

Data is Oil for Startup Initiative in India

Poojitha Bheemanapally, Madhubabu Pasula, Mahendran Botlagunta

Abstract--- India is one of the best place to initiate startups it is due to the fact that India is the second most populous country and is equivalent to 17.74% of the total world population. Prior to invest money on startup it is good to analyze business analytics about the startup. In this paper, we discuss startup in food sector. To identify a suitable food item for startup in food sector, we used google trends to identify frequently searched food item by web users across India between 2004 and 2017. Data was retrieved on quarterly basis from various regions and R statistical package was used to determine the statistical significance of the data. Results showed that, one keyword search unable to differentiate the difference in search rank index between food items. On the other hand, multiple comparisons over one keyword data search showed two different clusters, pizza and biryani form one cluster and dosa and idli form another cluster. Pizza and biryani cluster showed higher search rank index over another cluster. Data visualization revealed that pizza, and biryani was the most frequent search interests of the web users related to foods in India. Taken together, we believe that the pizza and biryani business activities are flourishing and continue to flourish over other foods in India.

Keywords— Pizza, biryani, idli, dosa, food interests

1. INTRODUCTION

Foods of various dishes such as pizza, Biryani, Dosa, Idli play vital role in normal psychosocial well-being by coordinating thinking, acting, and feeling. Consumption of these dishes is geographically distinct. Pizza is a flat, baked pie of Italian origin, comprises of a thin layer of bread dough topped with tomato sauce and cheese, often garnished with meat, fish, vegetables, and mushrooms, etc.[1] In the beginning, a flatbread developed by Romans, in which toppings applied. The pizza made in Naples and improved further with the application of tomatoes on to the flatbread in the late 18th century. Earlier pizza consumption was limited to Italian immigrants during 1940s. Later, it has become prominent and featured in one of the episodes of 'Popeye the Sailor' in 1960. The first Chicago style deep-dish pizza restaurant opened at Wabash and Ohio in 1943. The pizza transformed into many types and diversified types of pizzas are available across the world.[2]

In the mid-80s, the pizza was considered a snack item, and mostly available in bakeries and South Indian restaurants. The presence of tomato sauce on pizza made Indians enjoy a favorite hangout meal. In the 90s, pizza delivery service was available in Calcutta and New Delhi. The multi-national companies were opened pizza outlets at Bangalore and New Delhi, in 1996. [3], [4]. Biryani is one

of the South Asian dishes consists of meat and spices layered over cooked Basmati rice. The spices used in biryani may include cardamom, cinnamon, coriander, ghee, nutmeg, pepper, cloves, mint leaves, tomatoes, ginger, onions, and garlic.[5] In India, a biryani dish consists of dahi chutney (yogurt, onion, and mint) and green chili curry. The serving contains a salad of cucumber, carrots, onion, and lemon wedges.[6]. Dosa is a pancake prepared from a fermented batter and widely available in the Indian subcontinent. The chief components of dosa are rice and black gram. Dosa is most commonly found breakfast in the Southern Indian region, and one of the favorite meals of the Indian subcontinent. In general, dosa is served hot along with chutney, and sambar.[7] Idli is the most popular breakfast is Idli and found in most of the regions of India. It is a rice cake and prepared by overnight soaking of de-husked black lentils, and steaming the blended batter. It is served hot along with either sambar or chutney. [8]

In the present study, we have identified four food varieties out of many in the list of Indian dishes such as biryani, dosa, and idli. [9] Moreover, pizza, which is the Italian food item, has gained popularity over the last two decades over the traditional Indian food items. Hence, the proposed study involves generic trend analyses of pizza, biryani, dosa, and idli which may help the new startups for beginning food initiatives in India.

2. MATERIALS AND METHODS

Study design

The quarterly trend analysis of each food item was analyzed between the years 2004 and 2017. The cross-sectional study was performed by querying in Google with specific keywords such as pizza, biryani, dosa, and idli. The quarterly data of interest over time on various foods were downloaded freely from the Google Trends. The ranked data represents a relative search volume (RSV) for any selected variable. The data queried at <https://trends.google.com/trends> between 2004 and 2017 to evaluate search interests of selected dishes in India. The search queries were performed using automatic search suggestions like Dish or Food.

Statistical Analysis

The selected four quarter variables were assumed to be independent, ordinal, and follow similar distributions over each other. We selected the Kruskal-Wallis test to determine statistical significance ($P < 0.05$). Furthermore, between the groups' statistical difference was determined through Wilcoxon-Rank Sum test. R was used to determine

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the statistical significance of the data. The generic search keywords such as pizza, biryani, dosa, and idli were used to download the ranks from Google Trends. The ranked data obtained for the selected food items between 2004 and 2017 and analyzed.

