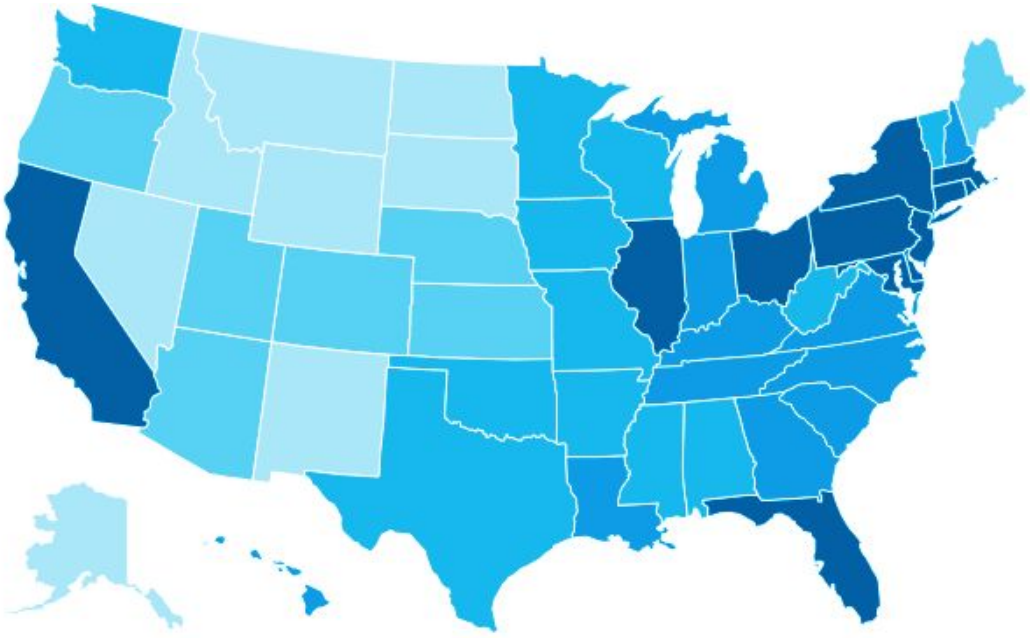

GEO-LOCATION BASED ADVERTISEMENT

Advertisement for physical store based on the user's location.

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-Guided by Dr. Roman Tankelevich.

ABSTRACT

Geo-location based advertisement is a system to determine the context of the user and based on that filter the content so that it becomes relevant to the user who is being targeted for advertisement. Any small business would need a sustainable model to advertise for less and obtain more from the targeted audience due to the budget constraint on advertising the product. If we don't consider geolocation of the user, we may end up displaying advertisements that are completely irrelevant to the user. This concept is beneficial to both the advertiser and user as well. The other idea behind this to advertise online and in such a way that sale is from an offline or physical store. This project focuses more on targeting relevant customer by applying some advanced filtering criteria for customers so that they remain engaged in buying that product. The concept of geolocation-based advertisement is only prevalent when advertisements are personalized, focus on the timing and targeted to a specific segment of customers. Our project focuses on fulfilling that criteria up to a certain extent by extracting important information from a dataset which can be beneficial for every small to mid-sized industry to elevate their customer outreach.

Outline

Below is the outline of geolocation-based advertisement covered in this report:

- **Introduction:** An introduction to motivation, need, and usage of this system.
- **Preliminary findings:** Challenges in an existing system.
- **Proposed Techniques:** Approaches used for this type of system.
- **Comparison:** direct comparison of existing and new system.
- **Analytical results:** Results obtained by the new system.
- **Future of advertising:** How this system could help in the future.
- **Conclusion:** Summary of how a project can be utilized in an efficient manner.
- **Bibliography:** This is where you attach papers supporting your proposal.

1.INTRODUCTION

Advertisers had the option to target - search and social media advertisements based on geographic locations for some years until now and it's still prevalent but it's not sufficient. The geo-location based advertisement can help to deepen the connection with target customer and can be easily implemented on multiple platforms. The only and an important thing to consider is the context and intent of advertisement. It is only useful when it provides the values in terms of results.

The key strength of this strategy is the timing and targeted user based on the location. If a user gets engaged in the advertisement, it increases the chances of his/her interest in the product. This implies that the probability of that user buying the product increases significantly and this results in a higher conversion rate for an advertiser. The more positive is customer experience, the more successful is the advertising strategy.

