Yelp User Engagement Graph Explorer (YUEGE) - BiPolo DisordeЯ

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Summary

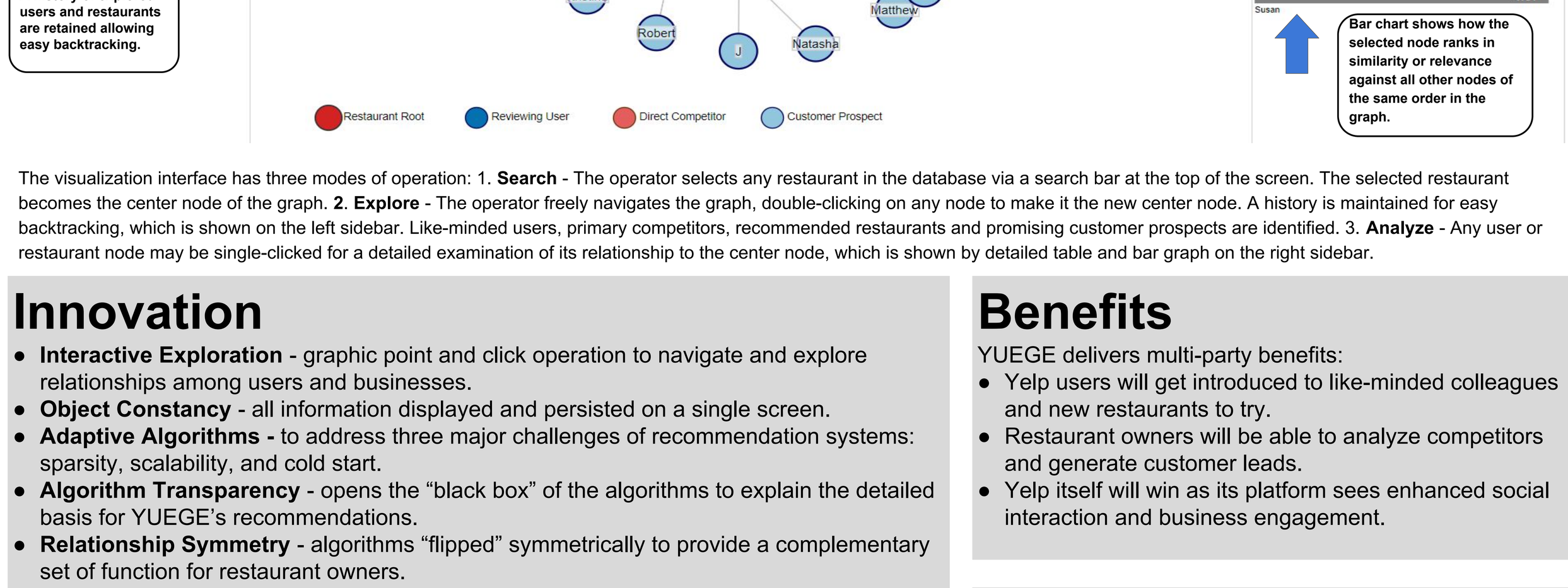
YUEGE provides a **rich user visualization** and **interaction** system which is based on **adaptive algorithms** with complete transparency for both:
a) restaurant customers to explore **like-minded customers** and **recommended restaurants;**
b) restaurant owners to explore **primary competitors** and **potential customers**.

Dataset

The Yelp open dataset contains 1.2M users, 3.7M reviews, and 156K businesses. YEUGE uses a subset of the DB focusing on Phoenix area restaurants. https://www.yelp.com/dataset/challenge

Problem

Yelp website users have no visibility to the Yelp customer-business universe except through successive drill-down searches. Yelp returns search results but makes no explicit recommendations. Also, Yelp has no facilities for business to conduct searches on customers and no way for either user or business to "mine" the relationships among themselves. YEUGE was developed to overcome these shortcomings.



The visualization interface has three modes of operation: 1. **Search** - The operator selects any restaurant in the database via a search bar at the top of the screen. The selected restaurant becomes the center node of the graph. **2**. **Explore** - The operator freely navigates the graph, double-clicking on any node to make it the new center node. A history is maintained for easy backtracking, which is shown on the left sidebar. Like-minded users, primary competitors, recommended restaurants and promising customer prospects are identified. 3. **Analyze** - Any user or restaurant node may be single-clicked for a detailed examination of its relationship to the center node, which is shown by detailed table and bar graph on the right sidebar.

Innovation

- **Interactive Exploration** - graphic point and click operation to navigate and explore relationships among users and businesses.
- **Object Constancy** - all information displayed and persisted on a single screen.
- **Adaptive Algorithms -** to address three major challenges of recommendation systems: sparsity, scalability, and cold start.
- **Algorithm Transparency** - opens the “black box” of the algorithms to explain the detailed basis for YUEGE’s recommendations.
- **Relationship Symmetry** - algorithms “flipped” symmetrically to provide a complementary set of function for restaurant owners.

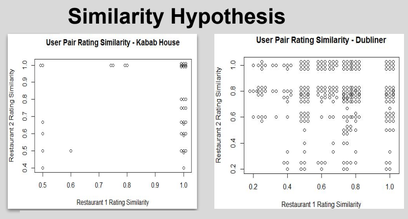
Benefits

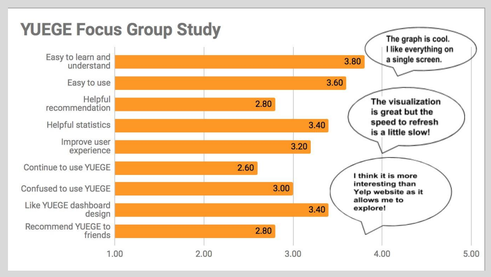
YUEGE delivers multi-party benefits:

- Yelp users will get introduced to like-minded colleagues and new restaurants to try.
- Restaurant owners will be able to analyze competitors and generate customer leads.
- Yelp itself will win as its platform sees enhanced social interaction and business engagement.

Evaluation

- **Algorithm Validation**:
  - **Similarity Hypothesis**: Using Jaccard similarity scores and random sampling of 623 user pairs, we find that pairs of users who rate one restaurant similarly tend to do the same for other restaurants.
  - **Algorithm Statistical Significance:** Using the ANOVA F test (p-value = 0.0186) we find our algorithms are able to identify other users whose “like-mindedness” is a reliable basis for restaurant recommendations.
- **Focus Group Study**:
  We asked 5 Yelp users for feedback on the YUEGE GUI and program operation. Our survey questionnaire asked 9 quantitative questions on a 1-5 rating scale and 1 qualitative question on user experience and suggestions for improvement. Overall results were mildly positive as shown.





Conclusions

- YUEGE provides a state of the art recommendation system that goes well beyond the current capabilities of the YELP website.
- Users can find like-minded users and get their recommendations for new restaurants to try.
- Through algorithm symmetry, a new set of functions have been created for restaurants to identify primary competitors and customer prospects.
- The basis for all recommendations is clearly articulated to the user.
- The user interface and program operation received mildly favorable reviews from the focus group study.
- An intuitive and interactive point-and-click GUI is provided for easy exploration and analysis of the YELP graph.