Association of one keyword search interests between 2004 and 2017

The one keyword search interest in the proposed study involves obtaining the ranks of the selected one food item from the Google Trends, which does not have multiple comparisons. The correlation coefficients of one keyword rank data with time were determined.

Median analysis of one keyword search interest ranks between 2004 and 2017

The downloaded ranks did not show normal distribution and skewed. The median of each keyword ranks and the significance of the data determined using the Kruskal-Wallis test at p-value 0.05.

Search interests for various food items by state in India between 2004 and 2017

South India region consists of the five states of Andhra Pradesh, Karnataka, Telangana, Kerala and Tamil Nadu as well as the union territories of Lakshadweep, Puducherry and Andaman and Nicobar. Northern India consists of Chandigarh, Delhi, Haryana, Himachal Pradesh, Jammu and Kashmir, Punjab, Uttar Pradesh, Uttarakhand. The central region constitutes three states of Chattisgarh, Madhya Pradesh, and Maharashtra. The north-east region consists of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura. The eastern region is consisting of Andaman and Nicobar Islands, Bihar, Jharkhand, Odisha, and West Bengal. The western region has Dadra and Nagar Haveli, Daman and Diu, Goa, Gujarat, and Rajasthan. The web user search ranks for each state for the selected dishes uploaded to SocialCops visualization URL to generate intensity maps.

Quarterly search interests for various food item in India between 2004 and 2017

The data for four quarters obtained for each year. These quarters known as four variables and suitable statistical tests were applied to determine the statistical significance of the data.

Multiple comparisons of selected food items between 2004 and 2017

Google Trends allows various keywords for comparing the trends besides one keyword alone. The dishes and time frame selected to measure the differences between them. The ranks and percentage interests’ downloaded and statistical significance determined. The median search interests and correlation coefficients data analysis performed. Furthermore, the percentage of search interests of each state visualized using SocialCops online tool.

3. RESULTS AND DISCUSSION

Analysis of generic food search in India based on one keyword search using Google Trends

Google Trends, a free and online public online facility from Google LLC. It is the occurrence of keywords searched in Google relative to the maximum queries across various regions of the world. The x-axis of the graph represents time (beginning from 2004), and the y-axis represents numbers, which is the keyword search interest relative to the maximum value on the graph for the given location and time. A value of 100 represents the maximum popularity for the searched keyword. A value of 50 indicates that the search keyword is half as popular. A rank of 0 represents that there was insufficient data for the search term.[10], [11] Google Trends provide unbiased Google search data. It gives information about anonymous, aggregated, categorized and normalized data. Normalized data enables to compare different time periods, various countries or cities. The “spikes” reveals the acceleration of specific keyword compared to usual search volume.[12] Furthermore, the data-driven organizations do 5% more productive and 6% more profitable than their competitors.[13] Now, more than 60% of home deliveries are occurring through the online channels over call-centers. Literature study revealed that the market share for the fast food industry alone in India was USD 2.11B 2014 and expected to grow to USD 4.61B by 2020.[14] The pizza market in India was INR 3500 crore (USD 500 M), and intense competition has been facilitating the entrepreneurs looking their presence across the tier-II and the tier-III cities of India. There exist a growth opportunity for entrepreneurs as the middle-class people are becoming well informed about standardized food intake. [15]

The one keyword search ranks of selected food items were downloaded and plotted search interest over the time between 2004 and 2017 (Figure 1). As shown in figure 1, the difference between every food item is very close and could not reveal the significant differences among the keyword searches. The correlation coefficients of the one keyword searches revealed that there exists positive association of food item in the selected time range as shown in table 1. The dishes of biryani and dosa have higher associations with time when compared to others. The Median ranks were calculated for pizza, Biryani, Dosa and Idli based on Kruskal-Wallis non-parametric test. Result showed that the one key word search interest ranks between 2004 and 2017 for pizza, Biryani, Dosa and Idli is 61,44,47and46 and the p value is less than 0.001 (Table 1).

