

# **BAN 5743 PREDICTIVE BUSINESS ANALYTICS**

## **ENHANCING VISITOR EXPERIENCE AT ISKCON USING TEXT ANALYTICS**

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## BUSINESS & DATA UNDERSTANDING

The International Society for Krishna Consciousness (ISKCON) temple is not only a place of worship, but also a charitable institution involved in improving all aspects of human life.

There is a need to understand what motivates visitors and discover ways to improve their overall experience. The current process is manual, time consuming, and inconsistent.

**Goal: Create all-in-one solution for managing/analyzing customer feedback.**

- Identify topics and trends
- Determine sentiments and their patterns
- Explore emotions associated with different sentiments
- Pinpoint top 10 issues to be addressed

Online presence team at ISKCON collected feedback from TripAdvisor, Google Plus, and Facebook.

- Manually labeled each review as positive, negative, neutral, and mixed
- Weekly totals calculated to determine overall sentiment

Data set contains 5,685 rows of reviews given between January 2013 and August 2017.

# DATA PREPROCESSING – REMOVAL OF DUPLICATES & TRANSLATIONS

Trip Advisor	A K C	FALSE	6/10/2015	Fantastic Vegiterian Restauran	Great Spread! Tasty and variety. Great snacks like Brinjal Fried and Aloo Tikka. The food quality was very good and the ambience
Trip Advisor	A K C	TRUE	6/10/2015	Fantastic Vegiterian Restaurant	Great Spread! Tasty and variety. Great snacks like Brinjal Fried and Aloo Tikka. The food quality was very good and the ambience

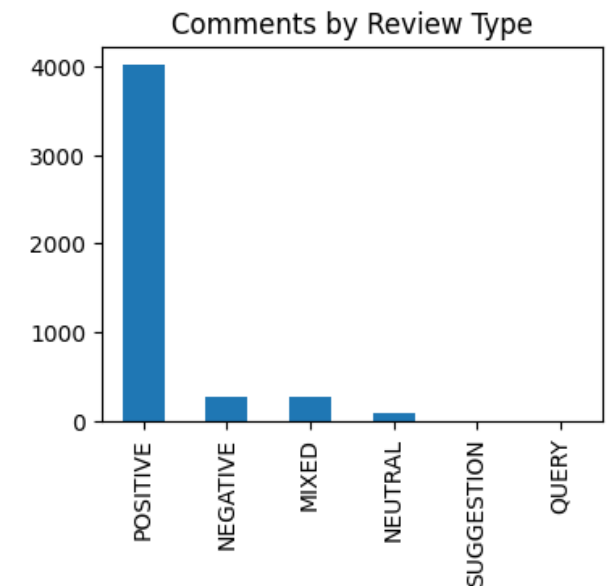
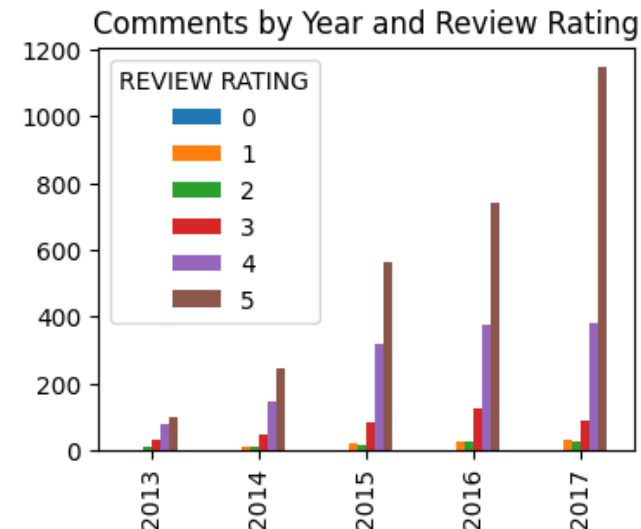
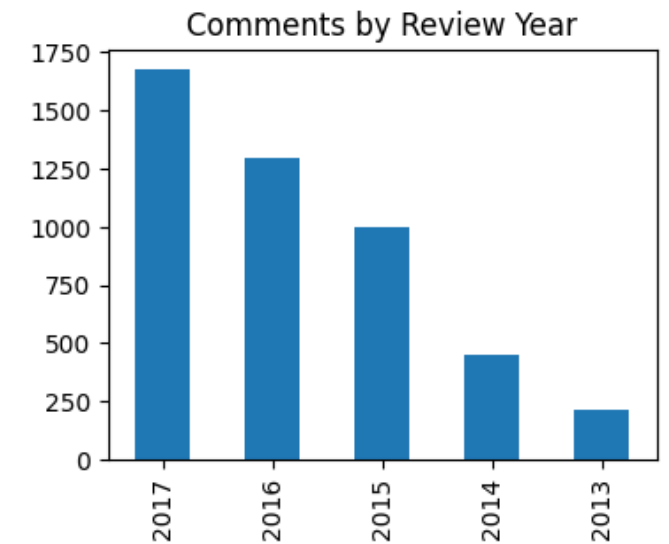
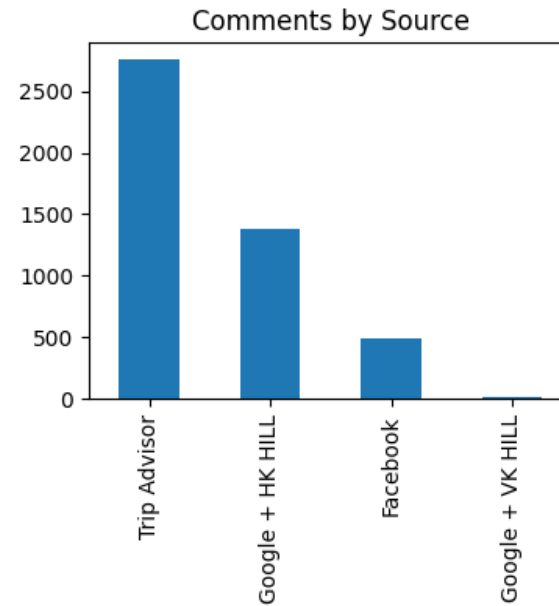
Example of duplicate review with different subject

