

Geolocation

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Abstract- As long as they have the necessary device, such as a smart phone, users may now locate and track the locations of other people, objects, machines, cars, and resources from the comfort of their own homes. Location-sensitive information requests are often made by a user known as the client or network provider. Today's most popular applications employ the Global Positioning System (GPS) to give position data.

Keywords- K-Means, Geolocation, Amenity, Folium, Foursquare API, Accommodation.

I. INTRODUCTION

Classic varieties of such platforms include Google Play, Windows Phone Store, Blackberry App World, and Apple App Store. Mobile applications are typically accessible through multiple distribution channels that may be under individual or organisational control. The creation of mobile applications has increased dramatically, accounting for applications like LBS (Location Based Services), GPS (Global Positioning System), factory automation, gaming, mobile banking, and order tracking. The main focus of the suggested system and study is LBS and GPS, which are actually extensions of mobile apps.

LBSs (Location-Based Services) are a way for businesses and clients to quickly access the location of a target object, which can be a smart phone, tablet, or PDA. Finding restaurants or the closest train station using any of the listed mobile devices is a typical example of using LBS.

Since the Federal Communication Commission (FCC) granted the operational permission for the delivery of emergency wireless services in July 1996.

Mobile operators' primary focus has steadily shifted to location-based services (Adusei, et al, 2004) Location-based services (LBS) are primarily used to determine the present and past locations of users, who actually hold objects like smartphones. With this data, we can provide information that may address issues like GPS location (Longitude and Latitude), predict the future location of that object using data mining, and trace an object's path back in time (Adusei, et al, 2004).

According to Wang, et al. (2008), these services also consist of: It is crucial to keep in mind that location-based services truly represent the convergence of three key technologies: mobile telecommunications systems, handheld devices, and geographic information systems, collectively known as "New Information and Communication Technologies" (NICTs) (Shiode, et al, 2004).

II. EXPERIMENT

We chose to use quantitative research methodology because it best for project that target a large audience, giving strength and accuracy to the research argument and work being carried out. It can easily be distributed online via email, or phone. As previously stated, a multiple research methodology and a major study serve as the foundation for the data collection strategy (Fig 1). This study relied on survey questions that were made available via a web-based survey to pre-selected respondents. Teachers, freshers, workers, and students make up the responders (Fig 2). This method's justification stems from the requirement to compute a significant number of outcomes in order to account for the range of outcomes for all included elements. The privacy of users will be prioritised; this programme will only use geolocation data with the user's full consent and, in the case of monitoring employees, it will only have access to such information during business hours.

Descriptive statistics and census characteristics reflecting the respondents' preferences within their financial constraints will be included in the data analysis. The basis for creating a correlation matrix of all indicators is a rotated factor matrix from the factor analysis, which displays the relationships between survey questions within factor categories. The ability to sufficiently regulate or categorise the type of amenities used by respondents is a concern. They were able to establish solid dependability, nevertheless. Because there is a significantly smaller range of probable responses, the overall set of amenities uses is much larger.

The project consists of the following stages:



Fig 1. Amenities uses is much larger.

Geographic data are a category or subset of spatial data that particularly have included an absolute or comparative georeferencing frame and handle "where" and "how far" types of issues. Geo stands for earth-based. Georeferencing, then, is the process of connecting two spatial objects by employing a shared coordinate system that is connected to the earth in some way. Additionally, each residential location's proximity to grocery stores, restaurants, fitness centres, etc. needs to be counted. Create a new query to fix all of these sites within a close radius of each residential location, then re-hit the endpoint.

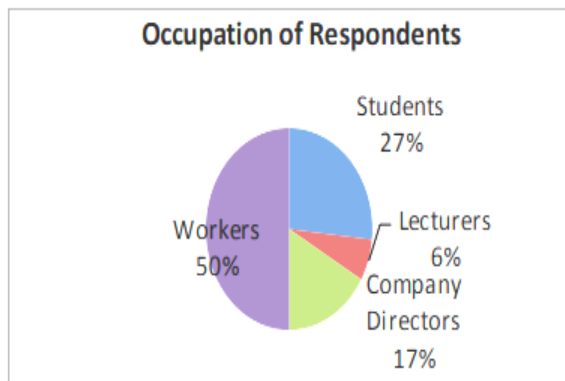


Fig 2. Earth-based. Georeferencing,

- Fetch Datasets from the relevant locations (Data Collection)
- Clean the Datasets to prepare them for analysis. (Data Cleaning via Pandas)
- Visualise the data using boxplots. (Using Matplotlib /Seaborn /Pandas)
- Fetch Geolocational Data from the Foursquare API. (REST APIs)
- Use K-Means Clustering to cluster the locations (Using Scikit Learn)
- Present findings on a map. (Using Folium/Seaborn)