Benefits of using this strategy:

Increase in-store visit: To attract customer nearby to the location of the store to by attracting them with some promotional offers.

Receive customer query calls: Local search advertisements may include the option for any users to call to their location and get information about it.

Providing customers with business information: To include the advertisement links of business along with location and information.

2.Preliminary Findings

As of now based on an existing system, we found several issues which were to be addressed to make this concept of location-based advertising more secured and reliable. These *issues* need to be addressed as they are an essential part of designing the system dealing with user's location data.

Privacy by design:

A service must consider carefully the intentional and unintentional data flows from location-based service offerings.

Treating kids data as sensitive.

Dealing with the private information of kids require acknowledgment of the corresponding legal obligations under the federal children's privacy law.

Transparency about location services.

A company should treat location information as sensitive personal data which means being transparent and careful with data.

User Consent

User permission is key to a good relationship between the services and the user. Therefore a service should not set location services enabled by default in application.

3.Proposed techniques

The two main strategies for targeting user are ***Push*** and a ***Pull*** approach. In the push approach, customers are targeted if they opted-in for receiving the advertisements while in pull approach the users are targeted based on their search results.

Targeting customers within a certain Distance of business/Promotion.

- Based on the user's current location, he can be advertised for several promotions or offer for which he subscribed earlier or have purchased in the past. If a customer is navigating to some specific location and his favorite food outlet is nearby, then he can be advertised for any offers at that time of day.

Target customers within a certain Distance of Competitor's Business.

- When a brand strategically targets a consumer based on their proximity to the competitor's business, basically they are harnessing the power of comparative advertising.

Search Results based on Location.

- With this approach, customers are targeted based on what they are looking for to buy for themselves. For eg., if a customer searched for some recipe to make falafel in his search bar, then he can be suggested nearby outlets who sell falafel or even advertised with ingredients available in the nearby local store to make it.

4.Comparison with existing techniques.

The main fact about location-based advertisement is that location data boosts the effectiveness of marketing and advertising campaigns remain true in every system. But the campaign effectiveness increases when location-based data is used to personalize the customer experience. So in our current system, as compared to the existing system, it does not stay dependent only on the user's location but also on their preferences, age group, areas of interest and also the bidding request for application and price of application offered to the user.

Some unique criteria for filtering user data.

In our project, we have taken into consideration several factors that could be taken into consideration for filtering location data of the user such that the target audience is narrowed and becomes more relevant to advertise to them.

One of the most important factor to be considered is using filters as the age group of user, their interest, the bidding price by an advertiser, category or genre of interest, target segment for the advertiser and mainly their location derived from latitude and longitude of their mobile device.

Case - Study on Walmart:

Walmart carried out an experiment called Geo-Fencing campaign where they created a zone around their physical store for advertisement targeting and used weather data to attract users by giving a recommendation based on their search. Campaign Goal: Wal-Mart wanted an efficient way to target on-the-go consumers with mobile location data along with weather-based location targeting. As new technologies became available, Mediative partnered with WalMart to test the ability to drive superior results and they carried out this experiment.

INSTANCE: The advertisement targeted users in Toronto, Montreal and Vancouver's business delivered a 1.03% CTR. This advertisement encouraged users passing nearby the store to purchase discounted swimwear and it delivered results as 1.85% CTR via their hyper-targeted delivery to a small geo-location around Canada's Wonderland, on the hottest day of the year which was recorded based on weather data of geo-location.

An example of reference using geo-fencing strategy for advertisement.

- *Strategies for Improved Media-Mix Effectiveness And Questions for Future Research, Vassilis Bakopoulos, John Baronello, Rex Briggs DOI: 10.2501/JAR-2017-052 Published 1 December 2017.*

5.Analytical Results of the project.

Bid requester will put his request in the system for displaying advertisement with all the necessary details. Agent or bot will keep on looking for new requests. As soon as a new request enters the system, the agent will be assigned to work on this request. This agent will then match user segments and geo locations with the user profile data. It will fetch the details of applications running on all the matching user's device. This device details will then be used for bidding on behalf of bid requester to display their advertisements. Bidding engine will make sure that it chooses the best bidder and display its advertisement.

