

Geographic Analytics and Visualization for Decision Making: An Application for Online Food Delivery Platform



Karan George, Sreejith R, Senthil S

Abstract- Promoting organizers such as marketing planners frequently utilize geographical information systems to single out appropriate retail stores, setting up advertising campaigns based on regions, and target direct showcasing exercises. Geographical information systems topical maps encourage the visual evaluation of regions. A wide arrangement of elective symbolization, for example, circles, bars, or shading, can be utilized to represent quantitative geospatial data on such maps. In any case, there is little learning on which sort of symbolization is most viable for each case. In a huge scale exploratory study, the creators demonstrate that the symbolization firmly impacts choice execution. GIS-based representations encourage the evaluation of store areas and help organizers to choose the most encouraging options. The choice of the best option requires a visual streamlining which is supported by GIS topical maps. In this study, the manner in which how various GIS-based information portrayals impact advertising analyst's decision making for online food delivery platforms is explored. The outcomes demonstrate that GIS maps are an important piece of work and that sort of guided representation impacts the initiated decision-making process.

Keywords – Geographical Visualization; Food delivery platform; Online food ordering

I. INTRODUCTION

India offers tremendous opportunities in the food sector and the traditional marketing techniques may turn out to be moderate or stagnated over some stretch of time. The world is witnessing the change in consumer behaviour in the case of restaurants and cafés these days. Due to the fact that the customers gain convenience and control, they prefer online food ordering rather than to dine from restaurants and that leads to the fact that the food delivering sector is growing rapidly. And that leads to the fact that the food delivering sector are growing rapidly but with increasing competitors.

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As per now, these companies select the restaurants just by accepting their formal request with FSSAI (Food Safety and Standards Authority of India) approval. But they encountered a problem with the increased non-valuable partners who deliver low-quality foods which made the app look less professional. So, these companies should be very particular in choosing their partners.

Which means there should be proper filtering. In a normal way, the executives could conduct a survey within the area for identifying the restaurants preferred by the customers and delist the ones who are not up to the mark. But there will be limitations in the part where there is a need to present these details like the interpretation which will be limited to text and graph. Geographic Analytics and Visualization techniques are used here for better presentation and analysis which can be used further to make important decisions. Visual analytics means to join the qualities of humans and electronic information handling. Visualization or Representation, whereby people and computer systems participate through illustrations, is the method through which it is achieved. In current society, spatiotemporal analysis isn't exclusively the matter of expert analysts. Numerous consumers would be keen on attempting an investigation of data in existence. Specialists should discover methods to deal with the complexities of the present data issues and discover approaches to make these tools open and usable for a wide network of potential clients for spatiotemporal reasoning and add to tackle the expansive scope of issues [1]. One of the major issues in the field of visual analytics is that the programmed information analysis network isn't spoken adequately in the visual investigation communities for quick advancement of the field [2]. Since the 1980s, there was an interest in developing geological visualization tools to aid interpretation among individual and community related geographical data. This has brought about the conceptualization of various hypothetical ways to deal with what we do and new ways of reviewing and utilizing land data [3].

II. GEOGRAPHIC VISUALIZATION

Geographic Visualization, now and then called cartographic visualization, is a type of data visualization in which standards from cartography, geographic data frameworks, exploratory data Analysis, and data visualization are incorporated in the improvement and evaluation of visual strategies that encourage the investigation, examination, analysis and presentation of geo-referenced data [4].

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Take the case of quantitative data, the essential stories that numbers need to tell frequently include an area where things are or where they've happened.

When we show quantitative data on a map, we join visual presentations of both dynamic and physical information. Quantitative data is dynamic, and it doesn't have a physical structure. At whatever point we represent quantitative information in a visual way, regardless of whether on a guide or else, we should think of visual articles that represent ideas in a reasonable and justifiable way [5]. In numerous Geo spatial scenarios, sketch maps (drawn with hands) are treated as a natural approach to gathering client created spatial data. The assignment of consequently mapping data from such hand - sketch maps to Geographical spatial maps are said to be the alignment task. Analysts have proposed different subjective portrayals to catch mutilated and generalized spatial data in sketch maps. But, up to this point, the viability of these portrayals has not been assessed with regards to an alignment task. The portrayals are assessed in a solitary perspective arrangement approach by showing the alignment maps for every individual sketch viewpoint. Furthermore, portrayals are assessed over various sketch perspectives utilizing more than one portrayal in the alignment maps. The assessments showed that the suitability of the chosen portrayal for adjusting client produced content with Geo-referenced maps in a genuine scenario [6].