	venue.name	venue.location.lat	venue.location.lng	venue.location.formattedAddress	restaurant	others
0	Starbucks Coffee Capital	19.063457	72.861576	[The Capital, India]	37	12
1	Hamleys	19.086655	72.889783	[Phoenix Market City Kurla (LBS Marg,Near Kama...	36	21
2	Khau Galli	19.072234	72.896335	[MG Road (Ghatkopar East), Mumbai 400077, Mahā...	20	11
3	IVY Restaurant & Banquets	19.069663	72.900535	[Above Shoppers' Stop (Near Amar Mahal, Chembu...	31	14
4	JW Marriott Mumbai Sahar	19.102502	72.878236	[IA Project Road, Chhatrapati Shivaji Internat...	62	38
...
95	Naturals	19.220688	72.851589	[India]	24	10
96	Starbucks	19.184860	72.834266	[Infinity 2 Mall (Malad West), Mumbai 400064, ...	47	25
97	Trident	18.927878	72.820711	[Nariman Point, Mumbai 400 021, Maharashtra, I...	52	28
98	Inorbit Mall	19.173065	72.835756	[Mindspace, Link Road (Malad (W)), Mumbai 4000...	40	20
99	Tata Theatre	18.925063	72.819958	[Nariman Point, Mumbai, Maharashtra, India]	36	17

Fig 3. API data.

To determine the longitude and latitude values for whichever item or device, utilise this component. Android devices with Global Positioning Systems (GPS) receivers

receive radio signals from satellites and compare those signals to local geodata databases to determine their precise location on Earth. The Foursquare API can be used to determine the location's address or street name (Fig 3). Location calculations in two or three dimensions can be done using satellite data. While three dimensions contain longitude, latitude, and altitude, two dimensions just include longitude and latitude, which can reduce the accuracy of the result.

III. RESULTS

The primary study used survey research to ask respondents about their opinions on whether the factors should be assigned to the approachment or the environment construct. Responses were gathered using a seven point Likert scale in this study. In conclusion, the primary study, which was a web-based survey, was primarily concerned with validating the binning of the quality and usability factors (Fig 6).

The relative paucity of utility literature relevant to geographic data and information that specifies the variables that make quality, context, and usefulness is a key finding of this research that motivates the exploratory method. But rather than being a barrier, this is a chance to advance the geospatial sciences sectors by starting a discussion among users, researchers, and other interested parties about how data and information utilised in GEO may be regarded and assessed in terms of its potential use.

- No licence or distribution costs are necessary.
- On the device, background tasks and applications can run simultaneously.
- It makes use of shared data storage.
- It is compatible with the 3G, 4G Edge, and GSM networks.
- Hardware that supports fully interactive multimedia programmes is possible.
- Built-in APIs (Application Protocol Interfaces) for location-based services, including GPS.

	cook	eating_out	employment	ethnic_food	exercise	fruit_day	income	indian_food	marital_status	on_off_campus	pay_meal_out	sports	veggies_day
0	2.0	3	3.0	1	1.0	5	5.0	5	1.0	1.0	2	1.0	5
1	3.0	2	2.0	4	1.0	4	4.0	4	2.0	1.0	4	1.0	4
2	1.0	2	3.0	5	2.0	5	6.0	5	2.0	2.0	3	2.0	5
3	2.0	2	3.0	5	3.0	4	6.0	5	2.0	1.0	2	2.0	3
4	1.0	2	2.0	4	1.0	4	6.0	2	1.0	1.0	4	1.0	4

Fig 4. 13 Dimensions.