- ***File1:*** Applications list
    - Applications, Category of application, Price, Age-group, Genre
- ***File2***: Bid-Requests
    - Bid_Id, Location, Price, Target-group, Target Segment
- ***File3:*** Users (generated as result by above two files)
    - Name, Address, Age group.
    -

Description of work done:

Building Recommendation Engine (by Vivek) and Bidding Engine (by Saumya):

Applications: This table contains data related to end-user applications, those are willing to display advertisements on their platform. It will store the data related to the type of advertisement they can display, type of application (mobile application, web page, streaming sites), the category of application (educational, games, music), etc.

Eg: Application id: 1234584

Type of application: Mobile

Name of application: Spotify

Category of application: *music*

Bid request: This table contains data related to customers who want to market their products or data about advertisers. It will also have details like user segments, location, type of advertisement(Audio, video, HTML, image).

Eg: Request Id: 283947,

Requested location: *Los Angeles, California, US*

Targeted brand: Starbucks

Targeted user segments: Coffee lover, young

Type of advertisement: Mobile Device Application, HTML

User profiles: This table will contain the data related to users. It will store user segments, purchasing index, current location, an application that the user is running at the moment in his mobile device, etc.

Eg: User id: 101001

Current location: 33.7838° N, 118.1141° W

Current application: Spotify

User segments (multivalue): Coffee lover, Gym freak, IT professional, Single.

The flow of Working: Bid requester will put his request in the system for displaying advertisement with all the necessary details. As soon as a new request enters the system, the agent will be assigned to work on this request. This agent then matches user segments and geo locations with the user profile data as a recommendation engine for an advertiser. It fetches the details of applications running on all the matching user's device. This device details will then be used for bidding on behalf of bid requester to display their advertisements. Bidding engine will make sure that it chooses the best bidder and display its advertisement after satisfying certain conditions which are mentioned later in the report. After getting this data set, as a result, we used Tableau to visualize the data as it is a more efficient way for advertisers to target the audience and devise a more relative strategy to target users within a specific location of a physical store.

How does it work?

The process flow for this system is as shown in the figure below used for our project.

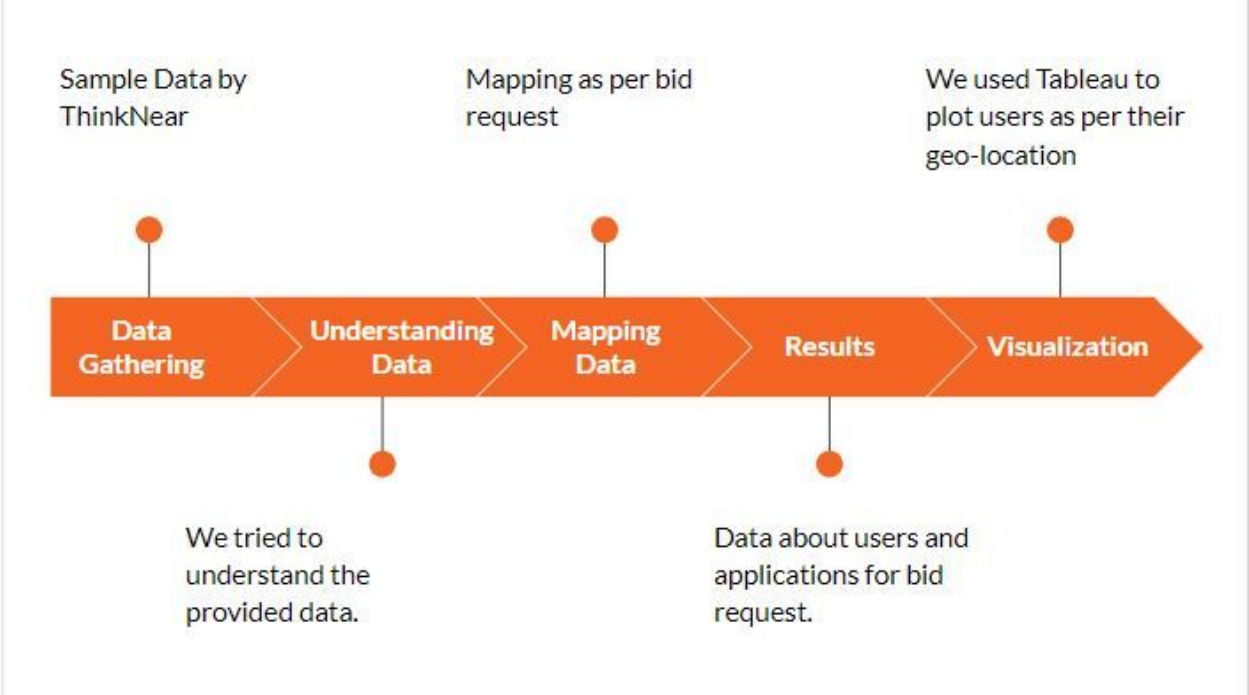

Fig: 5.1 Different stages of application for this project.

