Towards Easy Comparison of Local Businesses Using Online Reviews

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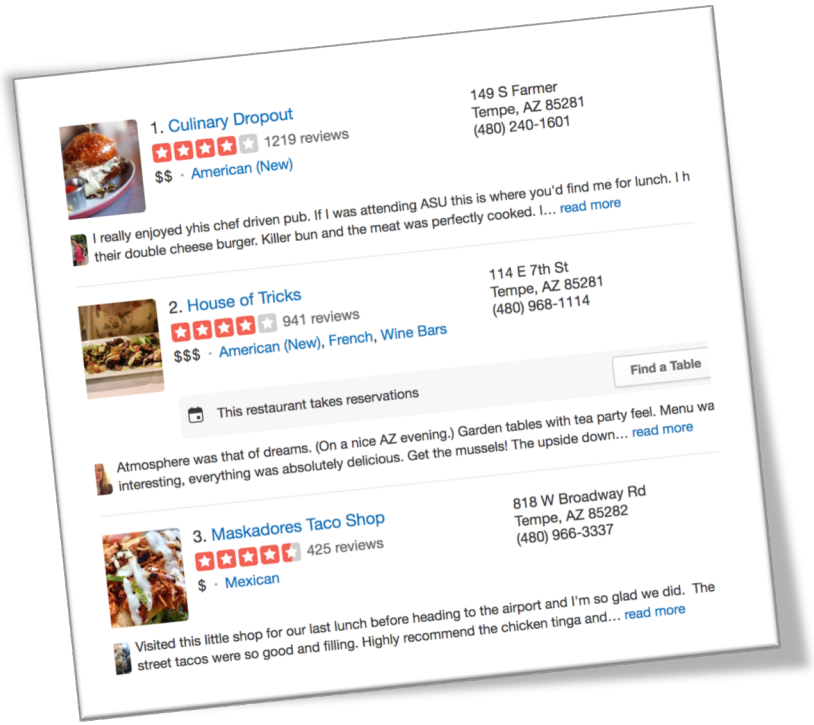
2 airbnb