III. GEOGRAPHIC INFORMATION SYSTEM

GIS are broadly utilized in almost all organization levels, since the techniques for geographic data handling are reasonable to help most kinds of tasks, with respect to the evaluation of a true circumstance by utilizing an adaptable mix of various information layers. Along these lines, the utilization of GIS dependent on quantitative strategies might be favourable to manage social interests in urban zones [7]. Looking at the application level, IT and tourism are two of the most powerful sparks of the rising worldwide economy. Both tourism and IT progressively deliver key opportunities and integral assets for monetary development and advancement of equity around the world. With the enormous development of the Web, an expansive range of tourism information is as of now disseminated over different Web sites. To satisfy the visitors' request for a broad information gathering, it is inevitable to make aggregated information from various sources accessible. Alongside, visitors have again defied with contrasts regards to information displayed on different Web sites. The fix to these issues is by utilizing maps to introduce information in a viable way. Maps are a characteristic method for showing tourism related information since ages. Tourists are utilizing maps to explore and track their movements. Additionally, maps exploit the capacity of human vision and deliver the information and details in a minimal and simple way [8]. Another application of GIS in real life scenario. Organic intrusions form a noteworthy risk to the reasonable arrangement of ecosystem products and administrations, both in manmade and regular ecosystems. Progressively, endeavours are made to dodge attacks or control the trespassers. It is quite accepted that geographical information system & remote sensing could add to this, for example through mapping intruder areas or territories in danger of attack. Remote sensing innovation has numerous

characteristics that would be advantageous for distinguishing, mapping and observing intruders. Spatial heterogeneity confuses the investigation of occasional and long-haul patterns of a biological attack. Incorporating GIS and remote sensing have effectively been connected to outline the distribution of plants and animal species, their habitat, climatic conditions and factors encouraging intrusions [9]. Geographical information system innovation answers questions and takes care of issues by taking a view at the spatial information in a way that is quickly comprehended and effectively shared and shows information guaranteeing quicker decision making. GIS sorts out geographic information with the goal that an individual who needs informative ideas can easily use a guide map to finalize his/her thoughts. A topical guide has a chapter by chapter info that enables the users to different levels of information to a base map of geographical locations [10].

IV. UNITS

A common methodology is to make a heat map utilizing the geographic information system and settings directions to examine their spatial dispersion properties inside a city. This type of map is one of the most utilized methods for communicating the thickness of point information's spatial circulation. What's more, the area wise data put together based on wilful cooperation of citizens gives the advantage of having the capacity to investigate the progressions occurring inside a city [11]. Utilizing promptly accessible Geographical Information system census information, respondents can perform buffer examinations to recognize key statistic highlights for specific zones. Take an example of a chemical spill, a crisis responder could make a buffer that expands twenty miles and fetches the census information to evaluate the number of individuals in the territory who might be affected. An electronic mapping application could then be utilized to post the outcomes, which will help leaders plan response strategies efficiently [12].

V. ONLINE FOOD ORDERING

A survey of 470 web clients found that marginally half of them have requested food online by a mobile application (Android, IOS) or with an instant message. The main explanation behind electronic requesting given by those have ordered is that they gain assistance and control. The central point that restrains the individuals who have not requested through an electronic channel is a desire for interaction or technological anxiety. The absolute most imperative quality of electronic ordering via apps is precision. That is trailed by the comfort and simplicity of requesting [13]. The concurrent and quick increase in the rate of buyers of computers and smartphones have urged and influenced advertisers to give Internet retailing destinations. A few specialists anticipate that the requirement for physical stores could be dispensed with in around four decades and supplanted with electronic retailing. While numerous marketers recognize the significance of utilizing the Internet in their advertising blends, just a bunch of specialists have examined what factors empower or reduces the purchasing decisions online.



In short, the advantages of utilizing the Internet in marketing are colossal as they offer huge opportunities for advertisers to make innovative moves that haven't been suitable till now. In any case, advertisers and marketeers need to build up knowledge about consumers purchasing behaviour when shopping on the internet. This data will help marketing managers to design their marketing blends and offers in such a way that it meets the client's prerequisites [14].