Nearly all industries now use GEO technology. At the limited anyone with internet connection may use basic mapping and map analysis capabilities thanks to websites like googlemap.com, and among others. Similar to this, office professionals looking should provide topographically visualizations out of their financial records might use mapping capability offered as incorporate in basic workplace business applications (such as MS Excel). For the sake of this study, these users of mapping-like

software tools are not technically GEO users. These called limited applications have an excessive number of users. Such variety of applications is shown in Table 1.

1. Another Existing System:

Numerous studies have been conducted on mobile communication. As previously mentioned, mobile applications were typically created to enhance/boost productivity and information retrieval, including e-mail, date/time planner, trading volume, contact information, and weather forecast. However, the market for applications in sectors including order monitoring, industrial automation, GPS, location-based services, and mobile games swiftly blossomed due to rising demand and the data integrity of web services, which increased people's reliance on devices.

Table 1. Another Systems

Reference	Data	Algorithm	Features
Wang et al. [52] 2018	14 days of Ambient Noise Intensity	Bivariate Linear with Gradient Boost	Correlated with self-reported personality traits.
Gao et al. [54] 2019	Call and messaging logs	Support Vector Regression	Conscientiousness
Stachl et al. [50] 2020	GPS, Bluetooth and Wifi	Linear Regression, Random Forest	Significant predictors of personality traits
This work, 2020	Smartphone usage	Neural Network	Emotional Stability, High extraversion by communication

The following are a few helpful tracking programmes created for the Android smartphone platform:

- The Life Map app by Chon et al (2012)
- Since Bluetooth served as the foundation for the "next generation children tracking system," which was developed using Java, it had nothing to do with GPS or location managers (Morii et al, 2012).
- An android routing application created by Rani et al. (2012) is utilised to find the shortest path between two places.
- Using Android technology, Gadri et al. (2012) created a land vehicle tracking app. Their programme was able to locate and show on a map the location of a land rover with an inbuilt GPS receiver.

Several antecedent factors should be eliminated by this investigation, either as a result of the pilot study or due to lack coefficient of determination in the research design. Furthermore, it is anticipated that the factors examined in this study will efficiently cluster as either taste factors or situation factors (Fig 5). Finally, despite the potential challenges of this research, it is anticipated that user experience level will moderate the responses collected.

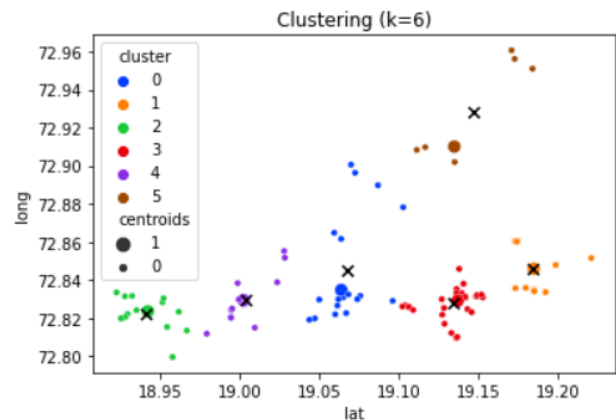


Fig 5. Clusters.

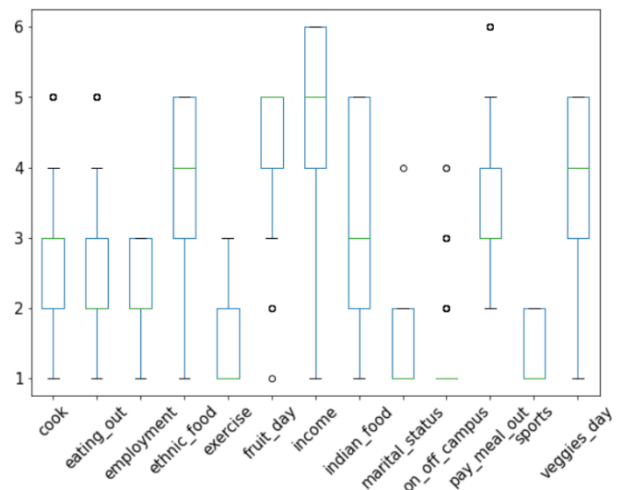


Fig 6. Boxplot.