As shown in fig 5.1, initially we gathered a sample data and that we tied to understand the different attributes in the data set. After that, we mapped the data as per several criteria and obtained the filtered results in different files. Than using tableau we visualized this data into the form of representation along with user location and zip code of that location.

Understanding Data:

This process started with the Collection of data related to how much they spent on advertising and marketing. After understanding and reading various details we understood the advertising cost is location dependent. The dataset of the users is collected from the google link provided, the application dataset with its attribute was found on google store dataset. After which we contacted a company to give us the bidding data, hence they provided us with the sample data because of their policy.

We cleaned the dataset by removing all the unwanted or non-ASCII characters in the whole dataset. In the user dataset we encountered users with some location which were not recognizable, therefore had to delete such users to avoid wrong location input. Also based on the user's age grouped them into categories such as adult kid etc. Further we analyzed our dataset on the Tableau to find where the users are located on the map to avoid biased location recommendation.

After gathering the necessary dataset, we tried to understand the data such that it can be used more effectively.

	A	B	C	D	E	F	G	H	I	J	K	L	M
	first_nam	last_name	company_	address	city	county	state	zip	phone1	phone2	email	web	Age_grou
	James	Butt	Benton, Jo	6649 N Blu	New Orle	Orleans	LA	70116	504-621-8	504-845-1	jbutt@gm	http://ww	KIDS
	Josephine	Darakjy	Chanay, Je	4 B Blue R	Brighton	Livingston	MI	48116	810-292-9	810-374-9	josephine	http://ww	KIDS
	Art	Venere	Chemel, J	8 W Cerrit	Bridgepor	Gloucester	NJ	8014	856-636-8	856-264-4	art@vene	http://ww	TEEN
	Lenna	Paprocki	Feltz Print	639 Main S	Anchorage	Anchorage	AK	99501	907-385-4	907-921-2	lpaprocki(	http://ww	KIDS
	Donette	Foller	Printing D	34 Center	Hamilton	Butler	OH	45011	513-570-1	513-549-4	donette.f	http://ww	ADULTS
	Simona	Morasca	Chapman,	3 Mcauley	Ashland	Ashland	OH	44805	419-503-2	419-800-6	simona@r	http://ww	KIDS
	Mitsue	Tollner	Morlong A	7 Eads St	Chicago	Cook	IL	60632	773-573-6	773-924-8	mitsue_to	http://ww	ADULTS
	Leota	Dilliard	Commerci	7 W Jackso	San Jose	Santa Clar	CA	95111	408-752-3	408-813-1	leota@ho	http://ww	ADULTS
	Sage	Wieser	Truhlar An	5 Boston A	Sioux Falls	Minnehah	SD	57105	605-414-2	605-794-4	sage_wies	http://ww	TEEN
	Kris	Marrier	King, Chri	228 Runan	Baltimore	Baltimore	MD	21224	410-655-8	410-804-4	kris@gma	http://ww	ADULTS
	Minna	Amigon	Dorl, Jame	2371 Jerro	Kulpsville	Montgom	PA	19443	215-874-1	215-422-8	minna_an	http://ww	TEEN
	Abel	Maclead	Rangoni C	37275 St F	Middle Isl	Suffolk	NY	11953	631-335-3	631-677-3	amaclead	http://ww	ADULTS
	Kiley	Caldarera	Feiner Bro	25 E 75th S	Los Angel	Los Angel	CA	90034	310-498-5	310-254-3	kiley.cald	http://ww	TEEN
	Graciela	Ruta	Buckley M	98 Connec	Chagrin Fa	Geauga	OH	44023	440-780-8	440-579-7	gruta@co	http://ww	KIDS
	Cammy	Albares	Rousseau	56 E More	Laredo	Webb	TX	78045	956-537-6	956-841-7	calbares@	http://ww	TEEN
	Mattie	Poquette	Century C	73 State R	Phoenix	Maricopa	AZ	85013	602-277-4	602-953-6	mattie@a	http://ww	ADULTS
	Meaghan	Garufi	Bolton, W	69734 E Ca	Mc Minnv	Warren	TN	37110	931-313-9	931-235-7	meaghan(	http://ww	TEEN
	Gladys	Rim	T M Byxbe	322 New H	Milwauke	Milwauke	WI	53207	414-661-9	414-377-2	gladys.rim	http://ww	ADULTS
	Yuki	Whobrey	Farmers In	1 State Ro	Taylor	Wayne	MI	48180	313-288-7	313-341-4	yuki_who	http://ww	KIDS
	Fletcher	Flosi	Post Box S	394 Manch	Rockford	Winnebag	IL	61109	815-828-2	815-426-5	fletcher.fl	http://ww	TEEN
	Bette	Nicka	Sport En A	6 S 33rd St	Aston	Delaware	PA	19014	610-545-3	610-492-4	bette_nic	http://ww	TEEN
	Veronika	Inouye	C 4 Netwo	6 Greenle	San Jose	Santa Clar	CA	95111	408-540-1	408-813-4	vinouye@	http://ww	ADULTS
	Willard	Kolmetz	Ingalls, Do	618 W Yak	Irving	Dallas	TX	75062	972-303-9	972-896-4	willard@h	http://ww	ADULTS