Table 1: The type of food item, median and correlation coefficients of the one keyword from 2004 and 2017

Food item	R ²	Median
Pizza	0.7427	61
Biryani	0.9187	44
Dosa	0.91	47
Idli	0.8831	46



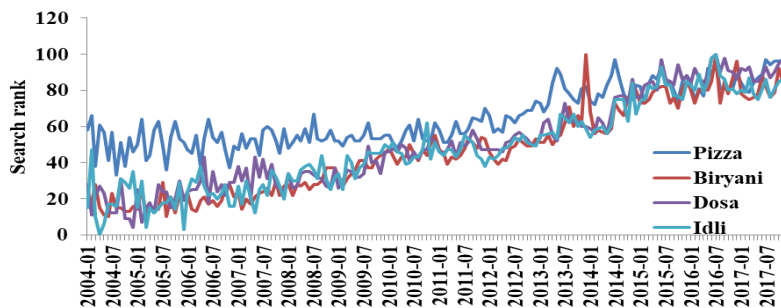


Figure 1: The one keyword search ranks of selected food items between 2004 and 2017

Quarterly search interests for various food item in India between 2004 and 2017

The purpose of the statistics is not only provide a economic status of start-ups in food sector but also help users and service providers to meet the demand for the type of food situation in society. To identify whether dish type is geographically specific, the data for four quarters for each year. These quarters known as four variables and The Kruskal-Wallis and multiple pairwise Mann-Whitney U test was applied to determine the statistical significance of the data. The Median values for Quarterly Data Collection for various food items in India between 2004 and 2017 are depicted in Figure 2. As shown in figure the median pizza search interests for the Quarter-IV significantly high, 53 (P=<0.05) compared to Quarter-I. There was no significant difference between Quarter-II and

Quarter-IV, and Quarter-III and Quarter-IV. There were no significant median differences between Quarter-I and II, and Quarter-I and III. The median Biryani search interests for the Quarter-IV was significantly high, 41 (P=<0.05) compared to Quarter-II. The other quarters did not differ significantly from each other. The median Dosa search interest for the Quarter-III was 53, which was high compared to the remaining quarters. There is no statistically significant difference among the quarters for Idli. The median Quarter-III value significantly differs over Quarter-IV. The significant differences observed between Quarter-I and IV, and Quarter-II and IV. Median search interest for pizza, which was very high and found be significantly different from other foodstuffs. Apart from pizza, the one keyword search interests for biryani, dosa, and idli were found similar in the selected time scale.

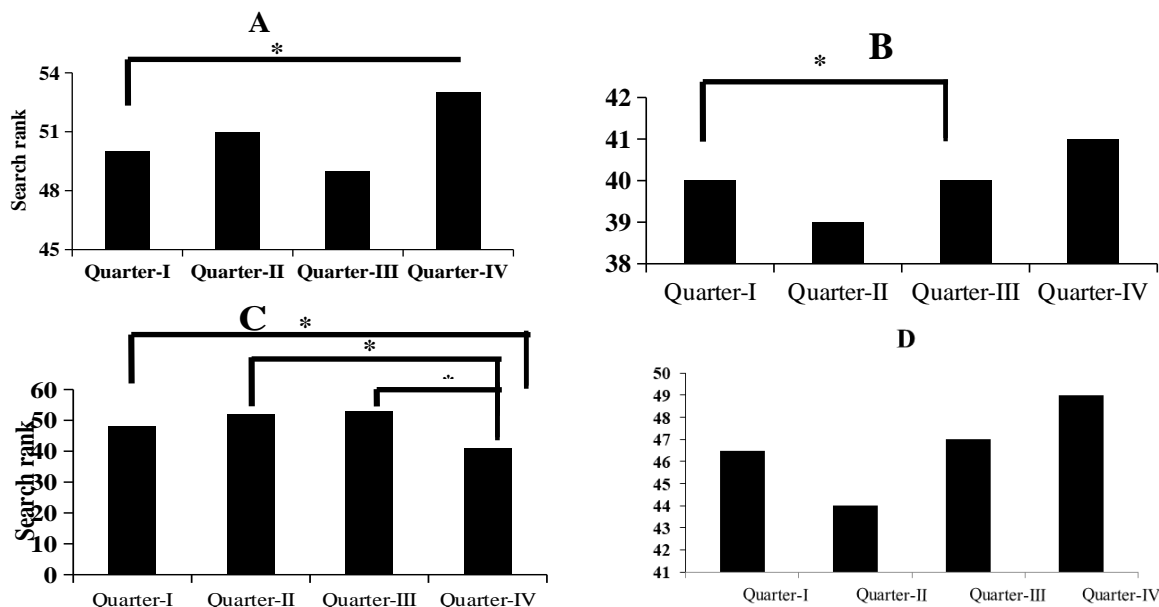


Figure 2. Median ranks of A. Pizza, B. Biryani, C. Dosa and D. Idli by quarter in India between 2004 and 2017. The test is based on Kruskal-Wallis ranks comparison (P = <0.05), and performed multiple pairwise Mann-Whitney U test comparison (P = <0.05). * indicates significant difference between the groups

One keyword over multiple comparisons

The analysis of data revealed for one keyword search that only pizza was significantly different over other food searches. The one keyword search requires entering only one search item, whereas multiple comparisons requires simultaneous application of all the keywords in search fields. In contrast to one keyword search, the data obtained from multiple keywords in single search showed

a significant difference between each food item. Multiple search analysis indicated that pizza, dosa, and idli were significantly different over the rest; biryani was significantly different over the rest of the food items. As shown in figure 3 pizza, and biryani in an uptrend,



while dosa and idli in the downtrend. The higher positive correlations (table 2) observed for biryani, dosa, and idli

between 2004 and 2017.

