Why Restaurants Fail?

The Evidence from Yelp Restaurants Reviews

MACS 30250 Project Proposal

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Research Question

What are the major factors that lead to restaurants' low rating scores in Yelp?

Importance:

- Discover the users experience and opinion by topic modeling
- Quantify the effect of users experience and business attributes on customers' satisfaction level
- Develop statistical models to predict the rating score

Theory/Literature

"Marketing is the business function that identifies current unfulfilled needs and wants, defines and measures their magnitude,....."

---Philip Kotler (marketing author; professor at Northwestern)

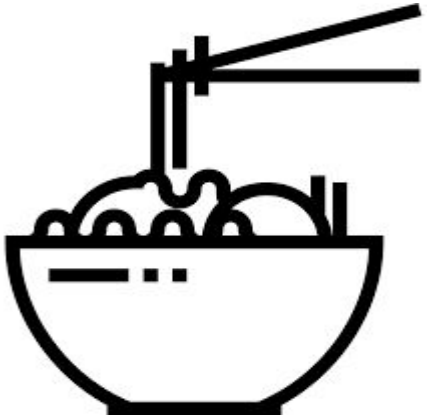
- Text as useful input for economic/business research (Gentzkow et al. 2017)
- Use sentence structure to infer and predict from customer reviews (Büschken and Allenby, 2016)
- Identify customer needs from user-generated content with ML (Timoshenko and Hauser, 2019)

- Gentzkow, Matthew and Kelly, Bryan T. and Taddy, Matt, Text As Data (February 15, 2017). Available at http://dx.doi.org/10.2139/ssrn.2934001
- Büschken, J., & Allenby, G. M. (2016). Sentence-based text analysis for customer reviews. Marketing Science, 35(6), 953–975.
- Timoshenko, A., & Hauser, J.R. (2019). Identifying Customer Needs from User-Generated Content. Marketing Science, 38(1), 1-20.

Customers Experience (Examples)

Unreasonable prices

Bad services



Horrible food

Business Attributes (Examples)

Location
(City;
Neighborhood;
Competitors)

Category
(American;
Chinese; Thai;
Indian; French...)

Provide parking
lots or not

Data

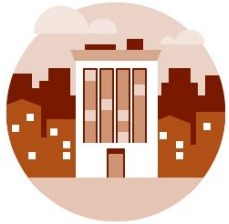
Source: Yelp Dataset Challenge (Round 13)