IV. DISCUSSIONS

The idea of validity is crucial to both the study design and survey. The validity of the geospatial information utility construct proposed in the fundamental research model is the first issue addressed by this study. The final creation and validation of an effective, verified survey depends on the soundness of this model. It follows that the validation process is a crucial component about any survey.

This study may have limitations that limit its capacity to be generalised or have external validity because there are so many various types of geographic data consumers and stakeholders in the area. This constraint is overcome by populating the sample pool from a variety of sources, such as professional and trade associations and context newsletters. Demographic questions are incorporated into the general information in the survey to determine the range of survey respondents by user type and to give respondent characterization and control. The study will try to include as many different types of GEO user types as it can in order to make the findings more generalizable.

It happens often that someone is too exhausted to prepare a home-cooked supper in the chaotic manner that the general public lives in. Yet, even if one eats meals prepared at home every day, it is common to desire to go out for a nice meal occasionally for social reasons. In any case, it is a well-known fact that one's diet plays a significant role in the lifestyle they lead, regardless of where they live. Imagine a situation when a person has just relocated to a new area. They already have particular tastes and interests.

If the student lived close to their chosen outlets, it would save both them and the food vendors a lot of hassle. Better sales and time savings for the customer result from convenience. Apart from food delivery services, operators of chains of restaurants and hotels can also benefit from this data. For instance, if a restaurant management is already familiar with the demographics of his existing patrons, he would ideally like to operate at a location where this group is most concentrated, ensuring quick access to the establishment and more consumers serviced. The best location for a hotel would be one that accommodates a wide range of tastes because one would want every visitor to have access to something they enjoy.

with a simple "yes" or "no," but they did not specify which questions could have been posed in a different way. The Likert Scale as it was used allowed for the following 5 responses in Table 2:

Table 2.

1	Strongly agree
2	Agree
3	Neutral
4	Disagree
5	Strongly disagree

The actual attribute values desired—that is, what should be in the respondent's mind as he or she answers the question—for several of the 13 examined dimensions (Fig 4), for the perspective component, will likely change depending on the particulars of any individual GEO analysis assignment. Generally speaking, these queries took the form, modify based upon my shifting GEO analysis demands. The investigation to distinguish between taste and situation elements is centred around these 13 questions.

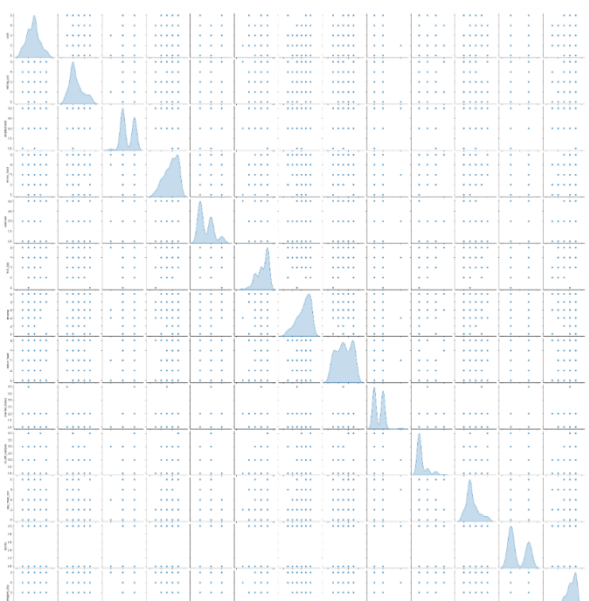


Fig 7. Pairplot.

As previously mentioned, the survey was carried out. The 60 items were too many, but one goal of exploratory factor analysis is to make the data less dimensional. That turned out to be a crucial component of this study (Fig 7).