Original	Translated
Bahut sundar vyavastha hai.sree radhakrishn ke charno men hamari priti ho. Jai radhe krishna.	It is very beautiful. Jai radha krishna.
Ce temple est magique. Une immersion totale dans la religion Indou, un cadre majestueux.... Ñ ne pas louper Ñ Bangalore!	This temple is magical. A total immersion in the Hindu religion, a majestic setting... not to be missed in Bangalore!

- 683 rows were identified as having the same source, review by, date, subject, and text then removed.
- Additionally, 353 more were identified and removed as potential duplicates that were not completed. The review was made by the same person on the same day and the text of one was a subset of the other.
- Four reviews without any text removed.
- New total: 4,645.
- Lastly, the comments were translated to English from other languages

# DISTRIBUTION OF REVIEWER COMMENTS

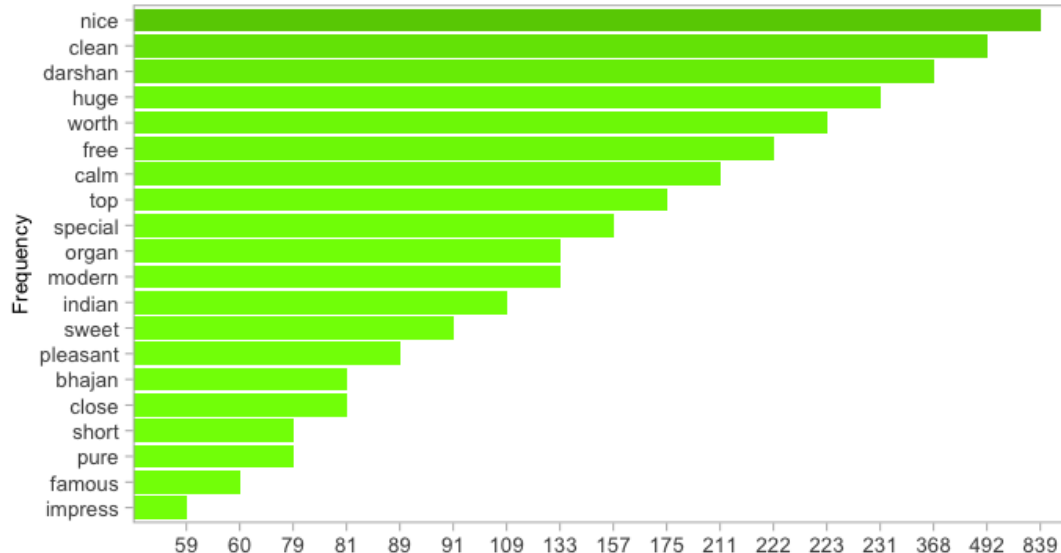
- Trip Advisor contributes to more than 50% of the reviews in the dataset; there are very few comments from Google + VK HILL
- The number of comments collected have increased significantly (~7 times) from 2013 to 2017
- In terms of reviewer rating, 4 and 5 rated comments have increased notably; 3 rated reviews have gone down from 2016 to 2017; 1 and 2 rated reviews have increased but not as significantly as 4 and 5 rated reviews
- Majority of the reviews (more than 80%) are Positive (as labelled by ISKON team); only ~6% reviews are labelled as Negative



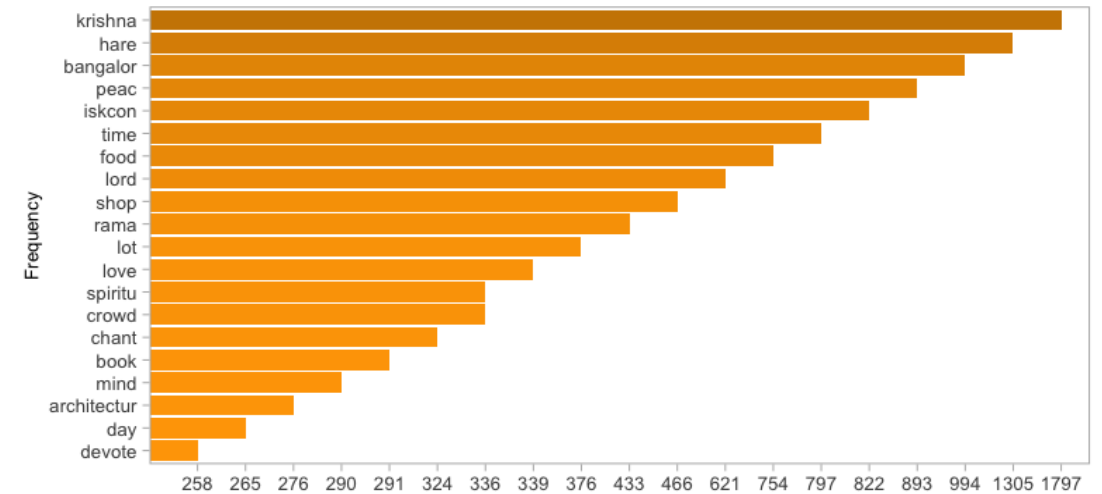
# TOPICS FROM KEY NOUNS, ADJECTIVES AND VERBS