Size: 6 GB in JSON format

6,685,900 reviews

192,609 businesses

200,000 pictures

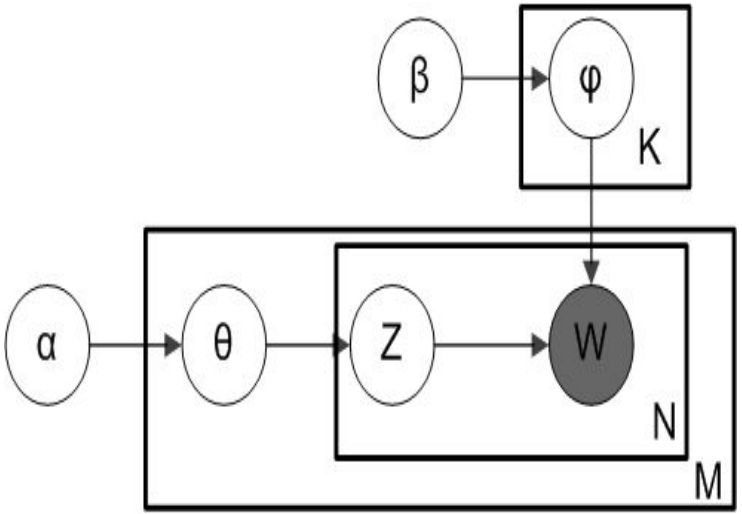


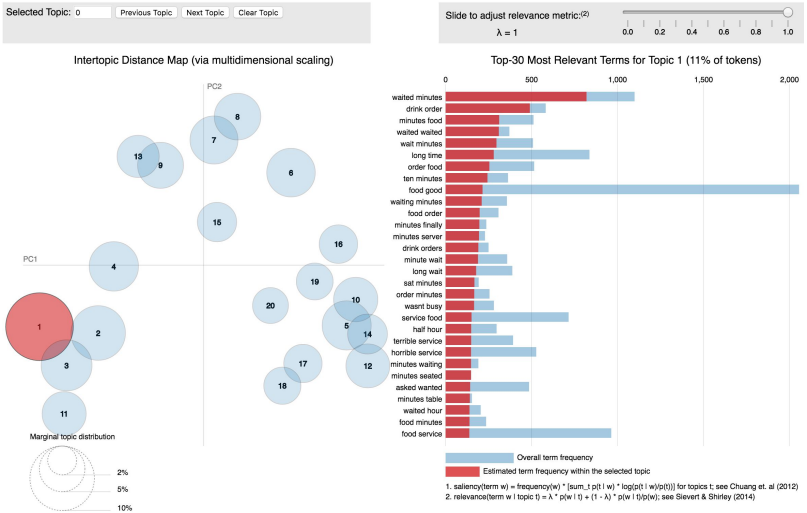
10 metropolitan areas

Topic Modeling for Reviews

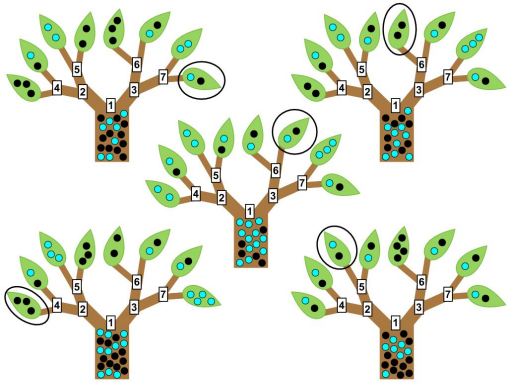
Purpose: find hidden semantic structures in documents

Algorithm: Latent Dirichlet allocation

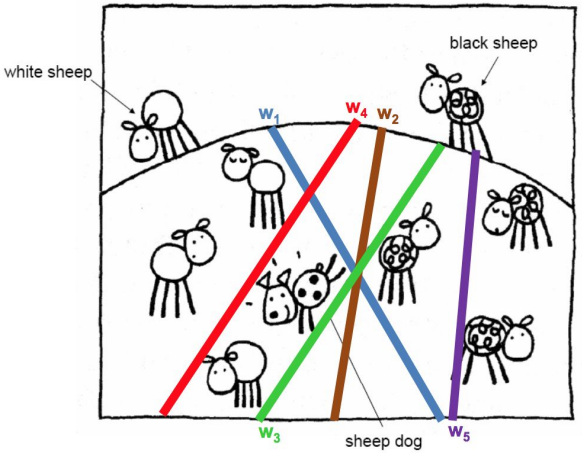




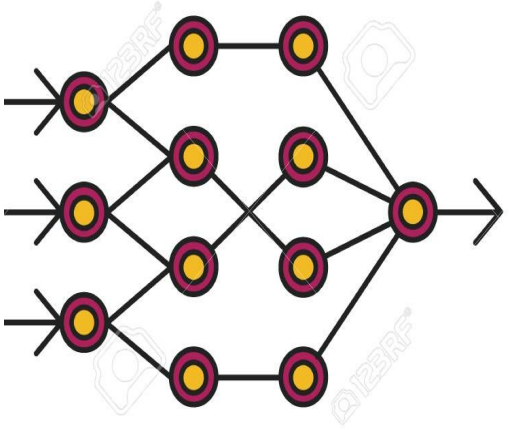
Predictive Model (Classification)



Tree Model
(Random Forest;
XgBoost;
Gradient Boosted Trees)



Support Vector
Machine
(with different
kernels)



Artificial
Neural
Network

Experiments

- Sentiment analysis as alternative metrics

  ( vs 3+ scores;  vs 3- scores)

- Grouping by cuisines type

  (Italian vs American-Chinese; Fine Dining vs KFC)

- Spatial analysis

  (Downtown vs Countryside; Las Vegas vs Madison)

Understanding why restaurants fail is crucial for avoiding future failing

- Customers' opinion deserve to be better heard and analyzed
- Predictive models provide marketing researchers with new metric of customers' satisfactory level

All images are from Google Image