detect the sentiment of each word pair

3. Layout: collision detection + Archimedean spiral
Detailed Comparison

- Augmented word cloud view
Evaluation
In-depth User Interview

• 12 participants with at least 3 years online shopping experience

• Procedures:
  - Introduce our prototype system
  - Free exploration
  - Finish tasks of comparing local businesses
  - Feedback collection and questionnaire
In-depth User Interview

• Feedback
  - Effectively supporting easy comparison: more insightful information is provided for both preliminary and detailed comparison
  - Good usability: visual designs are easy to learn
  - Limitations & suggestions: scalability, potential occlusion, NLP accuracy
Conclusion and Future Work

• We present a carefully-designed visual analysis system to support easy comparison of local businesses using online reviews

• Case study and in-depth user interview provide support for its effectiveness and usability

• Further improve the language processing accuracy and study the images in the reviews
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