Fig: 5.2 User.csv datasets used for gathering user base.

	Category	Rating	Reviews	Size	Installs	Type	Price	Age_grou	Genres	Last Updated	Current V	Android Ve
	ART_AND_	4.1	159	19M	10,000+	Free	100	Everyone	Art & Desi	07-Jan-18	1.0.0	4.0.3 and u
	ART_AND_	3.9	967	14M	500,000+	Free	100	Everyone	Art & Desi	15-Jan-18	2.0.0	4.0.3 and u
	ART_AND_	4.7	87510	8.7M	5,000,000+	Free	0	Everyone	Art & Desi	01-Aug-18	1.2.4	4.0.3 and u
	ART_AND_	4.5	215644	25M	50,000,000	Free	0	Teen	Art & Desi	08-Jun-18	Varies wit	4.2 and up
	ART_AND_	4.3	967	2.8M	100,000+	Free	0	Everyone	Art & Desi	20-Jun-18	1.1	4.4 and up
	ART_AND_	4.4	167	5.6M	50,000+	Free	0	Everyone	Art & Desi	26-Mar-17	1	2.3 and up
	ART_AND_	3.8	178	19M	50,000+	Free	0	Everyone	Art & Desi	26-Apr-18	1.1	4.0.3 and u
	ART_AND_	4.1	36815	29M	1,000,000+	Free	0	Everyone	Art & Desi	14-Jun-18	6.1.61.1	4.2 and up
	ART_AND_	4.4	13791	33M	1,000,000+	Free	0	Everyone	Art & Desi	20-Sep-17	2.9.2	3.0 and up
	ART_AND_	4.7	121	3.1M	10,000+	Free	0	Everyone	Art & Desi	03-Jul-18	2.8	4.0.3 and u
	ART_AND_	4.4	13880	28M	1,000,000+	Free	0	Everyone	Art & Desi	27-Oct-17	1.0.4	4.1 and up
	ART_AND_	4.4	8788	12M	1,000,000+	Free	0	Everyone	Art & Desi	31-Jul-18	1.0.15	4.0 and up
	ART_AND_	4.2	44829	20M	10,000,000	Free	0	Teen	Art & Desi	02-Apr-18	3.8	4.1 and up
	ART_AND_	4.6	4326	21M	100,000+	Free	0	Everyone	Art & Desi	26-Jun-18	1.0.4	4.4 and up
	ART_AND_	4.4	1518	37M	100,000+	Free	0	Everyone	Art & Desi	03-Aug-18	1.2.3	2.3 and up
	ART_AND_	3.2	55	2.7M	5,000+	Free	0	Everyone	Art & Desi	06-Jun-18	NaN	4.2 and up
	ART_AND_	4.7	3632	5.5M	500,000+	Free	0	Everyone	Art & Desi	31-Jul-18	3.1	4.1 and up
	ART_AND_	4.5	27	17M	10,000+	Free	0	Everyone	Art & Desi	07-Nov-17	1	2.3 and up
	ART_AND_	4.3	194216	39M	5,000,000+	Free	0	Everyone	Art & Desi	03-Aug-18	2.2.5	4.0.3 and u
	ART_AND_	4.6	224399	31M	10,000,000	Free	0	Everyone	Art & Desi	30-Jul-18	5.5.4	4.1 and up
	ART_AND_	4	450	14M	100,000+	Free	0	Everyone	Art & Desi	20-Apr-18	4	4.1 and up
	ART_AND_	4.1	654	12M	100,000+	Free	0	Everyone	Art & Desi	20-Mar-18	1.1	4.0.3 and u
	ART_AND_	4.7	7699	4.2M	500,000+	Free	0	KIDS	Art & Desi	12-Jul-18	2.2.6.2	4.0.3 and u