Several survey participants chose to email extra additional opinions after completing the questionnaire, even though all responses were recorded anonymously. Some people praised the items, while others objected to the formal language employed in some of them. The responder stated that they did not find the 1 to 5 Likert Scale to be helpful and that most of the questions could have been answered

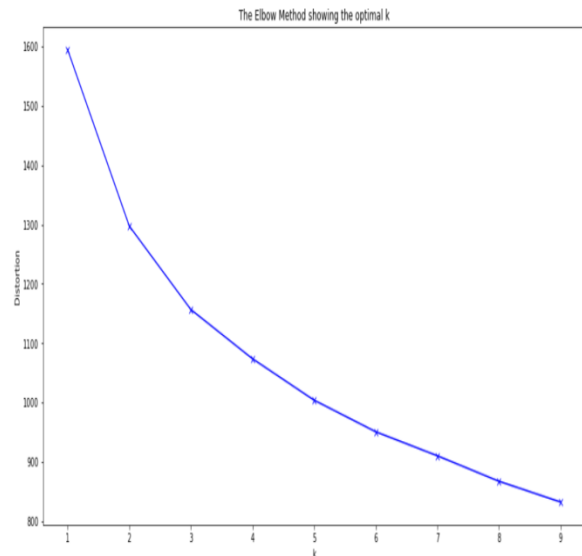


Fig 8. Elbow method for optimal k.

60 dimensions were whittled down to 13 by the pilot study. The data were examined using the collection of 200 responses, and the extraction method used was principal component analysis (PCA). Choosing how many components to extract is a crucial design and analytical decision when conducting an exploratory factor analysis.

Examine a scree plot, which graphically plots the Eigenvalues for each factor number, and choose the number of factors that present to the left of the "elbow" in the curve (Fig 8), meaning the plot flattens, there is no valuable increase in variance by increasing the number of factors. Then, during analysis, choose the number of factors that satisfy this threshold using the low error

approach. Use a chi square test; this strategy has a number of restrictions or limits.

V. CONCLUSION

The author has provided a general overview of location-based services, their background, and current trends. He or she will go into great detail about the key idea and developments that led to the technological innovation of Location Based Services (LBS), as well as earlier research on the system under consideration and the elements of the Android operating system. The study of the raw survey method yielded results that showed the research to be viable and likely to produce significant findings. If the findings of this study are put into practise, businesses will be able to avoid wasting valuable time on unofficial tasks while claiming to be performing official ones.

The author offers the following suggestions to help this application be improved and bettered in the future:

- A dependable server that generates static IP addresses for each device and has a restful API.
- A customised map for the organisation in place of the Google Map API.
- Enhance user experience by optimising the programme for lower power consumption on the target device and incorporating multimedia features like videos, photos, and audio. We have given a broad overview of Geolocation, its history and current trends. We should have a map centered on the location we chose, with the locations differentiated by colour scheme (Fig 9).

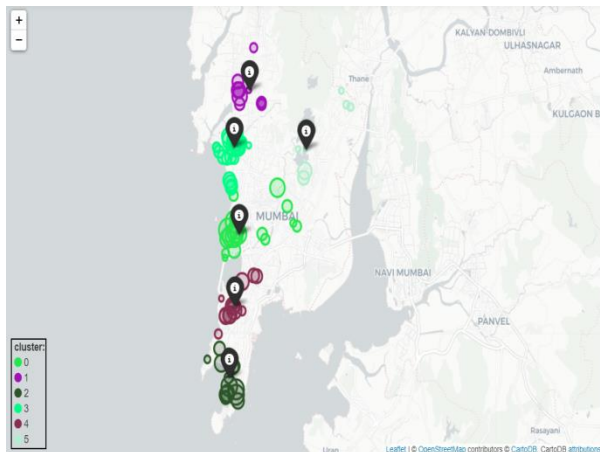


Fig 9. Final Output.

Beyond the original intent of the study, some of the specific results were the effective examination of the elements that make up geospatial information. the creation of a preliminary, verified survey instrument to be utilised by the GEO community to conduct more in-depth evaluations of how businesses and GEO researchers using geographic data use quality and context aspects. The geospatial data and remote sensing groups are now addressing metadata standards for data entered into GEO,

through trade and professional association forums. This way of comprehending geospatial information value is crucial. The survey answer information gathered for this study offers empirical proof of respondents' distinctions between context- and quality-based dimensions. The original set of 60 factors might be further reduced to a more usable level of 13 elements based on the two 1st factors through the correlation matrix and the resulting validity and reliability checks.

VI. ACKNOWLEDGEMENT

I would like to express my thank to Vasantdada Patil Pratishthan's College of Engineering and Visual Arts for allowing us to research and conduct the experiment.

REFERENCES

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