The Future Of Food Delivery & Pick-Up At AGM

Florencia Froebel & Dunny Semwayo
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Agenda

In an effort to improve the current delivery and pick-up system at AGM, while expanding the customer base, today we seek to explore:

- Adding more pickup locations
- Using public transportation to transport deliveries (BART system)
- Using delivery drones
- Using delivery robots
- A hybrid approach of any combination of these options
- NoSQL vs SQL database
- Use cases for MongoDB
- Use cases for Redis

Adding pick-up locations

Motivation For Choosing Pick-Up Locations:

- AGM executive only want to explore pick-up locations near the Berkeley store and the San Francisco Bay Area.

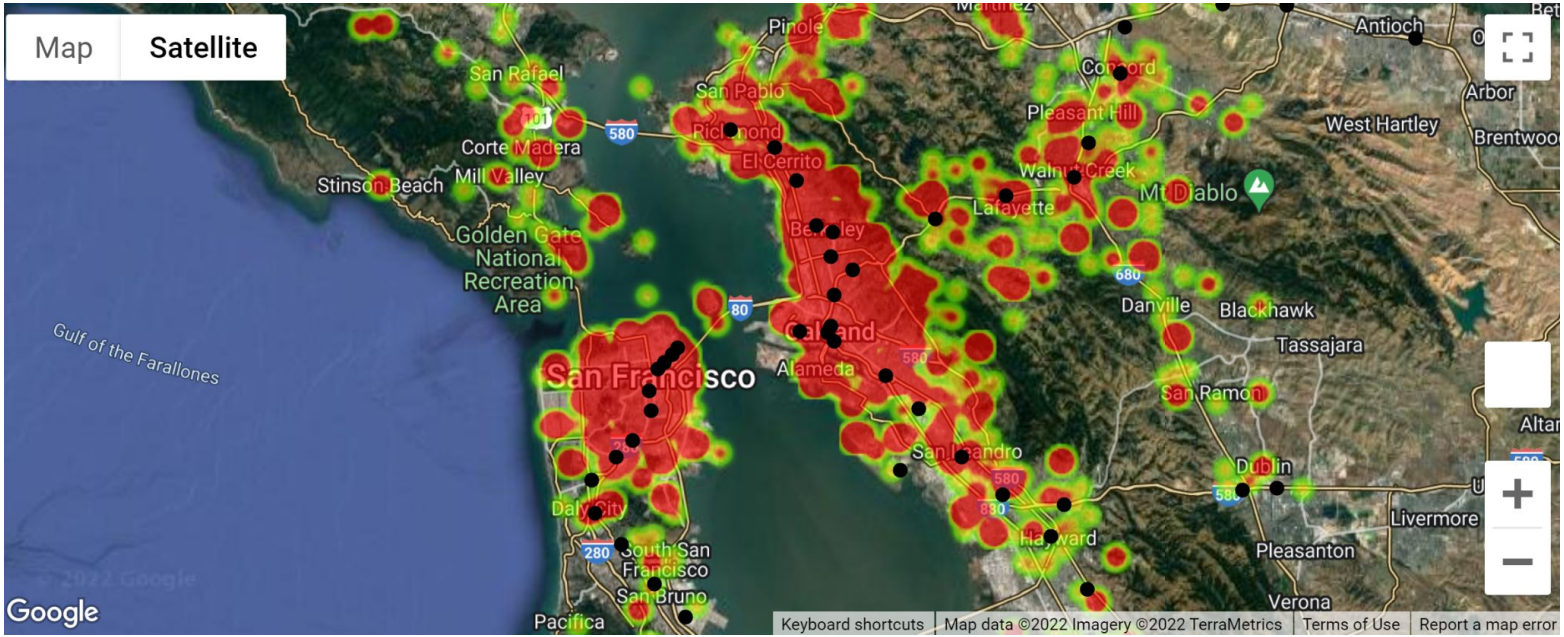
- We want to focus our efforts of choosing new pick-up location near or at the BART system stations. This is because of the convenience customers will experience if they have the ability to retrieve their AGM purchase as they travel to or from home.

- We also want to base our pick-up locations near the BART system in order to take advantage of the possibility of establishing a public transportation delivery system

- We want to find the BART stations that not only are in a strategic location but are also close to the majority of our customer base so there is an immediate revenue.