3 VISA Research

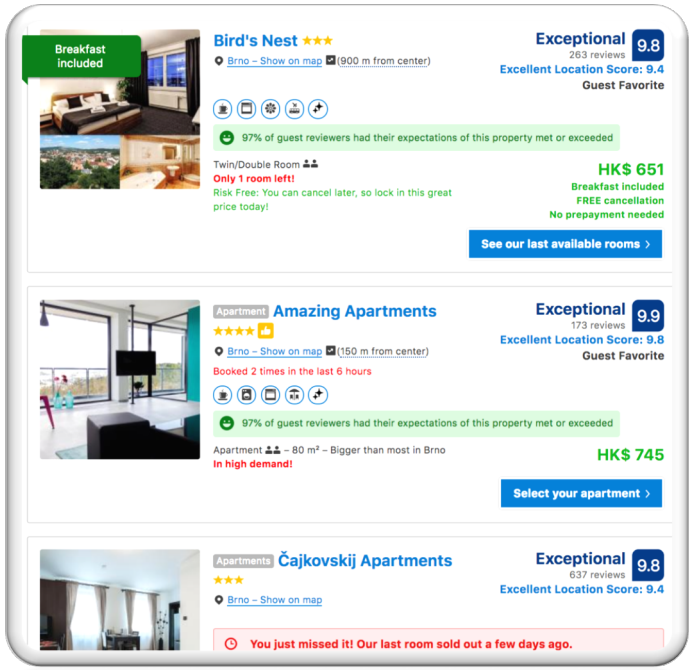
Background

Review Platforms

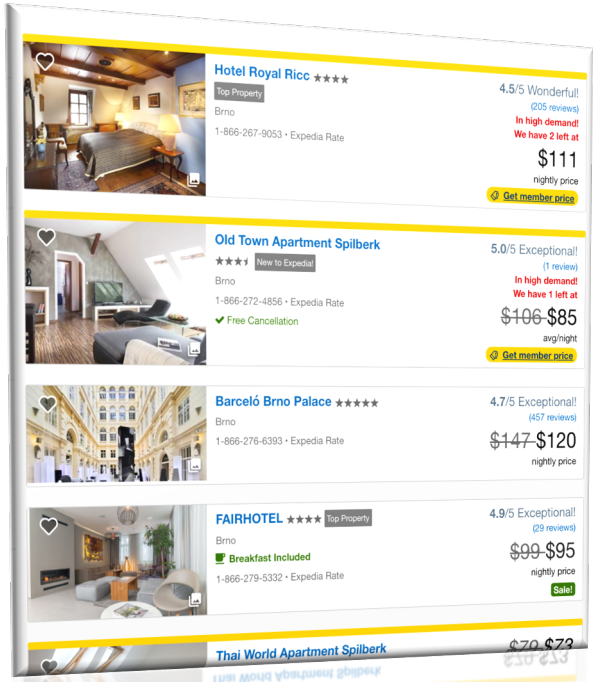
Yelp



Airbnb



TripAdvisor

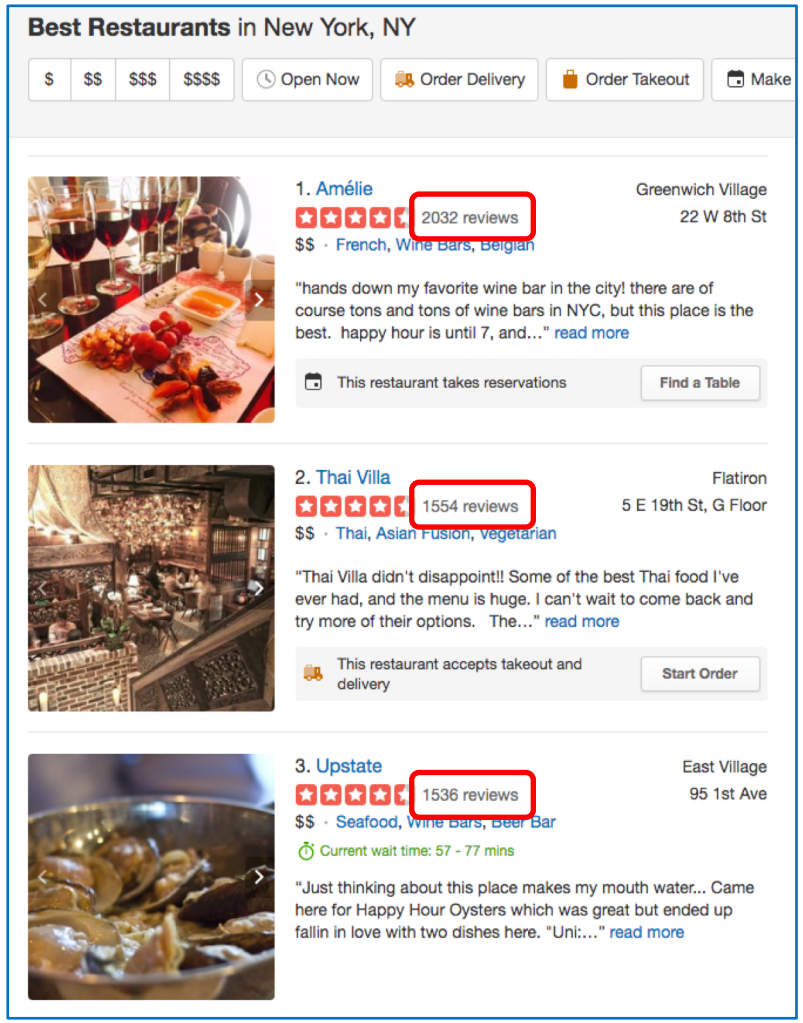


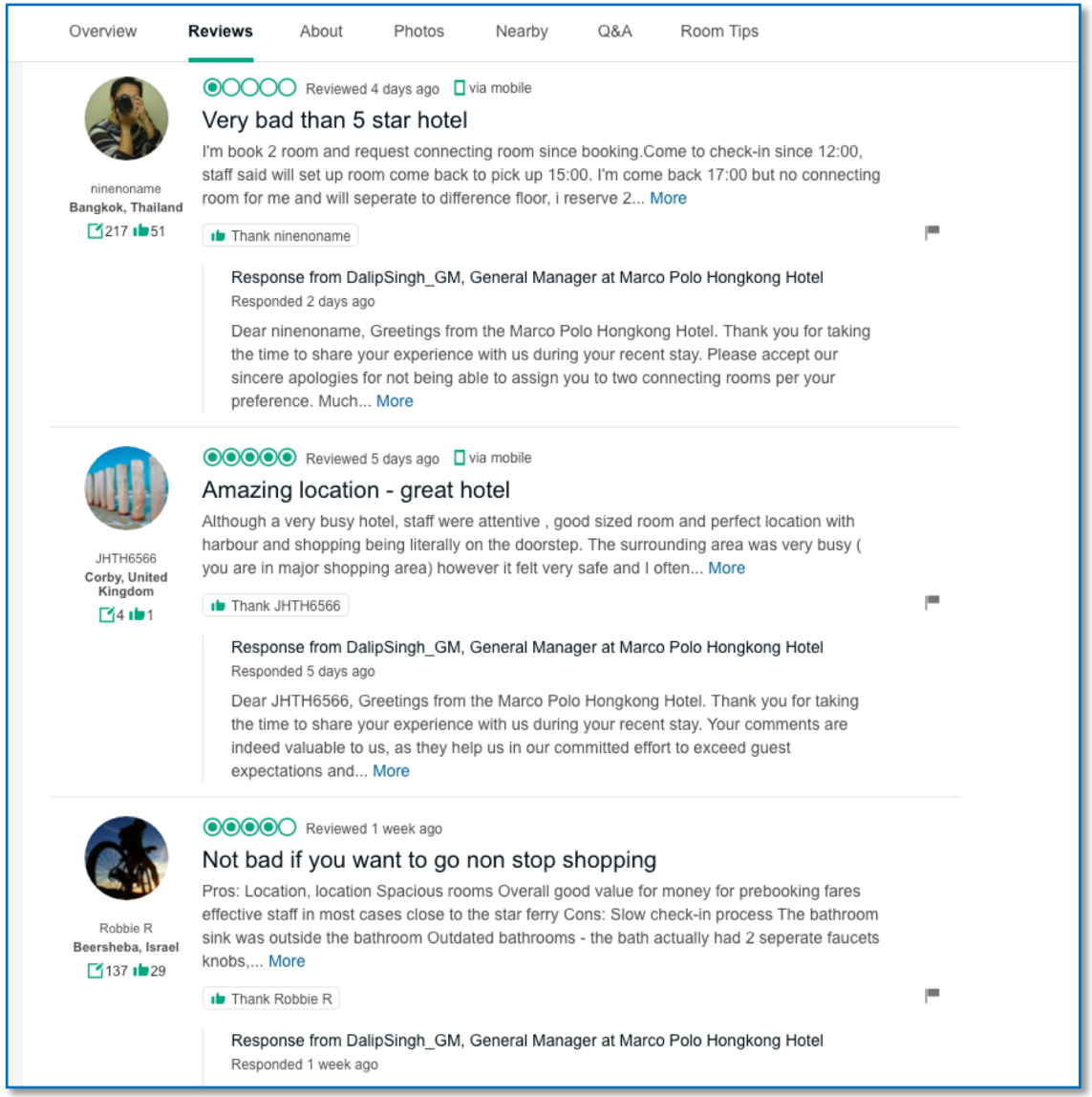
Online Reviews vs Purchase Decisions

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

[1] Gretzel, U., & Yoo, K. H. (2008). Use and impact of online travel reviews. Information and communication technologies in tourism, 35-46.

Online Reviews



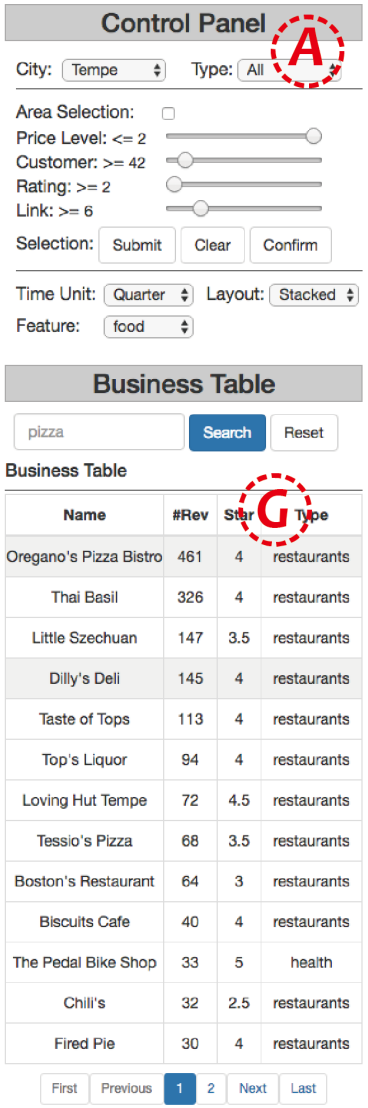


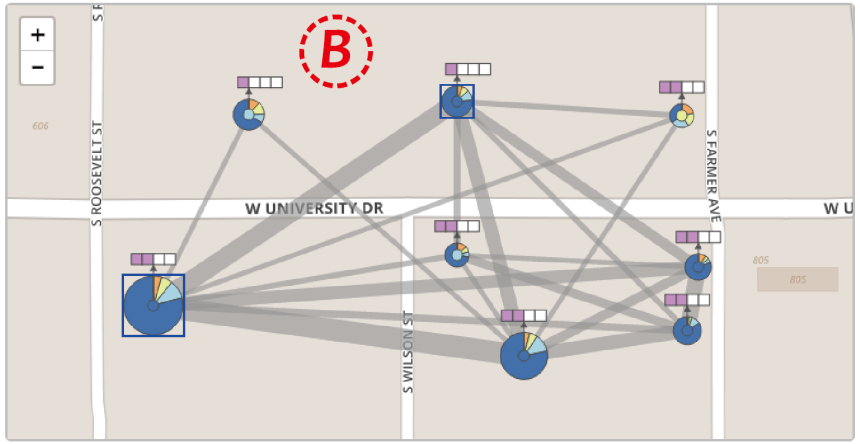
Challenges

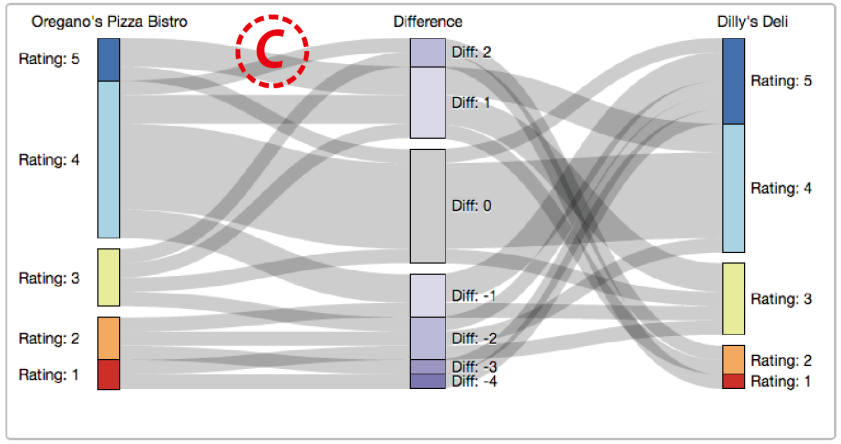
- There are usually many candidates satisfying users' requirements
- The online reviews are dynamically changing
- The information overload due to the large volume of review texts, different review focuses, etc.
- The possible standard inconsistency across different customers

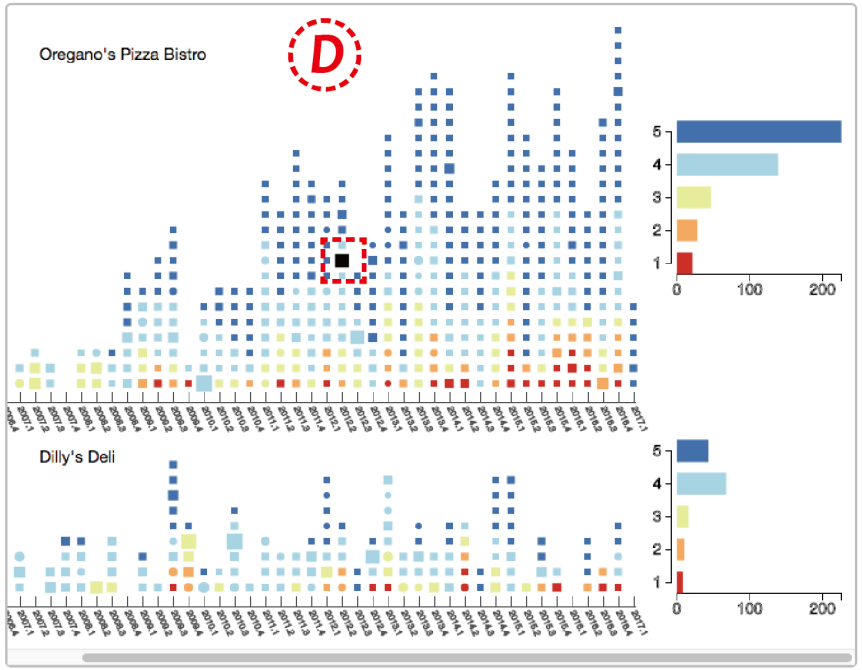
How can we achieve easy comparison of local businesses using online reviews?