VI. DELIVERY PLATFORMS IN INDIA

The sizzling Indian Food technology industry is predicted to reach 78 billion dollars by 2018 developing at sixteen percent per year. As of now out of 105 Food technology startups in India, just 58 of them are presently operational. At first, the food technology industry in India started with organizations like Zomato attempting to take care of the issue of finding a decent restaurant by a simple mobile application. Then organizations like Foodpanda endeavouring to address the issue of requesting or booking these restaurants as an aggregator. The following stage had players like Swiggy handling the issue of conveyance in the value chain. Basically, these aggregates up the development of the Indian food technology showcase to date [15]. The food delivery merchandise is esteemed at over twelve billion rupees starting in 2016, where upwards of 7 % of the share currently held for online food delivery services. Instead of 'Delivery as a Service' organizations, aggregator delivery services create a stage for shoppers to explore through an assortment of restaurants facilitated on an application and setting orders manually. The market is expected to widen forty percent every year. Increasing wages have energized the establishment of an undeniably wellbeing health conscious middle-class group, wanting meals which may substitute healthy benefits of home prepared meals. Forceful growth methodologies have not been as remunerating elsewhere in the food industry. Nonetheless, the future appears to be more splendid for the online food industry, as India develops [16]. The ceaseless and intense changes in the food business mirror the value for further study considering the blasting potential in the food service industry where online delivery service is taking up a major piece of the market. The hike in income, exposure and comfort have the most noteworthy effect on the choice made to outsource to other online food delivery service. likewise, online delivery service assumes upgrading client technology created new dining knowledge and it has a big role in changing the manner in which customers prefer to eat. The expansion of no-cook foodies is the aftereffect of changes in shoppers' patterns and inclinations where clients are very eager to spend more in return for better quality and convenience. Adding online food delivery service is slowly turning into a tool for survival in the food service industry as more clients are inclining towards online food delivery service [17].

VII. DATA COLLECTION

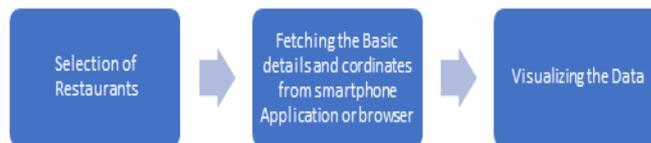


Fig. 1 - Design of the process

Using the internet, restaurant data is collected. Each restaurant is either registered on Zomato, Swiggy or both. The details which can be fetched using these browsers (web, smartphone application) include- Restaurant name, Ratings, Type (Veg, Non-veg, Both), Price, Cuisines, Delivery Rating, etc. Apart from that, the votes from google reviews are added. But these aren't the major data needed. Geographical Visualization only works when the coordinates of the restaurants are included (Latitude, Longitude). For this, an app called "Map coordinates" was used. Fig:2 shows cropped excel sheet data.

Restaurant Name	Longitude	Latitude	Rating	Votes	Application	Type	Delivery Rating
Hotel Aryaas	76.34151	10.01319	3.9	244	Zomato	Vegetarian	High
Hotel Al- Ameen	76.34509	10.01789	3.7	183	Zomato	Both	Low
McDonalds	76.36446	10.01535	3.7	89	Zomato	Both	Medium
Rappais Restaurant	76.35854	10.00181	3.6	595	Zomato	Both	High
Info Thattu	76.36607	10.01634	3.6	201	Zomato	Both	High
KR Bakes	76.3514	9.994858	3.6	15	Zomato	Both	Medium
Chakkarapanthal	76.3579	10.01227	3.5	212	Zomato	Both	High
Vaishnavi 39 Variety Dosa	76.34843	10.00286	3.3	89	Zomato	Both	Medium
Grand Vattekkad	76.36584	10.0155	3.3	61	Zomato	Both	Medium
The Voyager	76.34174	10.01172	4	504	Zomato	Both	High
Kettuvallam	76.34307	10.00943	3.6	260	Zomato	Both	Medium
Farm Kitchen	76.33804	10.01629	3.5	202	Zomato	Both	Low
Filter Cup	76.32569	9.995303	3.5	46	Zomato	Both	Medium
Hotel Arya	76.34566	10.01783	3.4	30	Zomato	Both	Medium
The Ice Cream Factory	76.36305	10.01269	3.7	11	Zomato	Both	Low
Sulaimani Bakers and Food Court	76.34442	10.01662	3.5	30	Zomato	Both	High
Hotel New Metro Palace	76.35033	9.999623	3.4	171	Zomato	Both	Medium
Olive Eva Hotel - Seven Spices	76.36466	10.01569	3.9	119	Zomato	Both	High
Malabar Plaza	76.32724	10.01264	3.3	55	Zomato	Both	Medium
Hotel Hill View	76.33494	10.01498	3.3	6	Zomato	Both	High
SFC Plus	76.35166	9.996625	3.1	247	Zomato	Both	High

Fig. 2 - Sample Data

VIII. DATA VISUALIZATION

The core idea of visualizing data is for easy interpretation. But it is not limited to charts like pie, bar, etc. Data visualization empowers clients to get immense measures of data with respect to operational and business conditions. It enables users to see associations between multi-dimensional data sets and gives better approaches to interpreting data. Imagine the above tabular data being interpreted. It's not visually appealing and it's hard to make decisions based on this. In the same case, it's a lot different if the right method is used. visual representations are followed.