- Key topics are:
  - Peaceful visit
  - Chanting "Hare Krishna Hare Rama"
  - Crowd and standing in lines
  - Eating food
  - Buying books and souvenirs from shops
  - Impressed by architecture

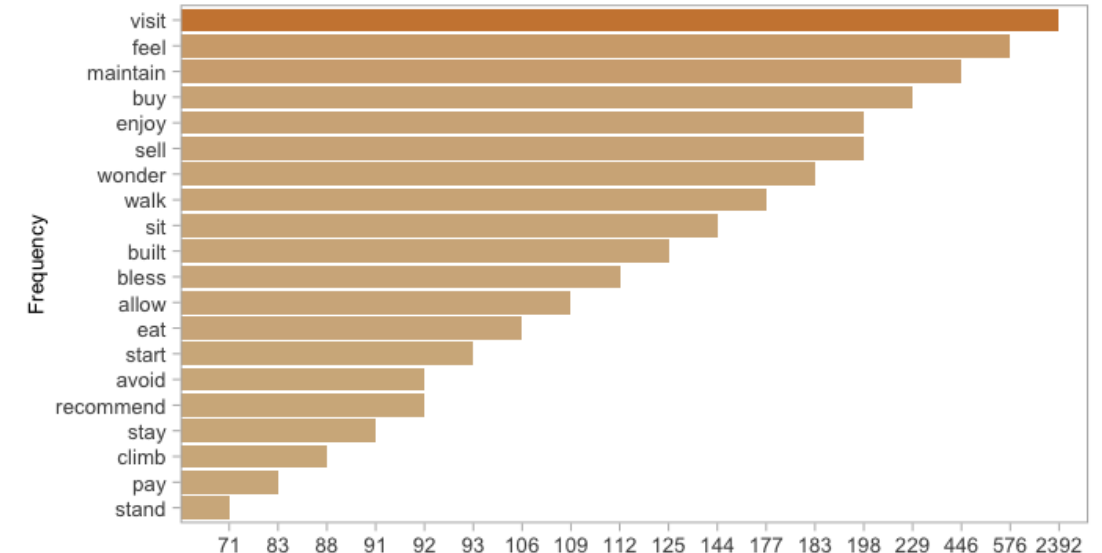
Adjective Occurrences



Noun Occurrences



Verb Occurrences



## EXTRACTED TOPICS FROM COMMENTS

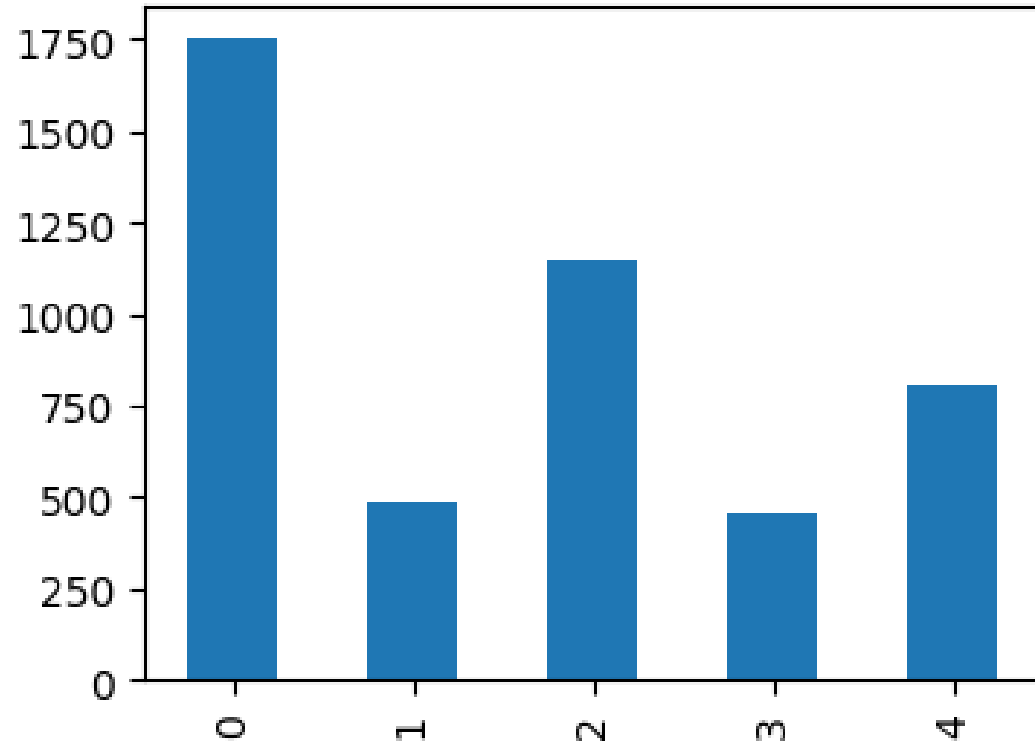
- We extracted 5 key topics using terms from the comments using Non-Negative Matrix Factorization (NMF), a statistical method used to reduce the dimension of input corpora; the topics are related to:
  1. Cleanliness, maintenance and beauty
  2. Chanting the names of Lord Rama and Krishna
  3. Peaceful, spiritual and calm environment at the temple
  4. Reviewers enjoyed the food at the temple
  5. Architecture and worth visiting with family