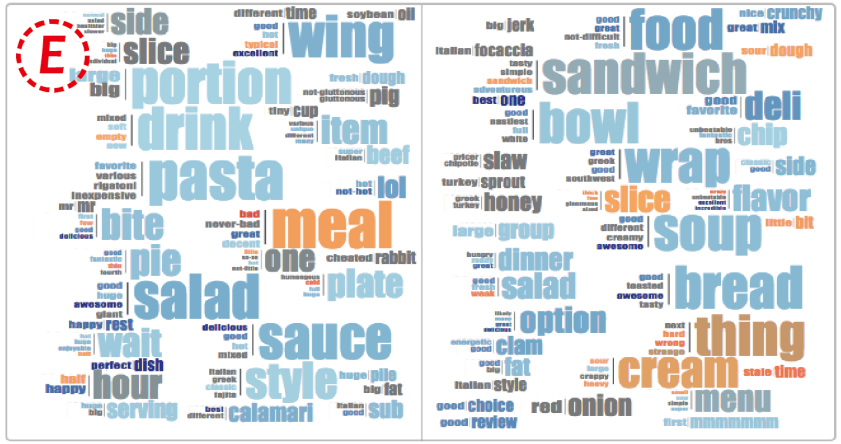
Our Approach: *E-Comp*







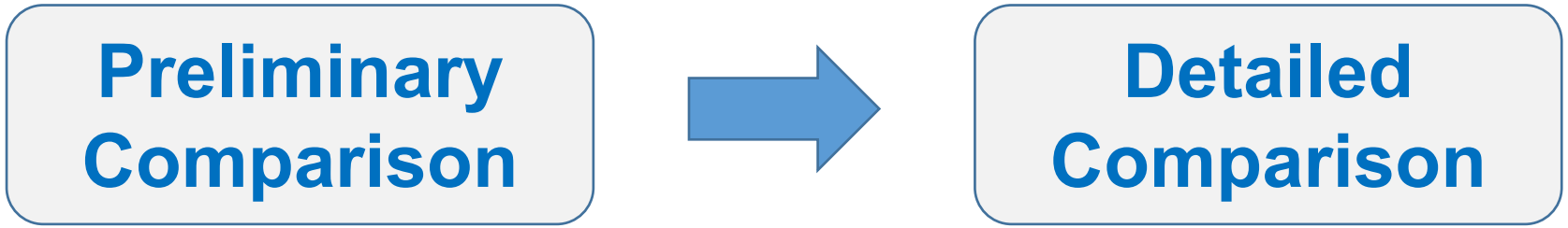




Business Name: Oregano's Pizza Bistro **Customer Name:** Mohammad
Review Date: 2012-05-31 **Rating:** 4
User Votes: 22
F
Review Text: There is a great amount of effort that goes into eating at this particular Oregano's. First of all, arriving between the times of 430-6ish means you will be arriving near the time where there is limited parking space. I'm not sure how many people Oregano's seats, but it's 3x the amount of parking spots available. Secondly, the wait time can be killer. They do not accept reservations so you can easily wait up to 45 minutes during a non-weekend dinner rush. It's up

Design Requirements

- General exploration procedures:



R1. Quick overview for filtering out candidates

R2: reliable comparison between businesses

R3: temporal analysis of user reviews

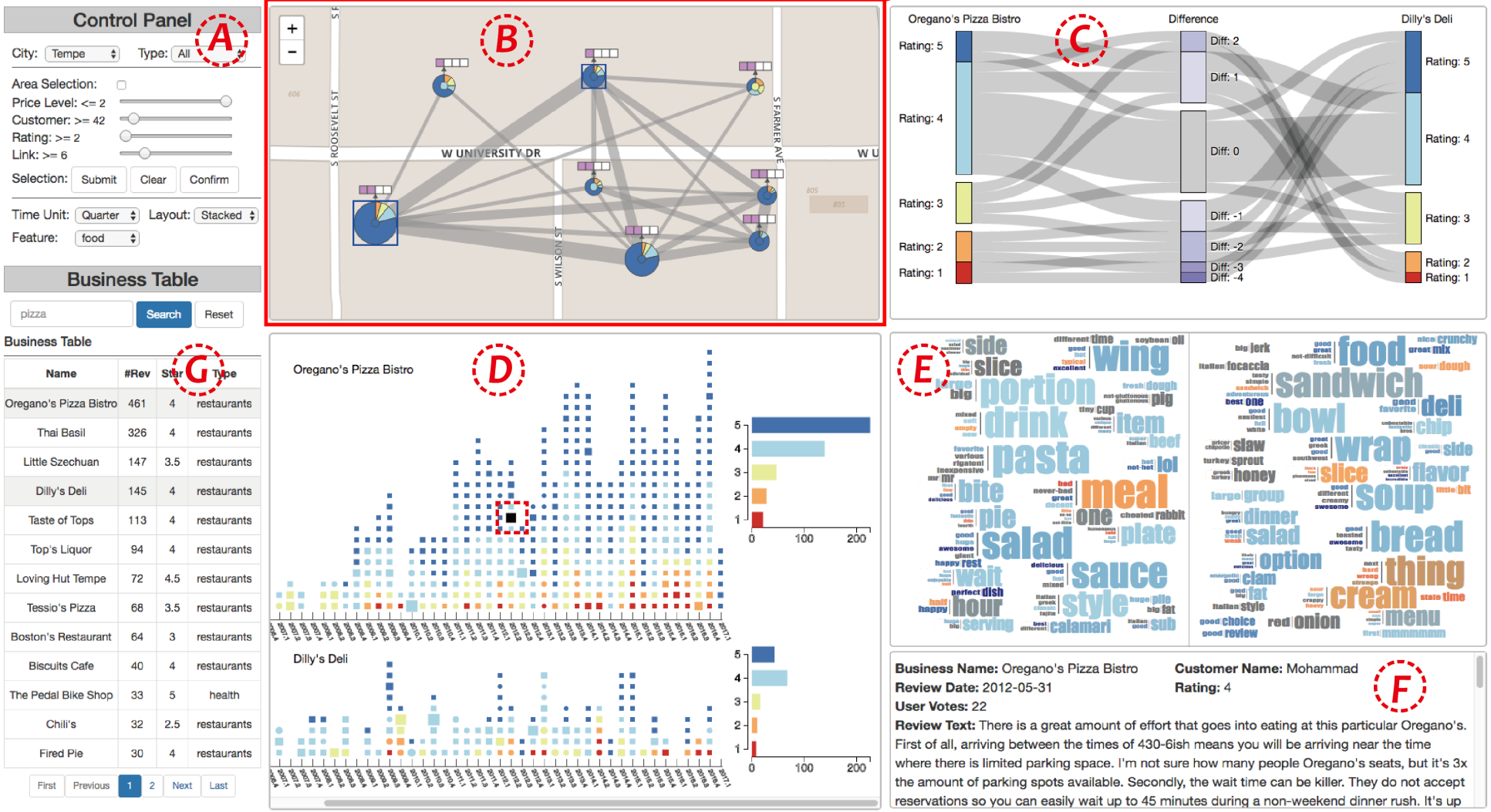
R4: insightful details of important features