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Fig. 3- All the Restaurants marked on the map

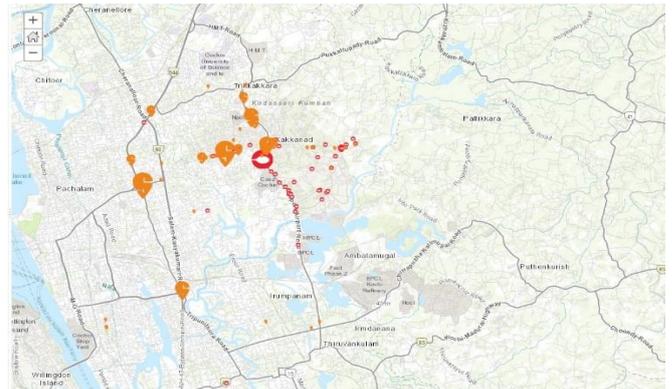


Fig.8 - Rating of the restaurant (Bigger the logo; Higher the Rating, Clicking the logo shows the details)

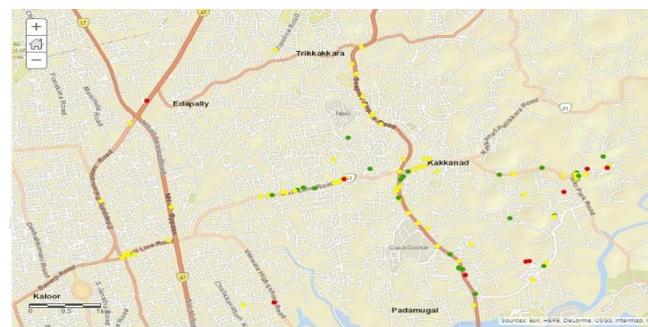


Fig. 4- Pricing. Green: High, Yellow: Medium, Red: Low

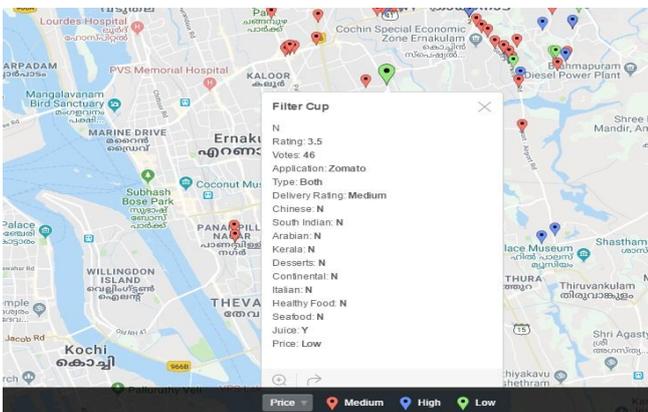


Fig. 6 - Pricing. Another View

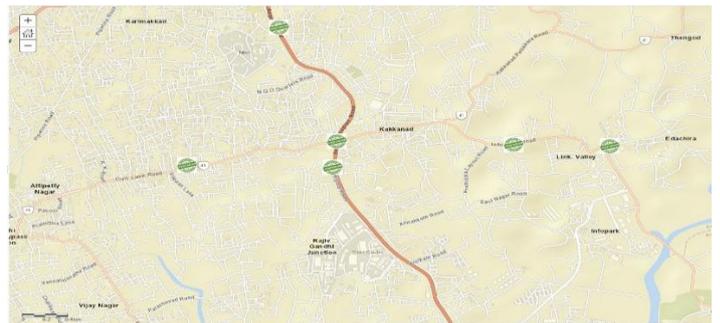


Fig. 10 - Open street map: Vegetarian Restaurants

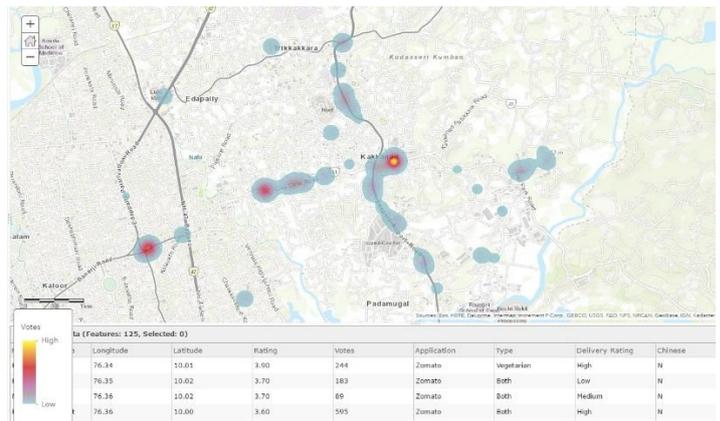


Fig. 5 - Heat map- Based on Google Votes



Fig. 7 - Satellite View

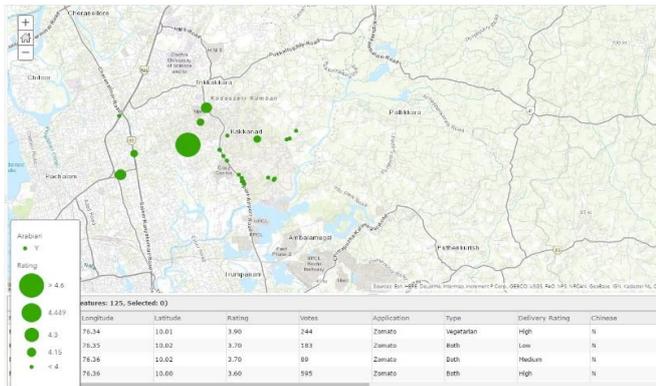


Fig. 9 - Restaurants with Arabian Food; Based on the rating

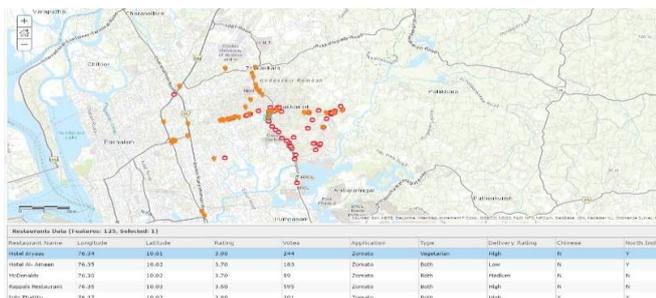


Fig. 11 - Map view with the interface for selecting restaurants

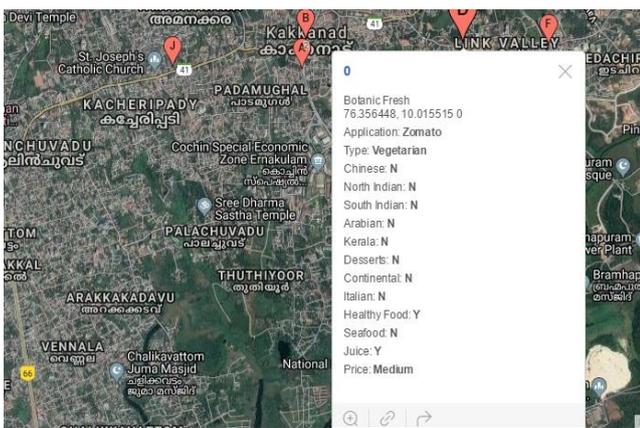


Fig. 12 - Satellite view: Vegetarian Restaurants

IX. CONCLUSION

Visualizing data is Informative, Efficient, Appealing and Interactive. The most essential function of a report is to advise the consumer of something, and an image can do this all around. Think about a guide map, maybe the most established type of information perception, or a pie outline, or a reference chart. Everybody knows about these visuals and can rapidly summarize the expected point they represent. Maybe the biggest advantage of using visualization is the productivity gained through appropriate execution. An efficient visual will spare the information analyst valuable time as it could convey the message briefly and without complication. It ought to convey information to the client rapidly without exhaustion. This is the reason visualization dashboards are an important need for business officials. This study dealt with the visualizing restaurant based on many attributes and it's clearly shown that tabular data is not easily interpreted.

Decision making is much simpler using data visualization. There are different kinds of geographical visualization techniques such as GGmap, Leaflet and OpenStreetMap package for R Programming, Tableau, Stamen Maps, Arc-GIS, BatchGEO, etc. ggmap is known for its accuracy in plotting but it's not free anymore. And tableau public has its own limitations. So, finding and selecting the right one is difficult. From a consumers' point of view, the selection of restaurants is much simpler and from the service providers (platforms) point of view, they could look at the visualizations and check the areas in which more low rated restaurants are present or they could assign more delivery executives in the areas where there are best-rated restaurants. These are just the sample benefits and given more data, Geo Visualization can be used beyond this scale.

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