Fig: 5.3 App.csv datasets of applications on the store.

As shown in fig 5.2 and 5.3, the data set for user and app store are available with many attributes out of which some are irrelevant whereas some needs to be converted to another form to be used for filter process to obtain results.

Mapping Data and Results:

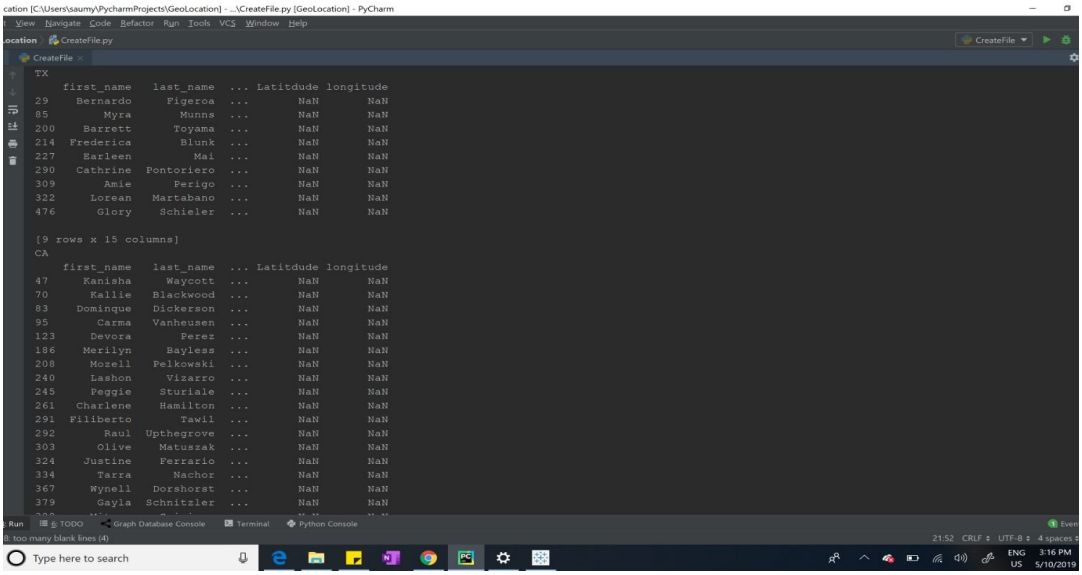

Fig: 5.4 Results of Users and application list for a bid request.

As shown in fig 5.4, several conditions were checked and filtered results were obtained for each bid_ID and list of app_ID for each user is obtained. Below is the list of several checked conditions to obtain those results.

Some necessary conditions to be satisfied.

- **Bid_price<=App_price:** To check if the bidding price of an advertiser is within range of price of application on the store.
- **Bid_Target==App_Target || Everyone:** To check if the targeted age group in both dataset matches to filter out other irrelevant user age groups.
- **Bid_TargetSegment == App_TargetSegment:** To check if the genre or category matches to obtain the final list of applications.
- **User_Location==Bid_Location:** To match mandatory location within a certain range for both dataset to make it relevant to the user.
- **Bid_TargetGroup== User_TargetGroup:** To check if both have same targeted users.