R5: detailed review text on demand

R6: intuitive visual designs

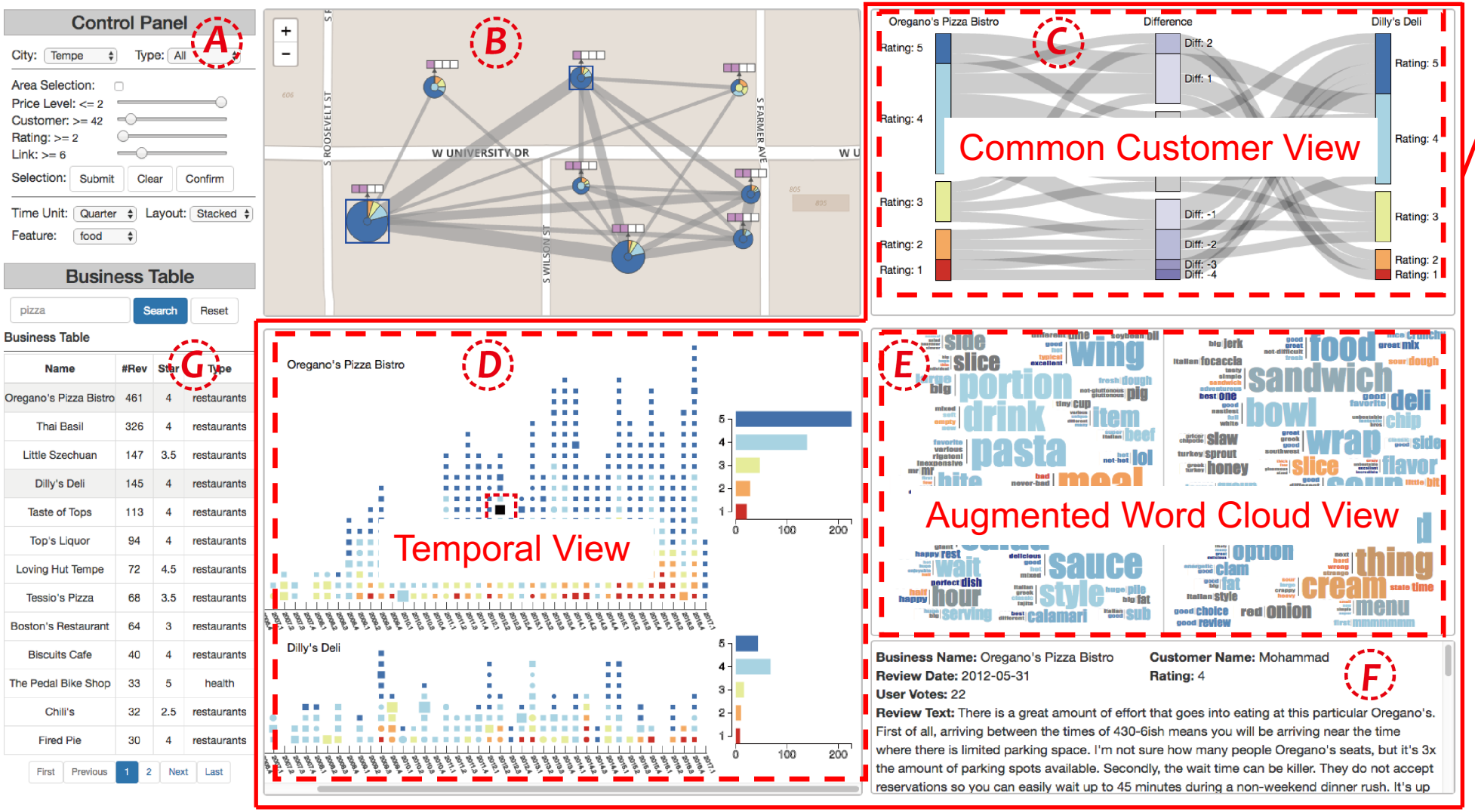
Our Approach: *E-Comp*

Map View: Preliminary Comparison

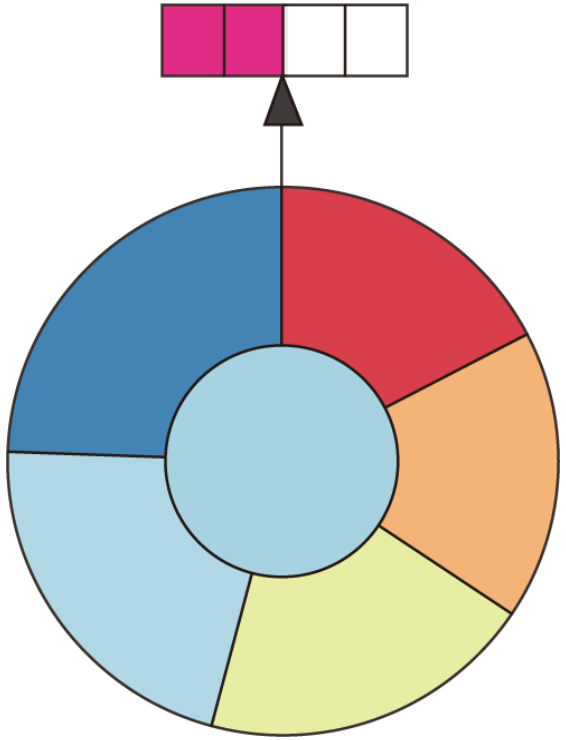


Our Approach: *E-Comp*

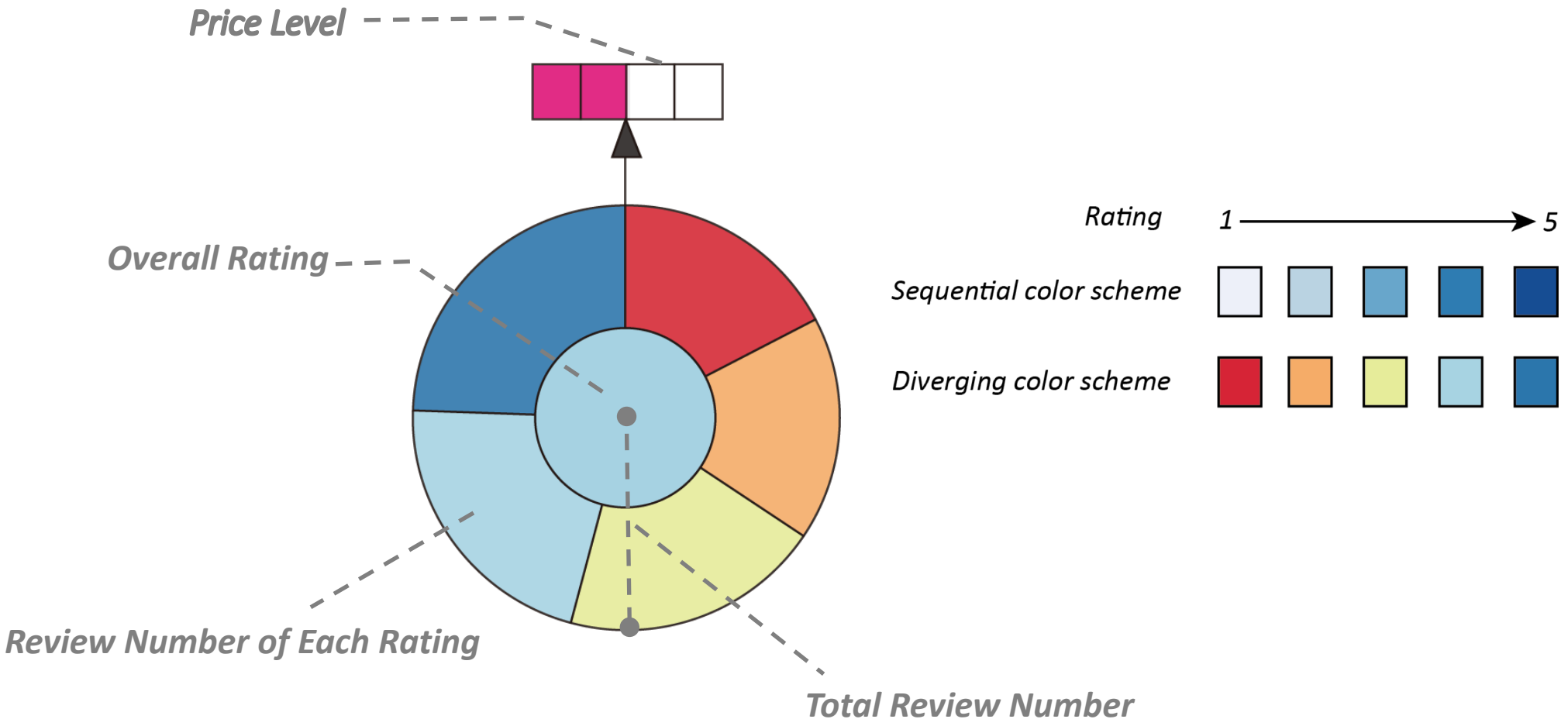
Detailed Comparison



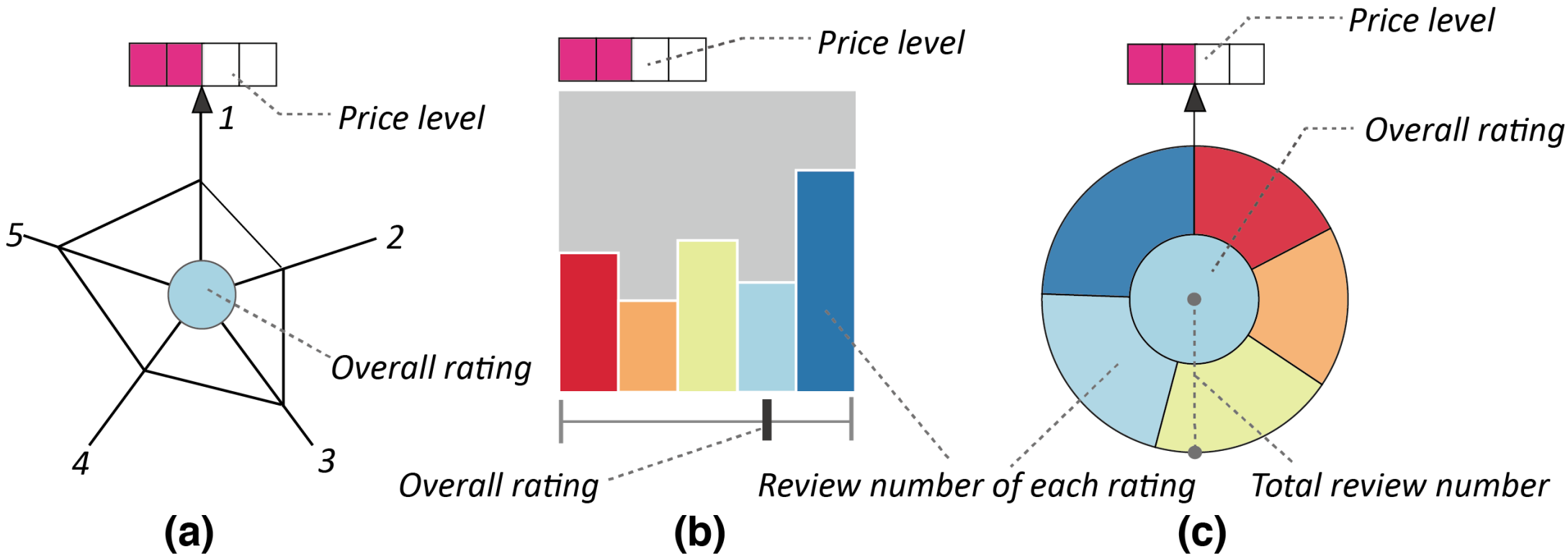
Preliminary Comparison – Glyph Design



Preliminary Comparison – Glyph Design