Topic	Key Terms	Topic Name
0	['visited', 'maintained', 'clean', 'lord', 'inside', 'krishna', 'food', 'iskcon', 'beautiful', 'temple']	Cleanliness
1	['sri', 'radha', 'feel', 'chant', 'chanting', 'ram', 'lord', 'rama', 'krishna', 'hare']	Chanting
2	['beautiful', 'calm', 'love', 'mind', 'spiritual', 'great', 'awesome', 'peace', 'peaceful', 'place']	Peaceful and Spiritual
3	['devotional', 'enjoyed', 'visit', 'location', 'family', 'food', 'view', 'place', 'temple', 'nice']	Food
4	['architecture', 'tourist', 'evening', 'worth', 'family', 'city', 'iskcon', 'time', 'bangalore', 'visit']	Architecture

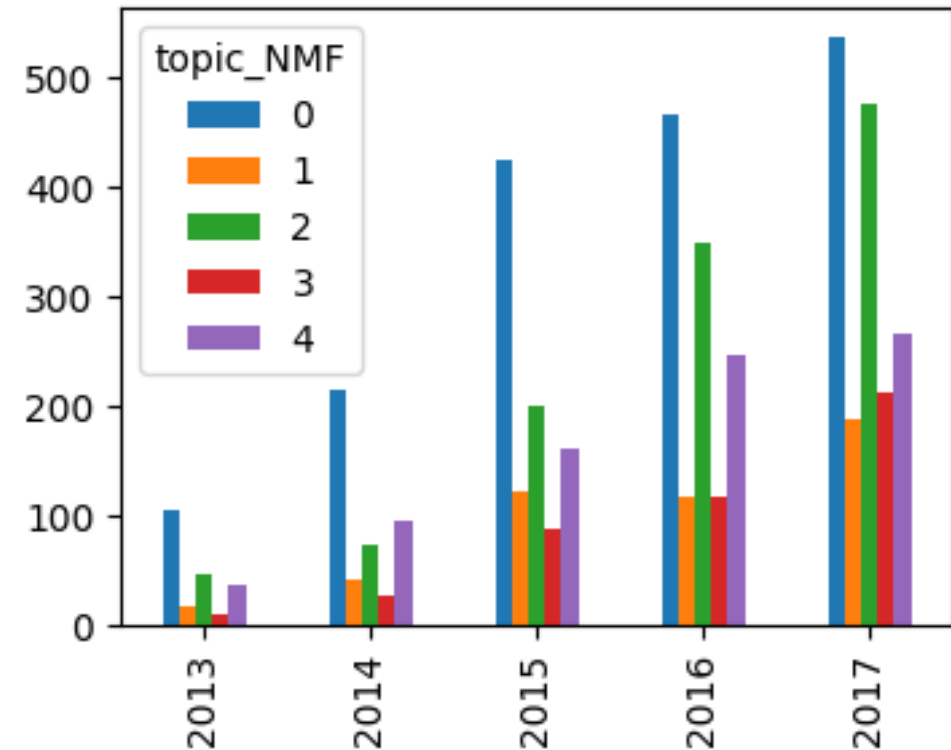
# CATEGORIZATION OF COMMENTS INTO TOPICS AND TREND ANALYSIS

- Topic 0 has the maximum number of comments followed by Topic 2; the temple is popular for its clean, well-maintained and beautiful premises, and calm, spiritual and peaceful environment among its reviewers
- Over the years, comments across all topics have increased similarly