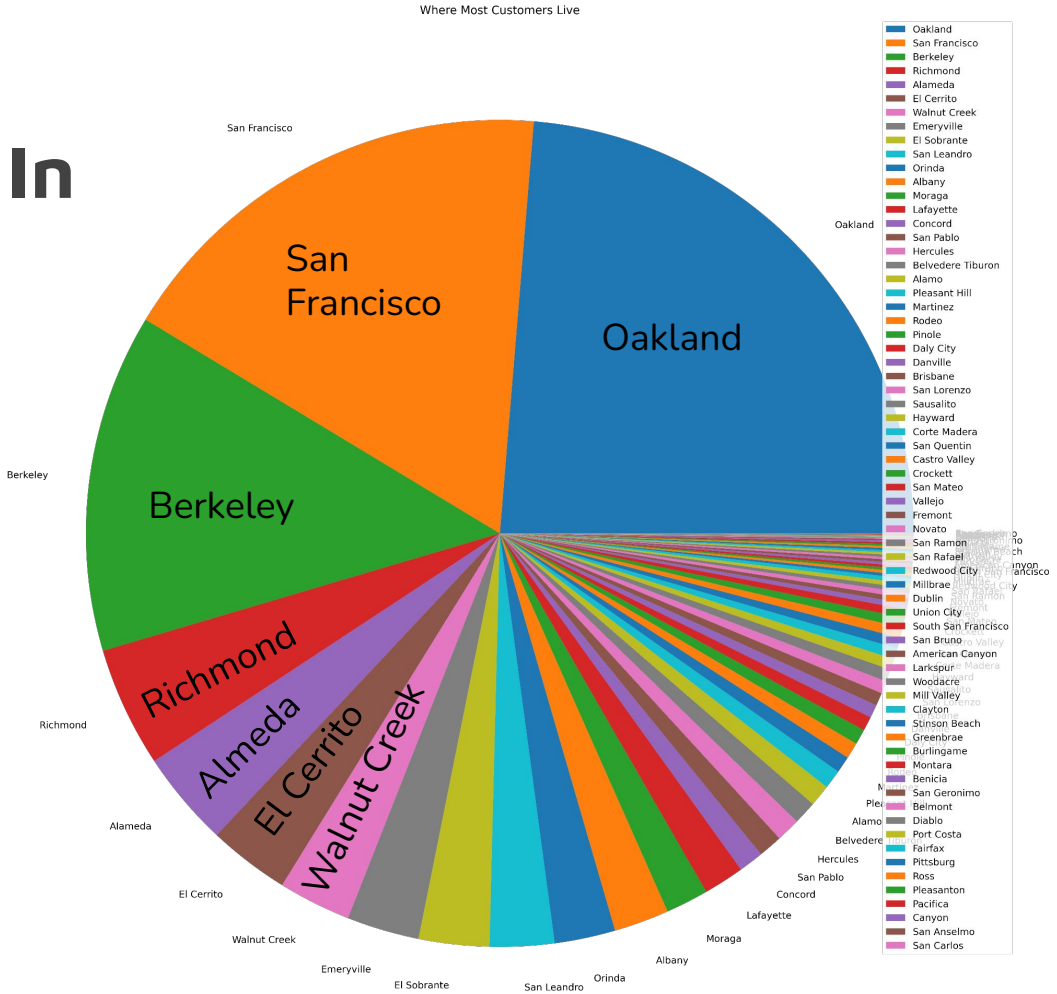
Where do our customers live?

- Our California customer base resides in 144 different zip codes and 66 different cities