Table 2: The positive correlations between biryani, dosa, and idli between 2004 and 2017.

Food item	R ²	Median
Pizza	0.7315	54
Biryani	0.9109	44.5
Dosa	0.9103	18
Idli	0.9047	13

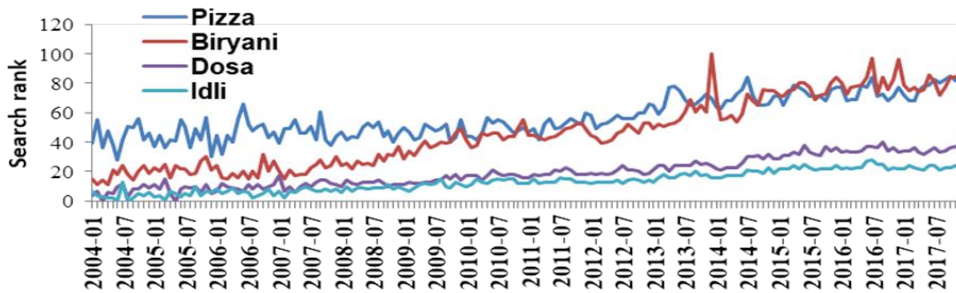


Figure 3: Multiple comparisons of percentage search rank index of selected food items between 2004 and 2017.

Multiple comparisons of percentage search interests by state in India between 2004 and 2017

The multiple comparisons plot of food items between 2004 and 2017 shown in figure 4, in which pizza, and biryani in an uptrend while dosa and idli in the

downtrend. The median search interests revealed that pizza significantly high over the others; biryani was significantly different over others. The higher positive correlations (table 2) observed for biryani, dosa, and idli between 2004 and 2017.

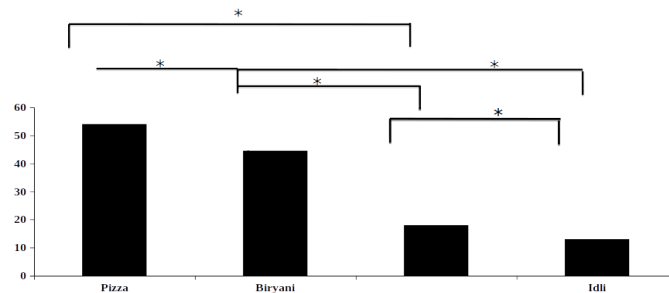


Figure 4: Multiple comparisons plot of food items between 2004 and 2017. The test is based on Kruskal-Wallis ranks comparison (P=<0.001), and performed multiple pairwise Mann-Whitney U test (P < 0.001). * indicates significant difference between the groups

The map visualization in figure 5 further allowed determining the percentage of food search interest by state. The pizza was familiar in the south, central, west

and north India regions (percentage >=16). Biryani was famous in the south, north, east, and northeastern regions. Dosa and idli were the least popular throughout India.

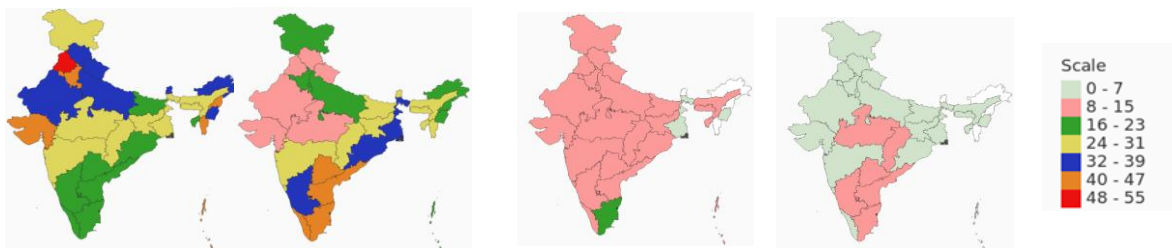


Figure 5. The percentage search interests by state in India (Courtesy of SocialCops)

4. CONCLUSION

The multiple comparison plots from 2004 revealed certainty of differences in the search interests over the one keyword search interests. Our study also recommends that the market research on Google Trends require a suitable time frame (2004-2017), and multiple comparisons instead of one keyword data look up. Furthermore, based on the results we assume that the pizza, and biryani business activities will flourish and sustainable over other foods in India.

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