Comments by Topic

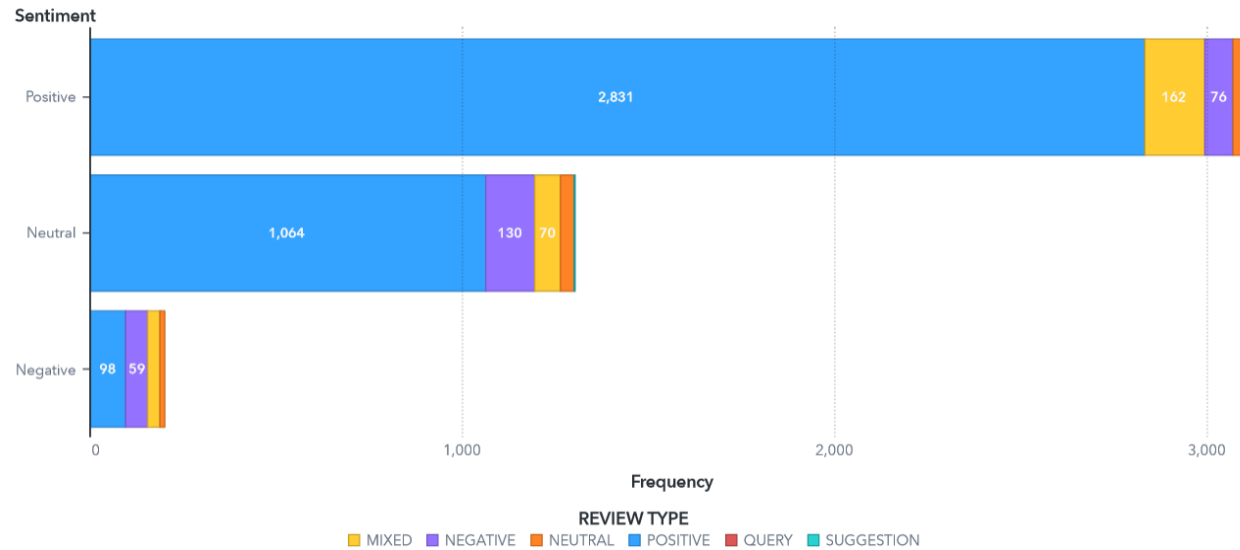


Comments by Year and Topic

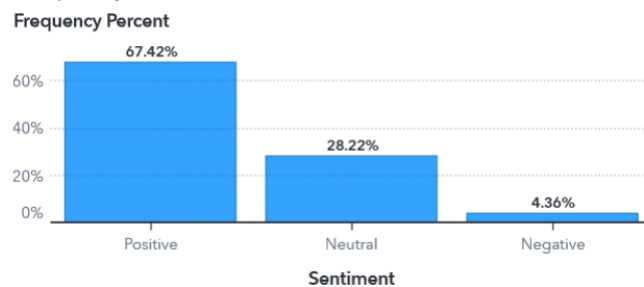


# SENTIMENT ANALYSIS – NEW VERSUS OLD PROCESS

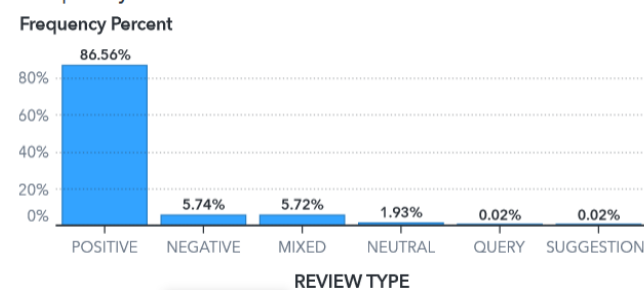
Breakdown of New Sentiment to Old



Frequency of New Sentiment



Frequency of Old Sentiment



- Old process was manual, inconsistent, and included multiple unnecessary categories such as mixed, query, and suggestion.
- It is not necessary to use the mixed class. The review can be scored and assigned to the higher sentiment.
- Used automated sentiment analysis to reduce categories to positive, negative, and neutral.
- The positive and negative sentiments decreased slightly while neutral increased.