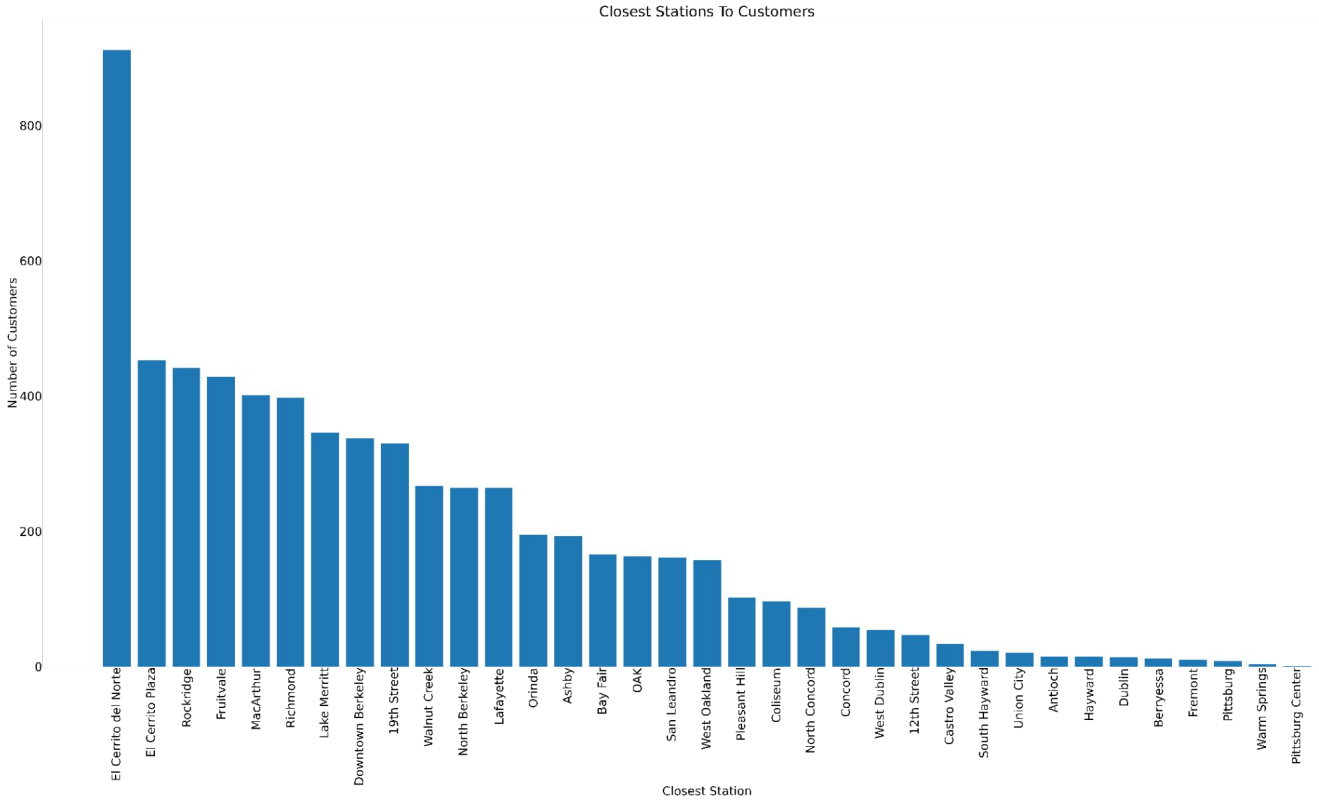
Cities Most Customers Live In

1. Oakland
2. San Francisco
3. Berkeley
4. Richmond
5. Alameda
6. El Cerrito
7. Walnut Creek
8. Emeryville
9. El Sobrante
10. San Leandro