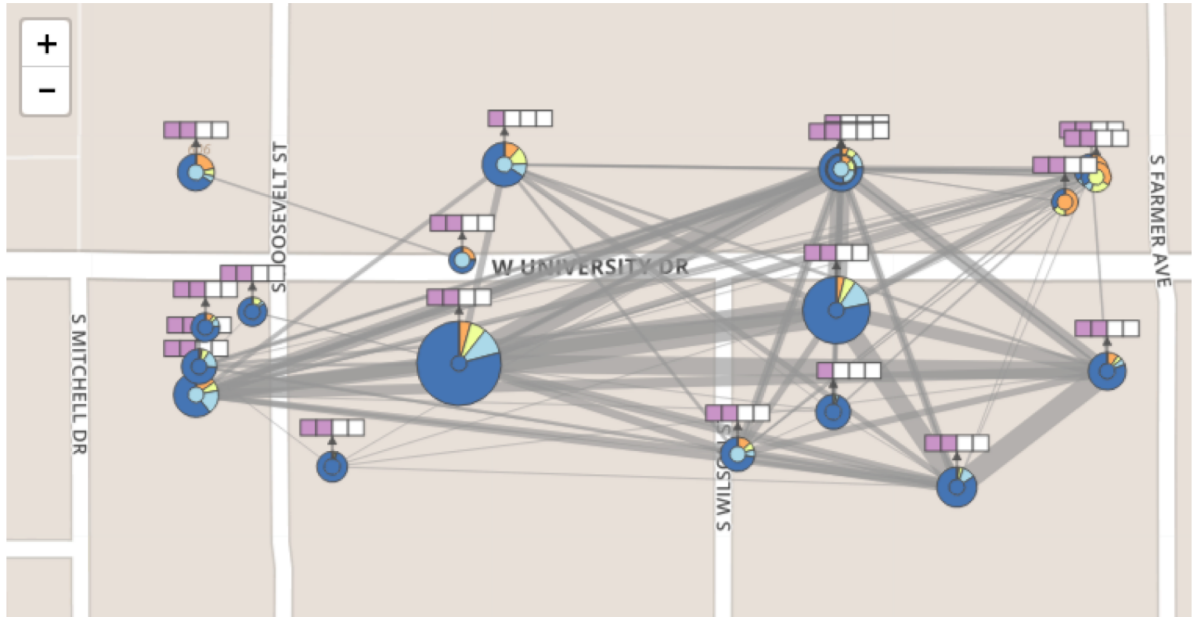


Preliminary Comparison – Glyph Design

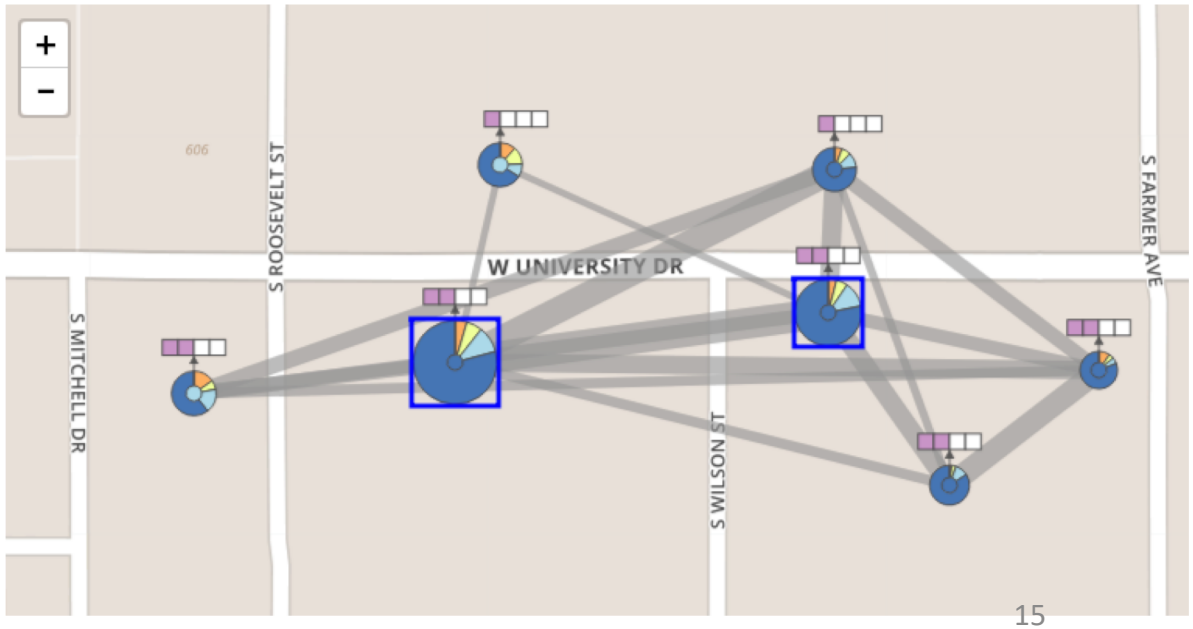


Alternative Designs

Preliminary Comparison



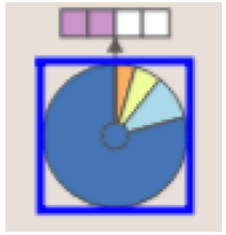
Interactive Filtering

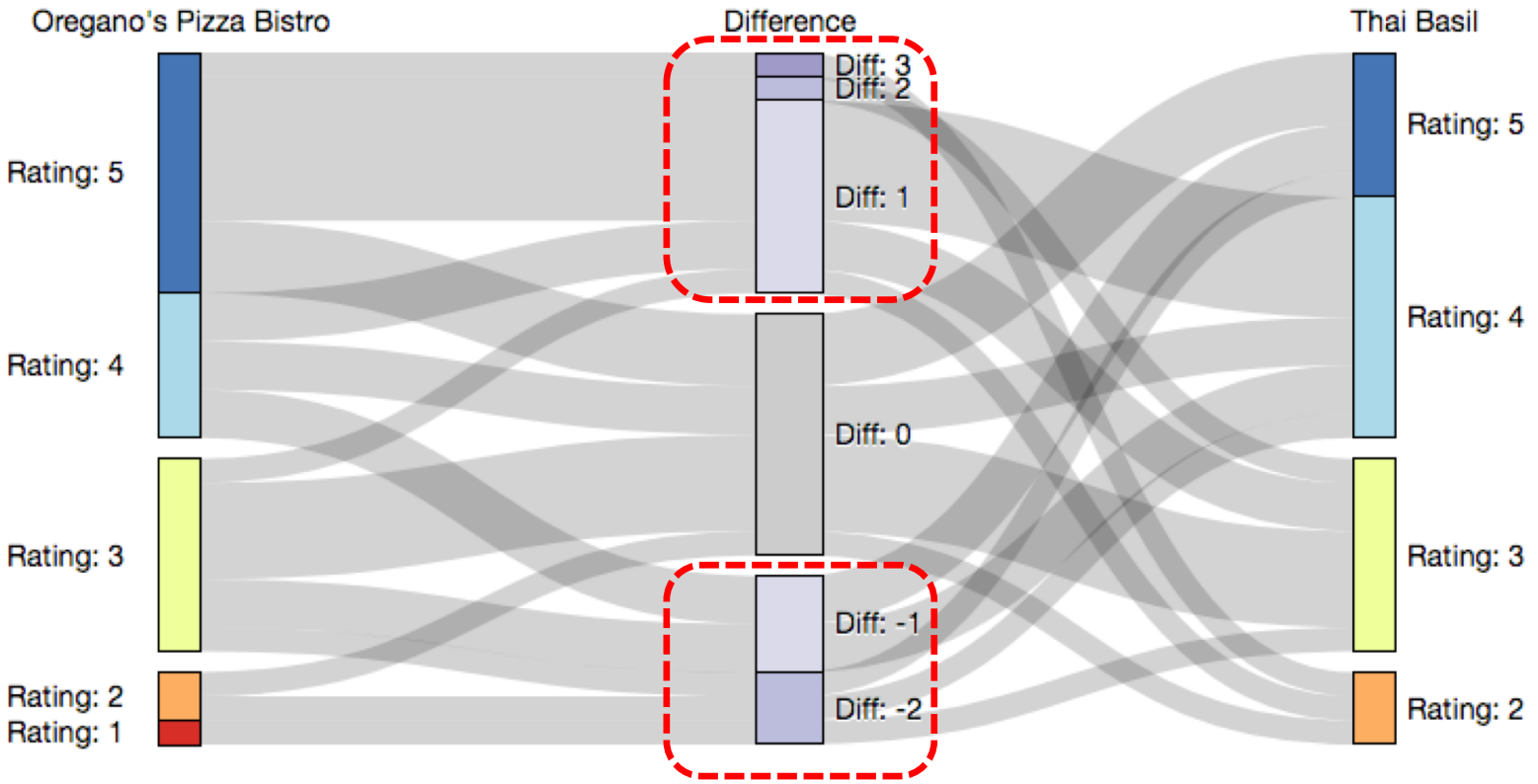


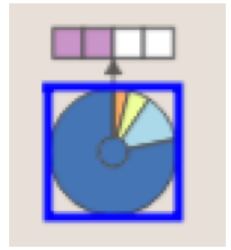
The link width encodes the number of common customers

Detailed Comparison