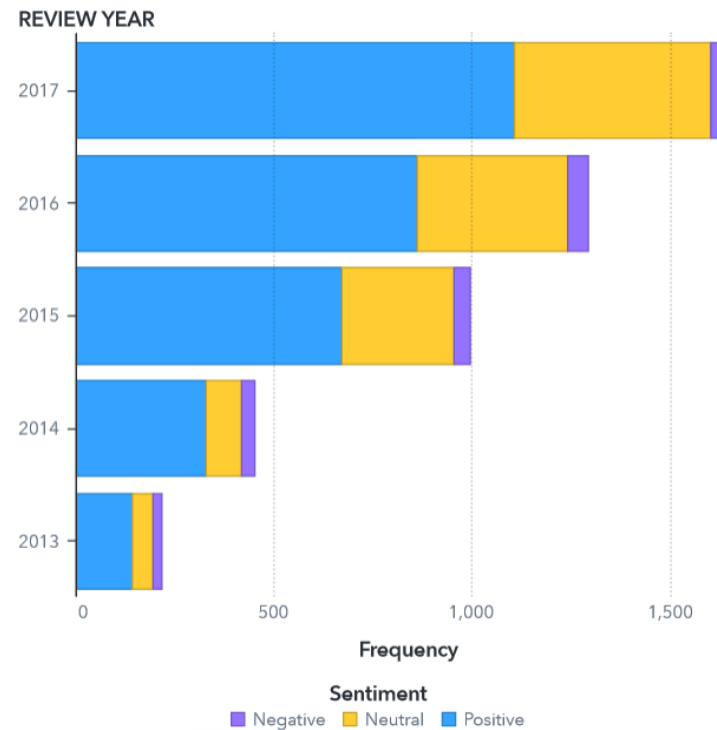


# SENTIMENT ANALYSIS – TRENDS

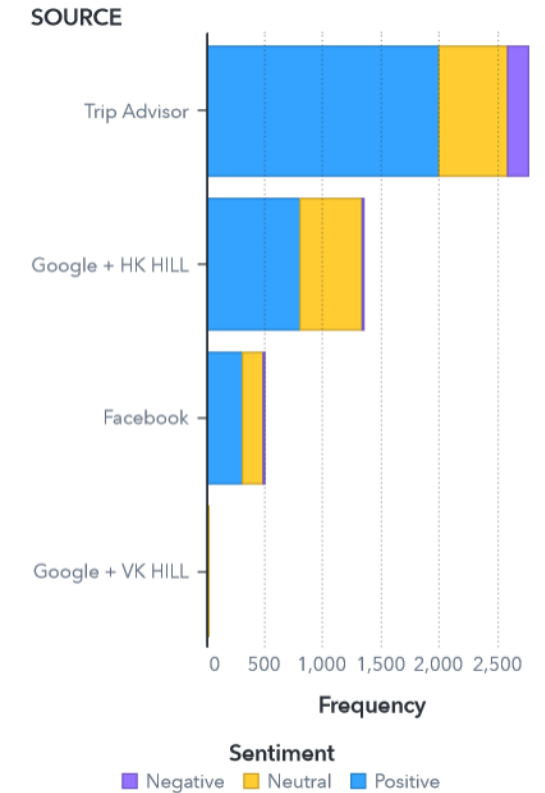
Review Sentiment by Month



Review Sentiment by Year



Review Sentiments by Source



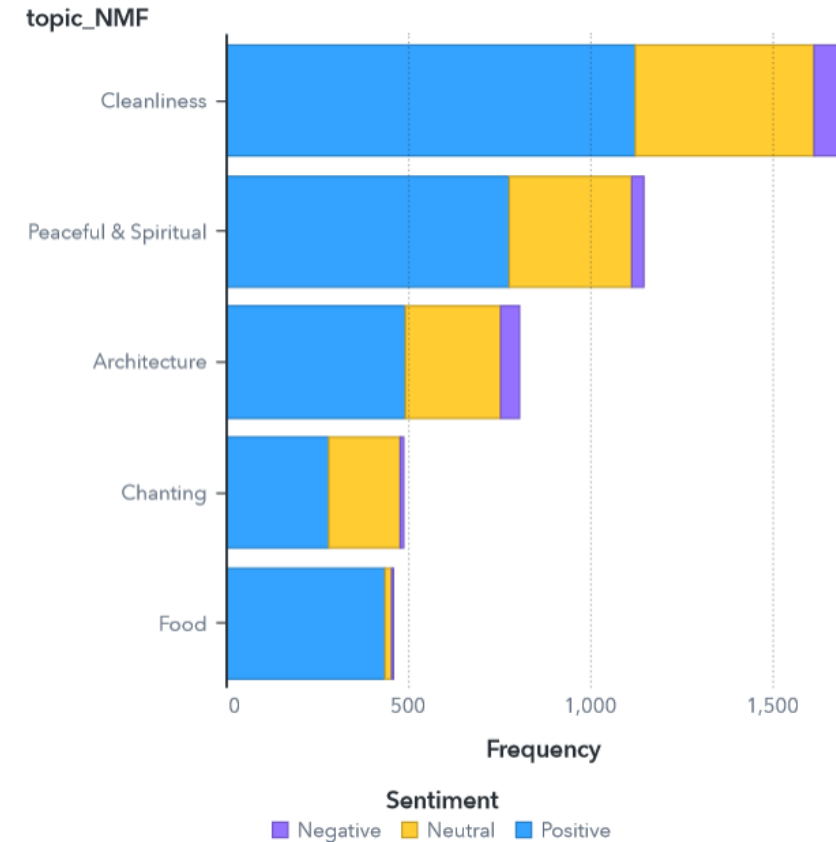
- Distribution of sentiments remains proportionate throughout months and years; there are no concerning outliers to pinpoint unusual activity for a specific time period
- Sentiments also appear proportionate for each source; one does not stand out as being more extreme than others

# SENTIMENT ANALYSIS – TOPICS

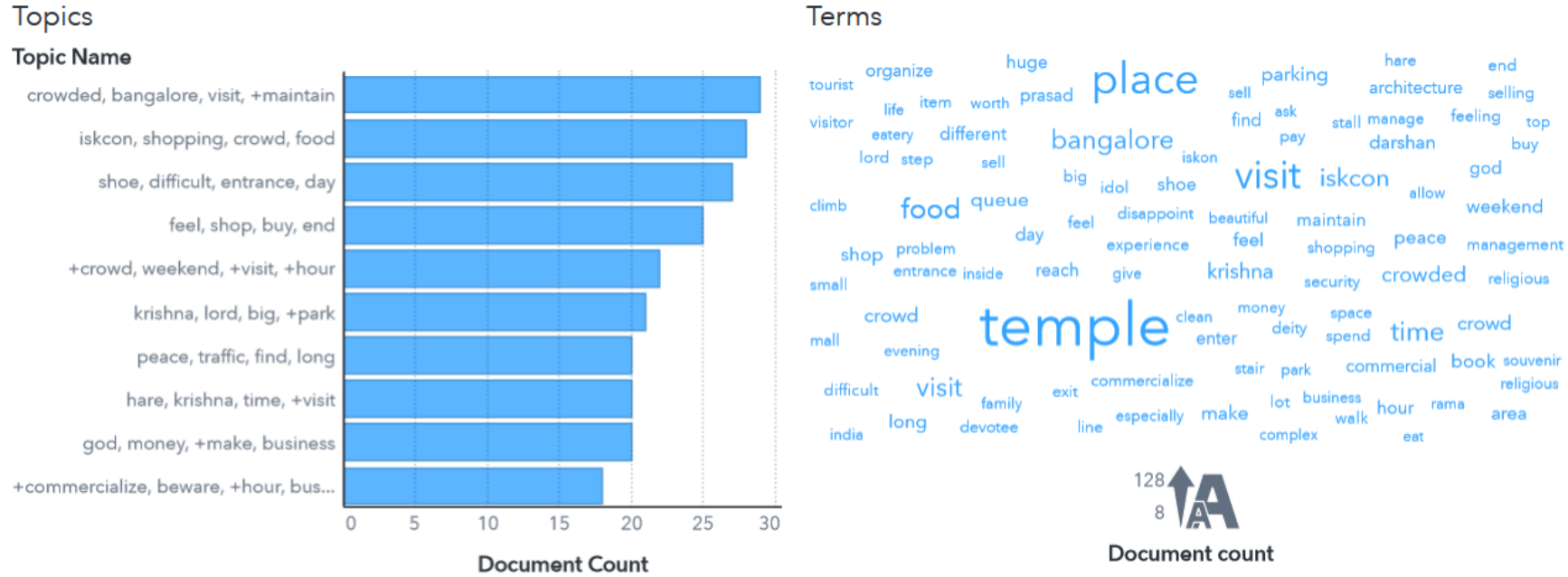
Combined previously extracted topics with sentiment to gain further insight.