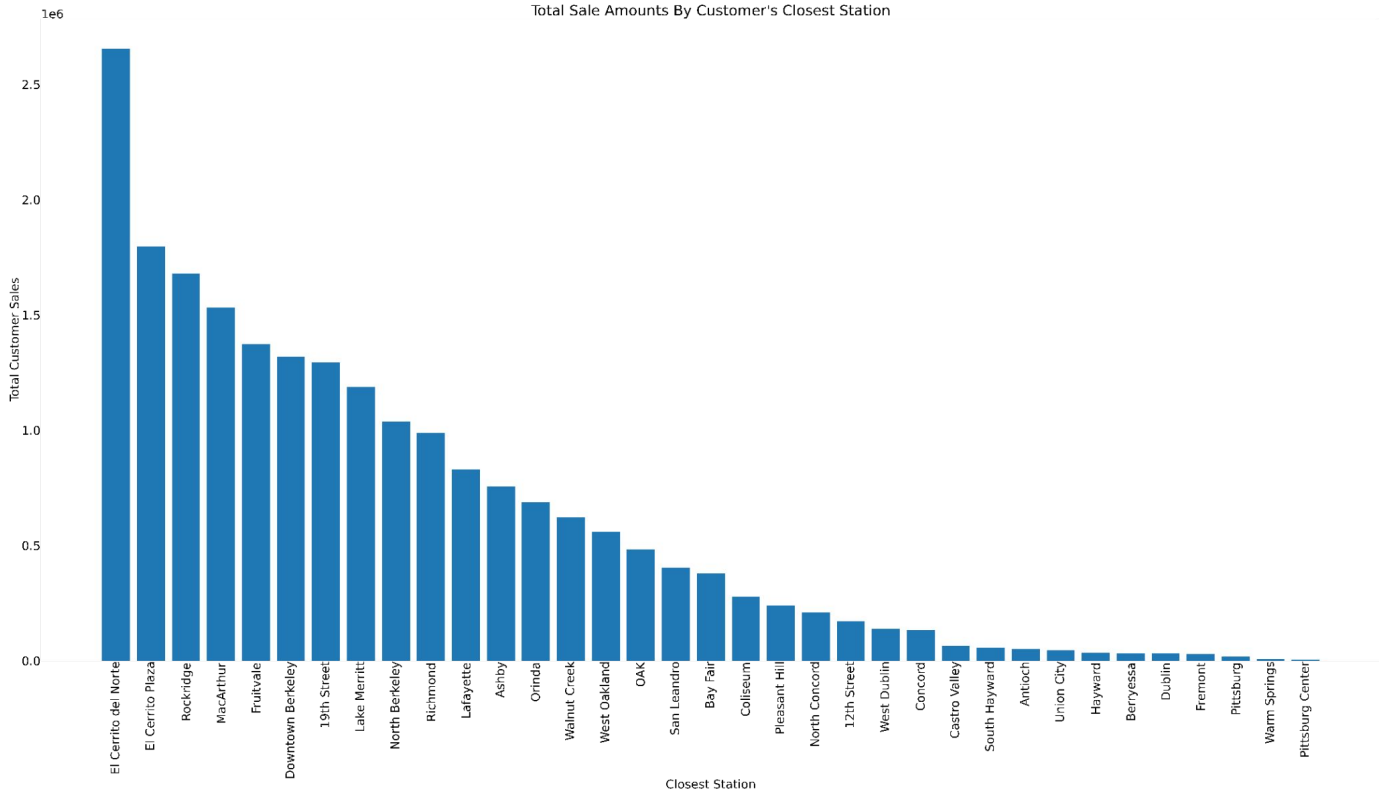
What BART Stations Our Customers Closest To… (Excluding San Francisco Bay Area Stations)

1. El Cerrito del Norte
2. El Cerrito Plaza
3. Rockridge
4. Fruitvale
5. MacArthur
6. Richmond
7. Lake Merritt
8. Downtown Berkeley
9. 19th Street
10. Walnut Creek



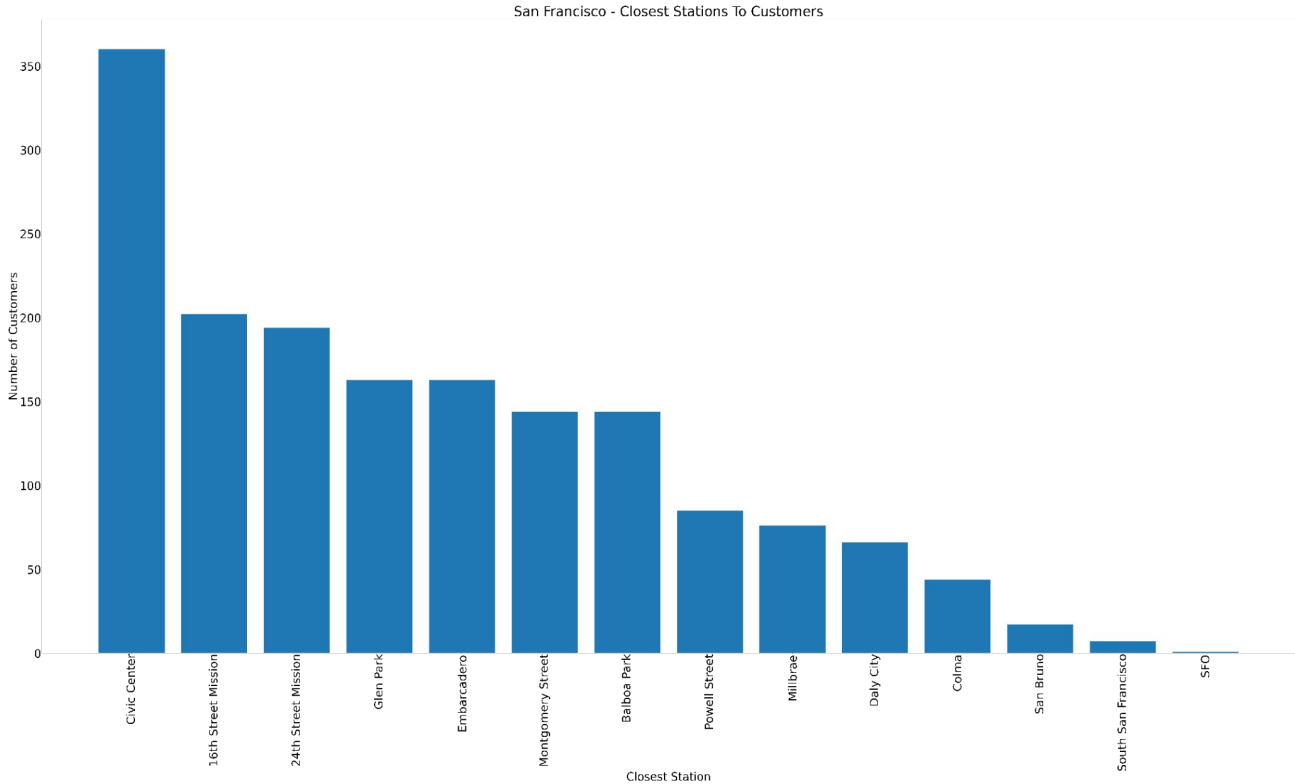
What BART Stations Bring In The Most Revenue… (Excluding San Francisco Bay Area Stations)