- **Common customer comparison view**
  - The review standards by the same customers are relatively stable

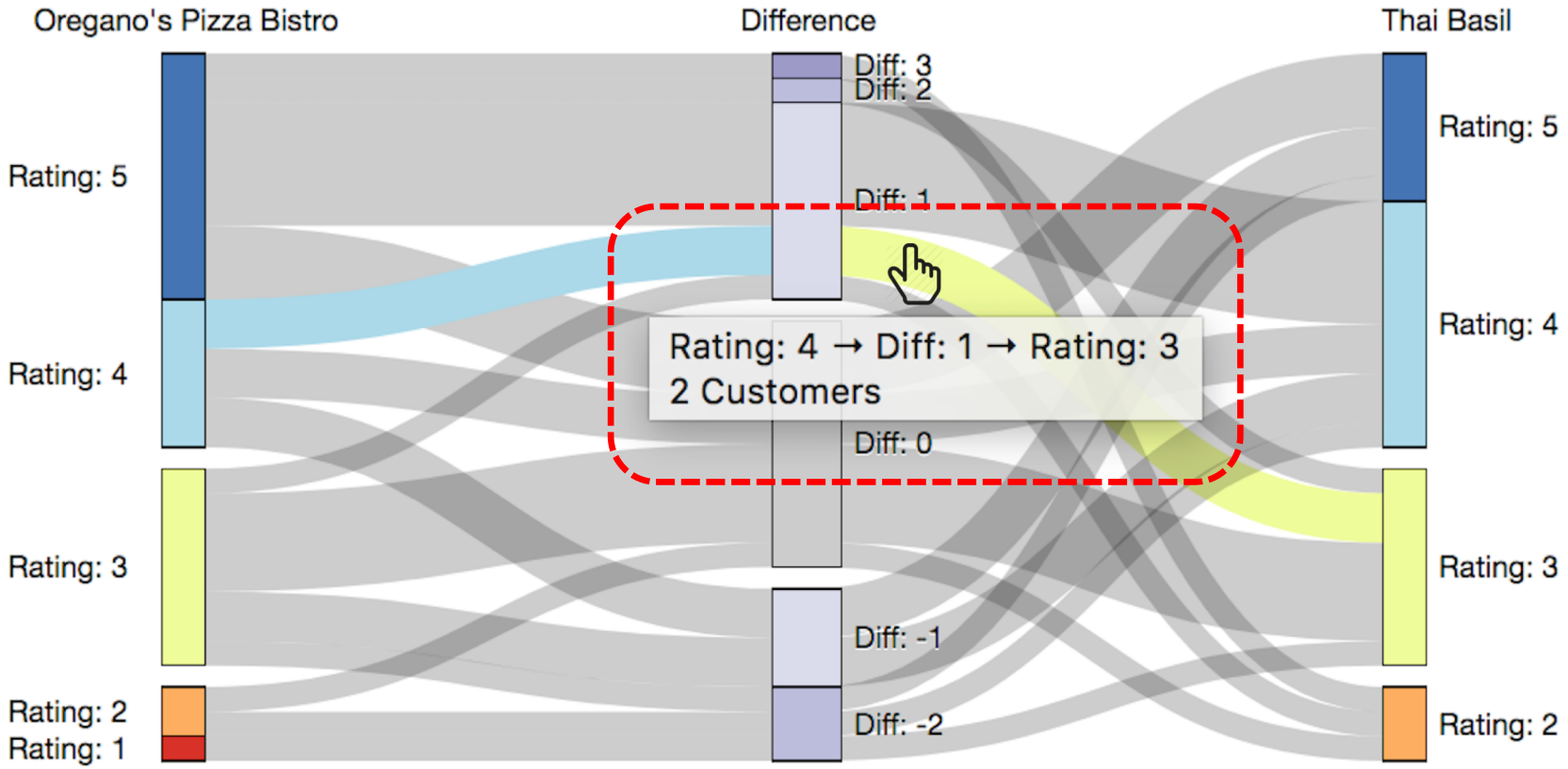






Detailed Comparison

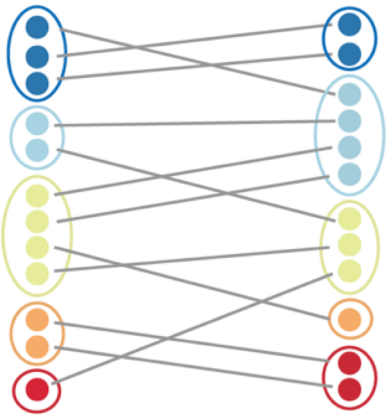
- **Common customer comparison view**



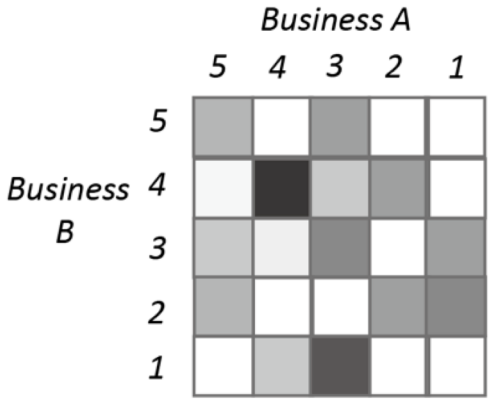
Interactive Exploration

Detailed Comparison

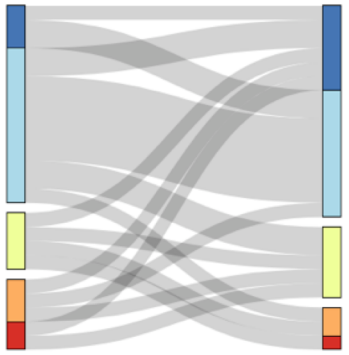
- **Common customer comparison view**



(a)