- Overall, majority of reviews for each topic were positive
- The topic with the lowest proportion of negative reviews was food
- Chanting had a higher proportion of neutral reviews
- Potential areas for improvement are in cleanliness and architecture

NMF Topics by Sentiment



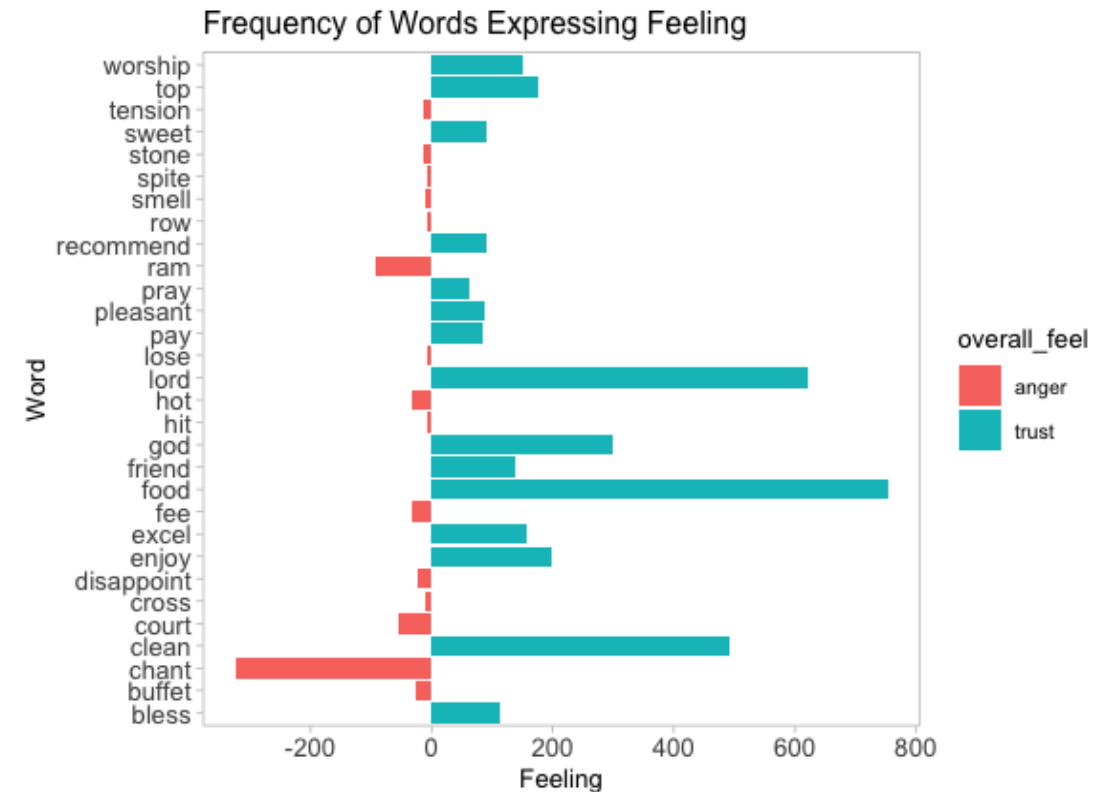
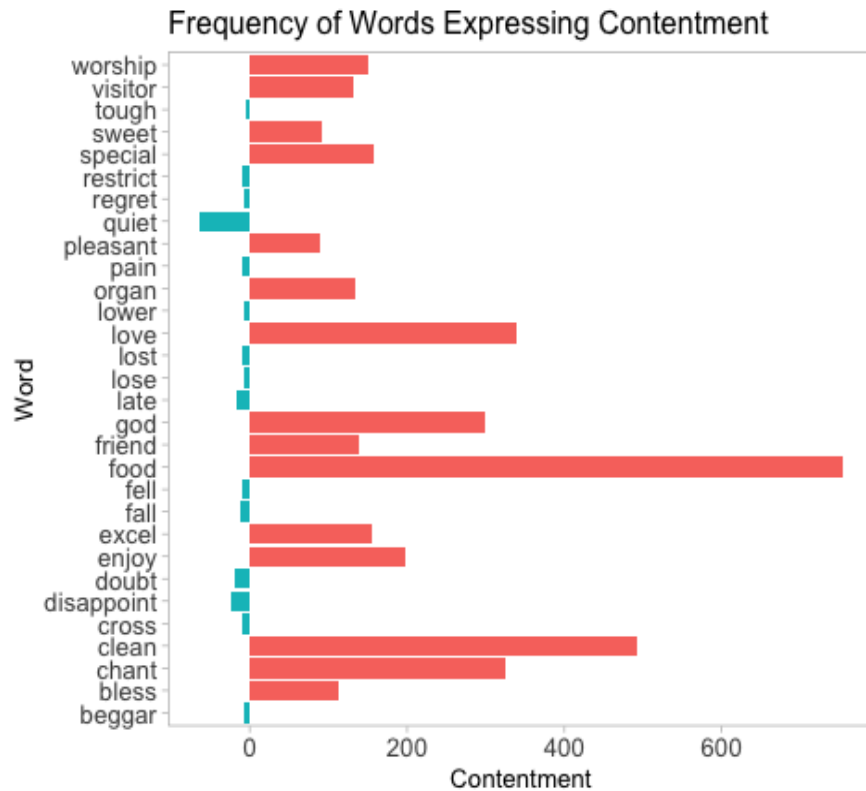
## TOPIC EXPLORATION OF NEGATIVE SENTIMENT