1. El Cerrito del Norte
2. El Cerrito Plaza
3. Rockridge
4. MacArthur
5. Fruitvale
6. Downtown Berkeley
7. 19th Street
8. Lake Merritt
9. North Berkeley
10. Richmond



What BART Stations Our Customers Closest To… (San Francisco Bay Area Stations)

1. Civic Center
2. 16th Street Mission
3. 24th Street Mission
4. Glen Park
5. Embarcadero
6. Montgomery Street
7. Balboa Park
8. Powell Street
9. Millbrae
10. Daly City



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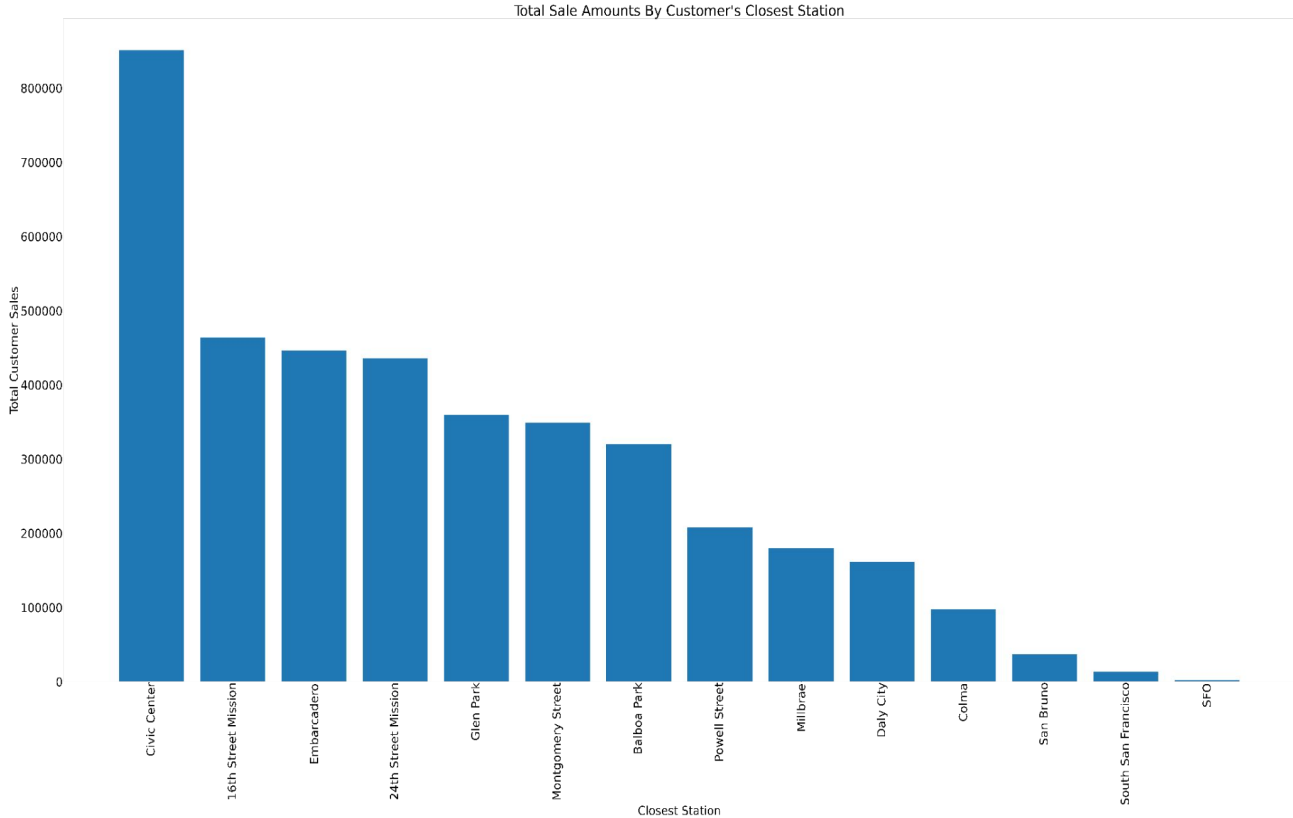