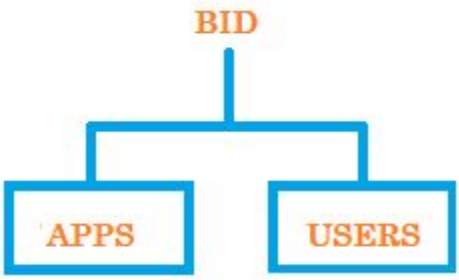

Fig: 5.5 Apps and user result based on bidding.

Visualization:

This strategy makes it easier for an advertiser to determine their target audience easily and gives them more statistics for regions where they need to focus on more for growing their business.

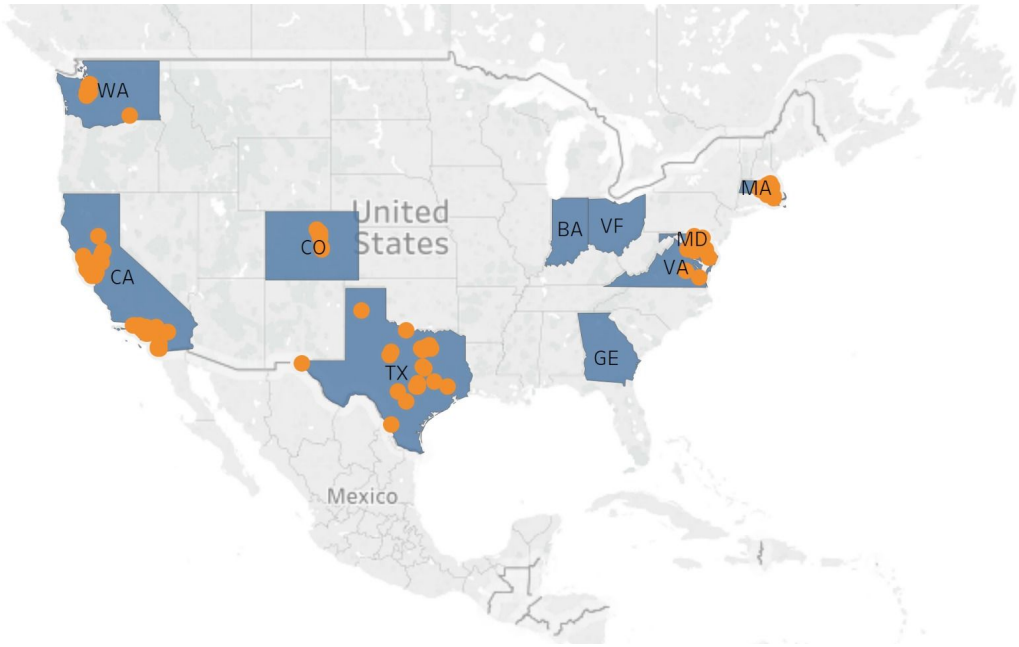

Fig: 5.6 Visualization of users based on their location.

As shown in fig 5.6, after obtaining the result file with applied filters, it is then plotted on a map with coordinates to visualize the targeted user base. Based on that advertiser could devise a strategy to engage more customers to buy their products from local or physical store within their location.

6.Future of advertising

User Interests.

- Based on the user's area of interest, the available dataset can be enhanced and this leads to more relevant advertising to the user.
- If a user has some preferences than they can get a recommendation based on what they have subscribed for or have searched for something similar.

Embedding in Self-driving cars.

- The user can be advertised for some offers in a nearby physical store in an automated car based on their proximity to the location.
- They can get an advertisement when the car is at a traffic signal or not in any motion state and by that approach, an advertiser can widen their reach to the targeted customer.

6.Conclusion

- In this Report, we presented a systematic discussion of the scientific aspect and summarized location-based recommendation. First, we discussed the benefits of this technology and the preliminary findings.Second, we did a case study on how walmart used this technique and used their data to develop same for their company. Lastly, we discussed about the proposed technique, how the dataset is gathered and used to recommend users and application based on the bidding request from the companies.Results that we get is application and users for each bidding request which helps to target users for advertising based on their geo-location such that users get only relevant advertisement based on filter and conditions checked and advertiser's can obtain maximum profit from their effective marketing strategy. This strategy in advertisement keeps the user engaged in the product as they only get relevant advertisement based on their preferences and interest when their location is nearby physical store and thereby it also helps advertisers to collect data with permission from the user to give a better recommendation based on his geo-location.

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