- The top 10 topics surrounding negative sentiment are related to: crowded, shopping/food crowds, shoes, shops, big park, traffic, visit time, money, and commercialization
- Insights into the driving forces of negative reviews will help determine action plans to solve these issues in the future

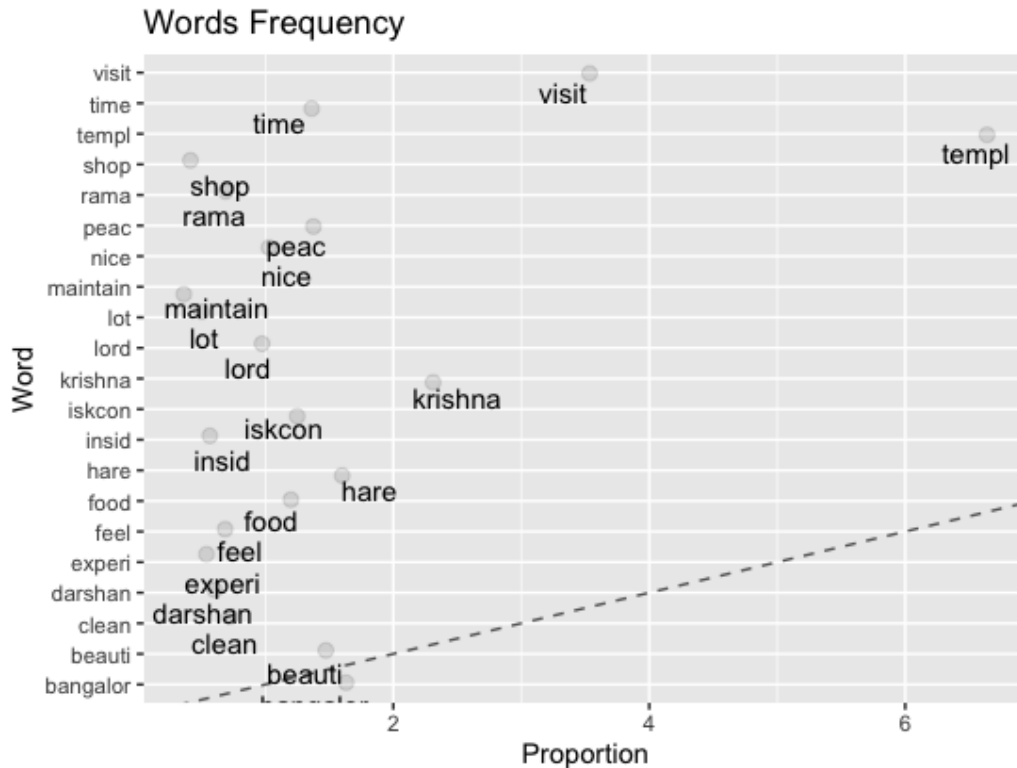
# ANALYSIS ON THE PEOPLE'S EMOTIONS (1|2)

- The below graphs represent the frequency of top 15 words representing people's emotions
- The frequency of positive words (signifying Trust and Joy) is significantly greater than the frequency of negative words (signifying Anger and Sadness)
- People are joyful about food and cleanliness; they feel blessed and love worshipping at the temple; they are angry and feel bad about the beggars present at the temple



## ANALYSIS ON THE PEOPLE'S EMOTIONS (2|2)

- Some of the high frequency terms include peace, nice, maintain, food, clean and beautiful; overall, reviewers have expressed positive emotions towards the temple
- The upper half of the word cloud shows key negative terms whereas the lower half shows positive terms
  - The reviewers feel bothered by presence of beggars
  - They also feel harassed by touts



Word Cloud with Top Positive and Negative Terms



## SUGGESTIONS FOR ISKCON TEMPLE

1. Make temple premises begging-free zone; if possible, they can work with city to move them to shelters
2. Reduce the price of the merchandise being sold at souvenir shops so that people are encouraged to buy from them; also avoid selling in an aggressive manner at souvenir shops
3. More transparently share with people how funds collected from them through donations and commercial stores are being used to fund charitable activities like free meals, books and other temple maintenance activities so that they are aware and further get motivated to donate more
4. Fast pass or timed entry option to those who do not want to wait in lines
5. More police on weekends to maintain crowds and ensure proper lines; separate lines for senior citizens
6. “Toilets on wheels” can be put inside the temple premises

## AUTOMATION OF CURRENT PROCESS

- Web scraping the reviews instead of manually collecting them using Selenium package in R and Python
- One-time python code can be used to pre-processed the new dataset – translating from other languages to English, removing duplicates, etc.
- Instead of manually labelling the reviews, the sentiment analysis can be automated using SAS
- Dataset can be updated in the currently created program code to periodically track key terms and topics; it would also help them understand if their remedial actions are working