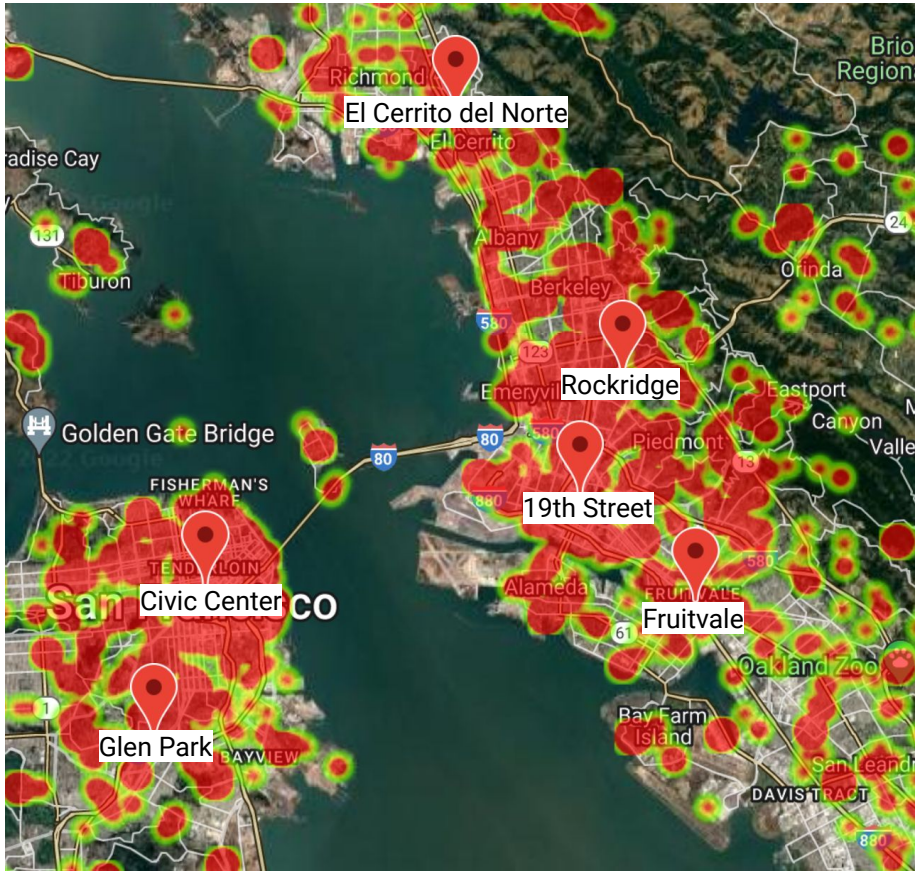
What makes a location in the BART system strategic?

- High Betweenness
  - High betweenness indicates a station that is a highly influential control point in the BART system. It also means the station lies on a lot of paths between two other stations.

- High Closeness
  - High closeness indicates that a station has a short distance to other stations and is able to connect to other stations most efficiently

- High Degree Centrality
  - High degree centrality indicates that a station is highly connected to other stations since it has a large number of incoming and outgoing paths

Potential Pick-Up Locations



Using Public Transportation To Transport Deliveries (BART System)...