(b)



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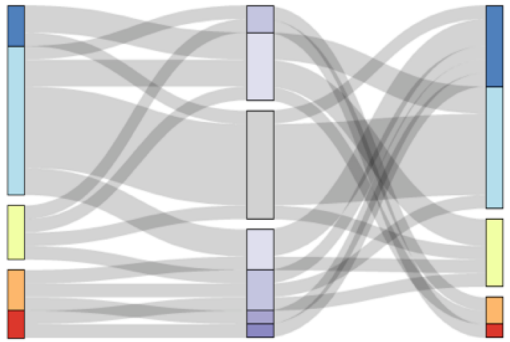
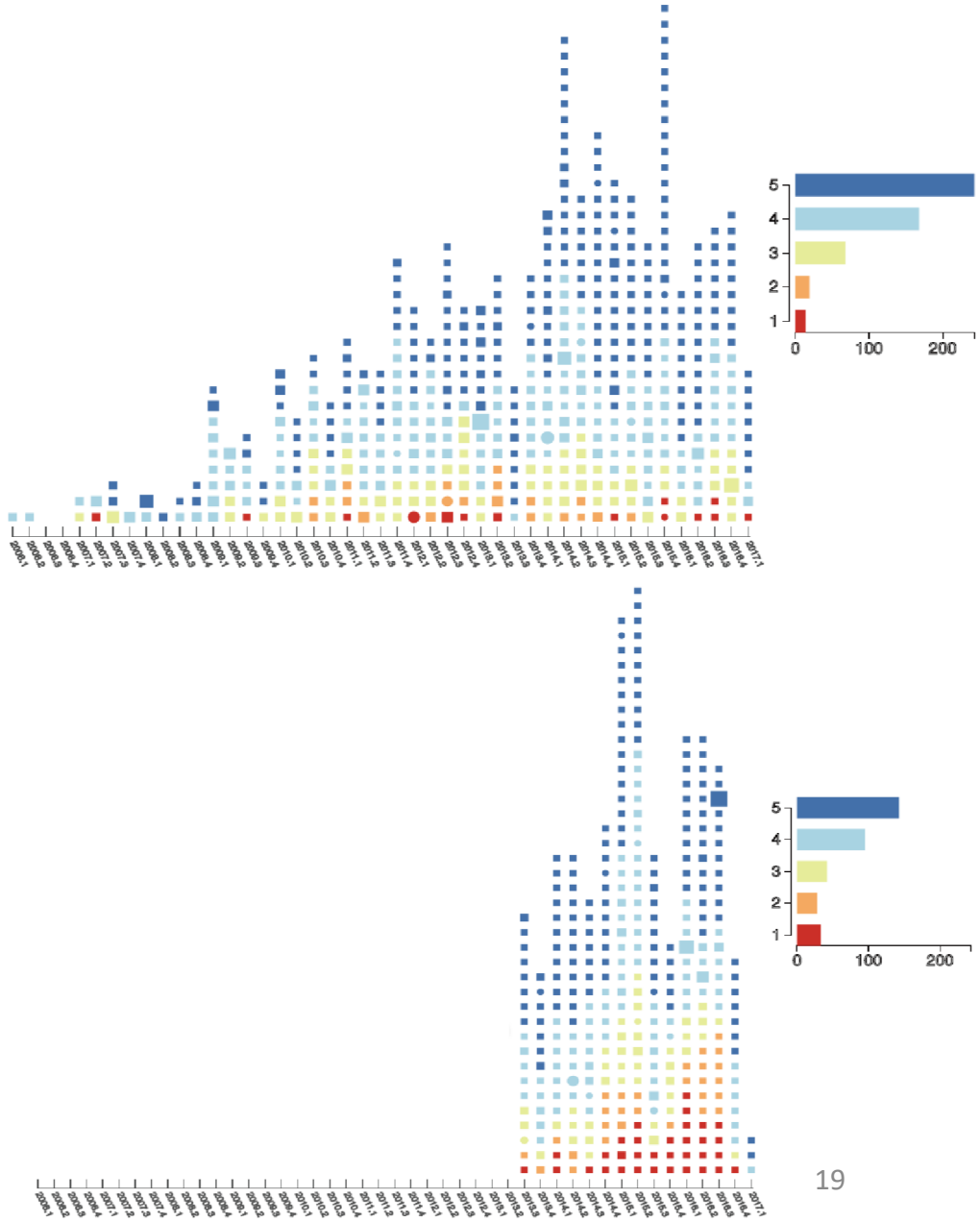


(d)

Alternative Designs

Detailed Comparison

- **Temporal view**
  - Temporal trend of reviews



Detailed Comparison

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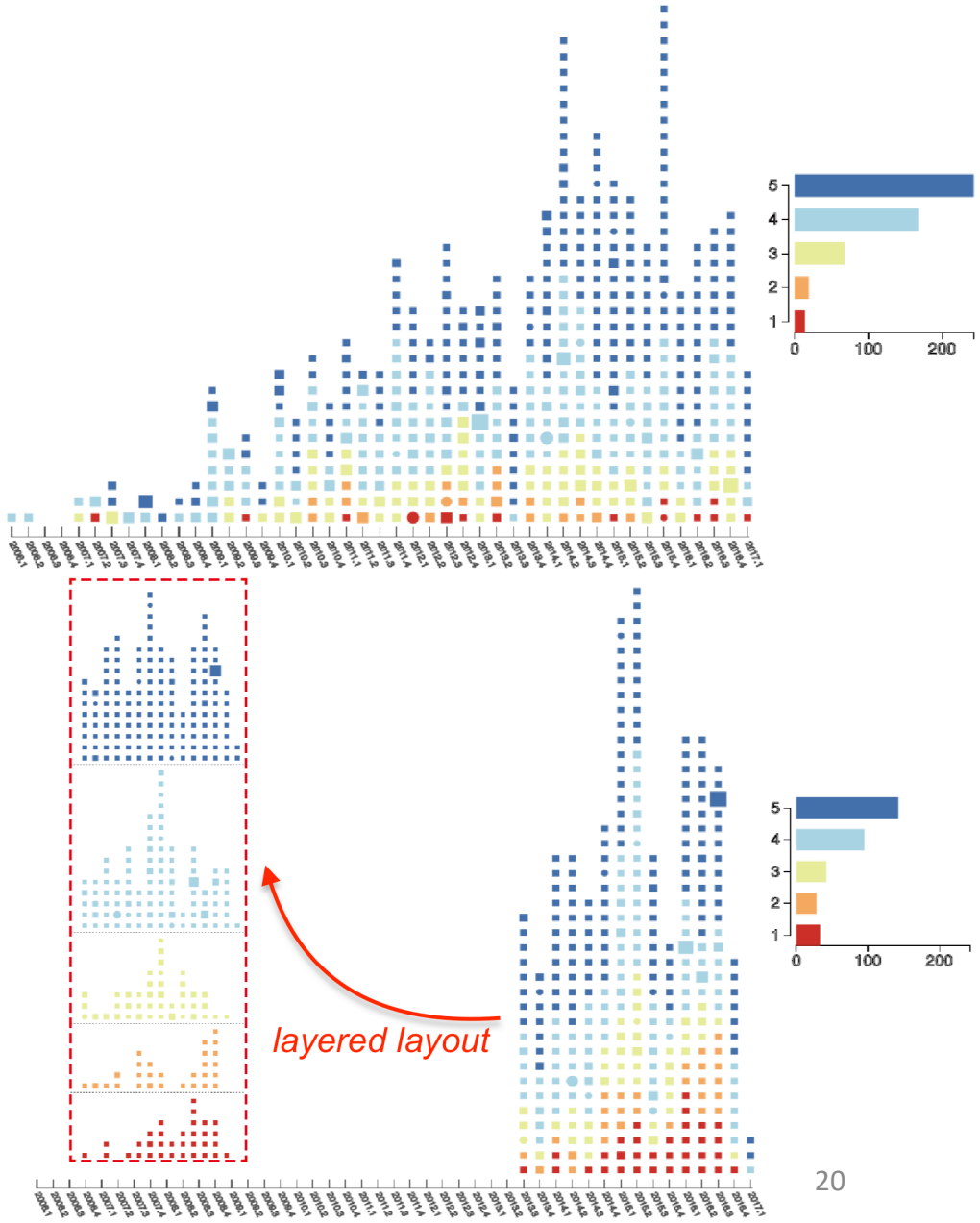