- We can leverage the investment of new pick up locations to launch a public transportation delivery system
- The proposed pick up areas are in strategic locations to be able to reach the wide set of AGM customers

<u>The Idea:</u>

1. Delivery workers can retrieve customer orders from the Berkeley store and then easily reach pick up locations to deliver customer orders using the BART system.
2. The food will be kept in small locked climate-control storage spaces while waiting to be picked up by customers.
3. Customers can then use the BART system to travel to the pick up location and retrieve their orders on their way to/from home.

Using Delivery Drones...autonomous

- *Capacity to carry up to 26 pounds parcel size & up to 15 miles delivery range.*
- *Research shows use of home delivery drones will more than double market size of local businesses.*
- *Drone delivery at least 50% cheaper than existing & safer than existing options.*
- *More suited to less dense & suburban homes*
- *Delivery drones pose a threat to human employment.*

Proposal to use robots at a University

- *Last mile delivery accounts for over 50% of the total delivery cost.*
- *Drone station to be set up at or near Berkeley store.*
- *Business case for own delivery system or rental*
- *Drone delivery prioritised for suburban areas.*
- *Total delivery cost will likely be less than @$2 per trip*
- *Cheaper than Peak delivery cost of $12 per order.*

Using Delivery Robots...

- *Robots are autonomous 99% of the time.*
- *Capacity to carry up to 20 pounds parcel size & up to 3 miles delivery range.*
- *Ideal for closed environments like university campus.*
- *Starship robots leader - completed 2 million miles*
- *Each robot cost up to $5,000 & require 6 trips daily @$2 per trip to pay back cost.*

Proposal to use robots at a University

- *Robots can be kept in a delivery van set up at a campus.*
- *Delivery will be available at set times around meal times.*
- *Number of drones will depend on expected delivery volumes.*
- *Delivery will be for a fee and aim is for each drone to complete at least 10 deliveries per day.*

Hybrid Approach

- *Berkeley store remains as the anchor*
- *Set up delivery collections points at or near the selected stations depending on space availability*
- *Deliver regularly to the collection of pick-up locations using the BART transport network*
- ***ADD** option of drones for customers who cannot access store & collections located in less dense suburban areas*
- ***CONSIDER** robot delivery in closed communities like University campuses in Berkeley*
- *Financials should be reviewed taking into account all costs & comparison with Peak delivery option*
- *Maintain Peak delivery option until POC is done and a long term decision made.*

NoSQL vs SQL

- SQL is structured, transaction focused and can easily use keys

  It was use to determine where most of the customers lived, where the money is being made, and what stations most of the customers are closest as this dependent on a key like customer ID.

- Neo4j handles complex relationships, flexible and easily scalable. NoSQL graph database has built in and readily available metrics o find these strategic points. For example, we could easily calculate how central and in between a station is. This would be challenging to figure out in SQL as its structured.

  This was used to determine the most optimal/strategic location for the pick up spots using the the metrics above

- NoSQL like neo4j have good graphics for visualisation

  A NoSQL graph database such as Neo4j would be a logical choice to analyze a systems such as BART. It provides helpful tools to not only analyze relationships between stations but also visualize them.

Use cases for MongoDB

- Use of MongoDB for data analysis of store and delivery options.
- Different Point of Views will be key for the analysis to understand activities by customers, stores, stations, delivery methods.
- Need to ensure data is updated automatically in all its available forms as its denormalized.
- Works in storage with cache memory to ensure both on demand and long term analytics can be quickly delivered.
- Company will need on demand analytics for delivery options and which station to replenish...
- Also requires long term analytics to evaluate viability and profitability of the business and hybrid delivery network

Use cases for Redis

- Hybrid delivery system will mean a number of delivery options are available to the customer.
- Delivery options will depend on customer location and time of ordering.
- Quick response will be required before a client places an order.
- Customer address aspects like zip code , latitude will be used as keys to retrieve option.
- Available meals or options will also need to be quickly updated & considered before an order is accepted for a set delivery option.
- Database of customer addresses and meal availability will fit in memory.
- Will be good as business scales to more customers and additional stores.
- The cost should be manageable but will need to be considered in the financial assessment of the hybrid delivery system.
- The database should be backed up on a regular basis to storage in case of failure.

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Questions?