Detailed Comparison

- **Temporal view**
  - Review helpfulness

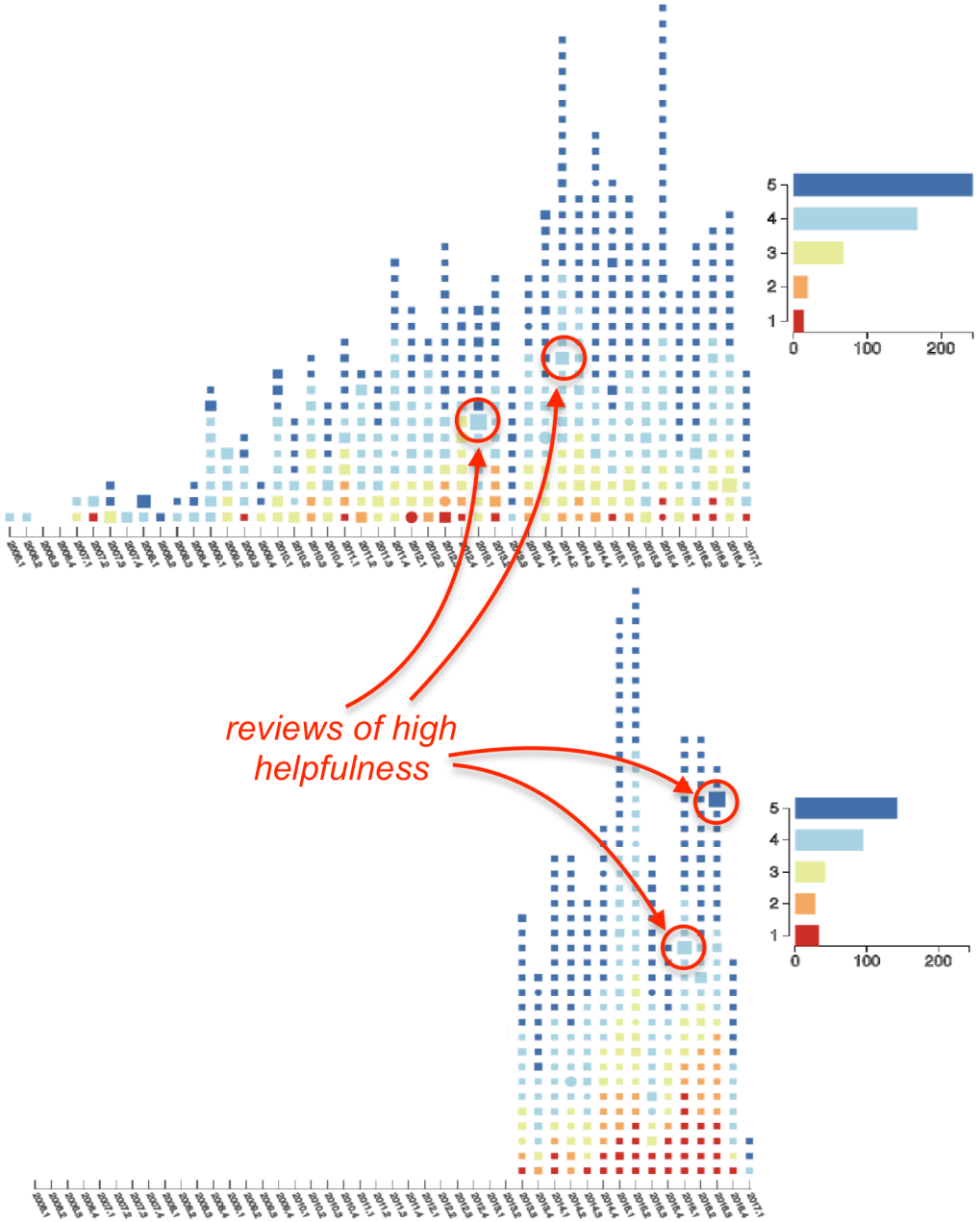
$$H = \alpha \cdot R_e + \beta \cdot R_d + \gamma \cdot R_v$$

Helpfulness votes

Review depth

Review extremity

$$R_e = 3 - |r - 3|$$



Mudambi, S.M. and Schuff, D. What makes a helpful review? A study of customer reviews on Amazon.com. MIS Quarterly 34, 1 (2010), 185–200.

Detailed Comparison

- **Temporal view**
  - Review helpfulness

$$H = \alpha \cdot R_e + \beta \cdot R_d + \gamma \cdot R_v$$

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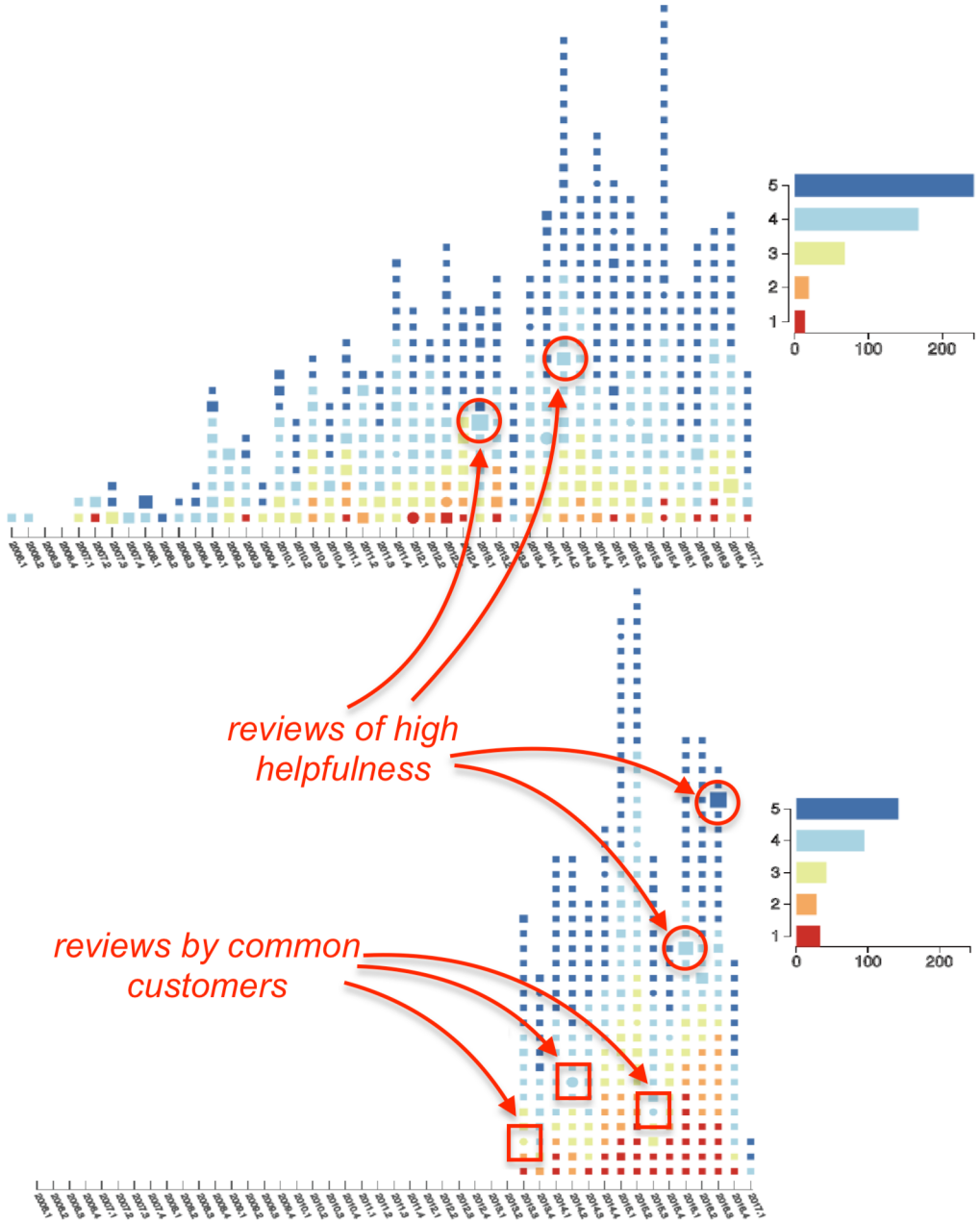

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Detailed Comparison

- **Augmented word cloud view**

Traditional Word Cloud

Adjective+Noun Word Pairs

http://firstmonday.org/article/view/5436/4111

Yatani, Koji, et al. "Review spotlight: a user interface for summarizing user-generated reviews using adjective-noun word pairs." CHI, 2011.

Detailed Comparison

- **Augmented word cloud view**

Service

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

food

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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