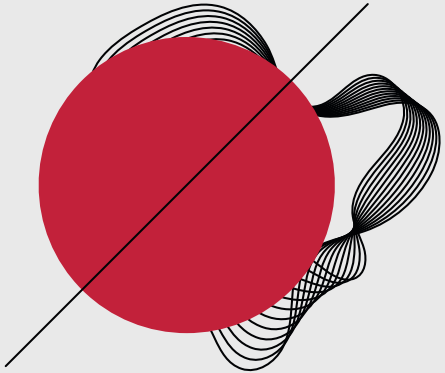
COVID-19 VACCINE CENTERS

A faster way to herd immunity.



Prepared by:
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01.

Introduction

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Back story of the project

- **40% percent of new yorkers uses the subway daily!**
- **Placing the vaccination centers near to subway stations is great idea!**
  - People can get can get vaccinated while going to work/home!
- **New York City Department of Health seeked to NYC Data Science company to answer:**
  - Where is the most effective stations to place the vaccination centers near by?

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Scope of the project

Sample size:

- Four months worth of data (3M rows); reason:
NYC started to distribute vaccine for all ages before 4 months.

Datasets used:

- MTA turnstile dataset.
- MTA subway stations zip code dataset.
- NYC-health COVID-19 vaccine dataset.

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Exploratory Data Analysis

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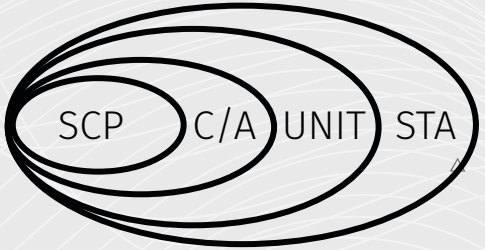
Working with the dataset

- **Grouping each turnstile**
- **Assumation:**

Total number of turnstiles: 5032




```
Data columns (total 7 columns):
 #   Column      Dtype
---  ------      -----
 0   STATION     object
 1   UNIT        object
 2   C/A         object
 3   SCP         object
 4   DATE_TIME   datetime64[ns]
 5   ENTRIES     int64
 6   EXITS       int64
dtypes: datetime64[ns](1), int64(2), object(4)
memory usage: 201.2+ MB
```

```
Data columns (total 5 columns):
 #   Column         Dtype
---  ------         -----
 0   STATION        object
 1   TURNSTILE ID   object
 2   DATE_TIME      datetime64[ns]
 3   ENTRIES        int64
 4   EXITS          int64
dtypes: datetime64[ns](1), int64(2), object(2)
memory usage: 143.7+ MB
```

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Working with the dataset

MISSING VALUES

- NO MISSING VALUES ARE FOUND

DUPLICATES

- THERE ARE DUPLICATES IN DESC COLUMN
- DUPLICATE ARE REMOVED

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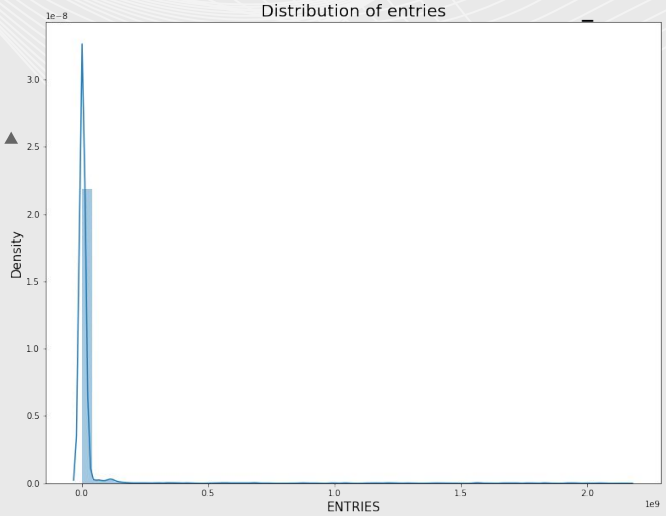
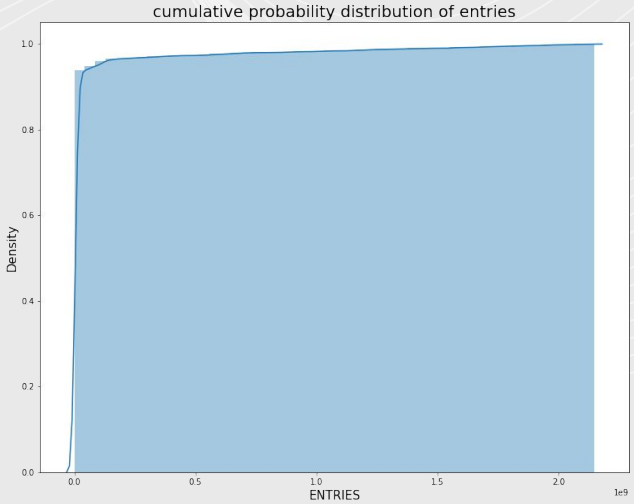
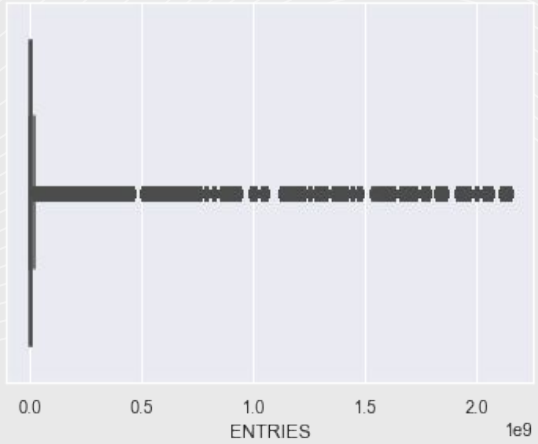
Visualizing the data

Dataset suffers from severely outliers!







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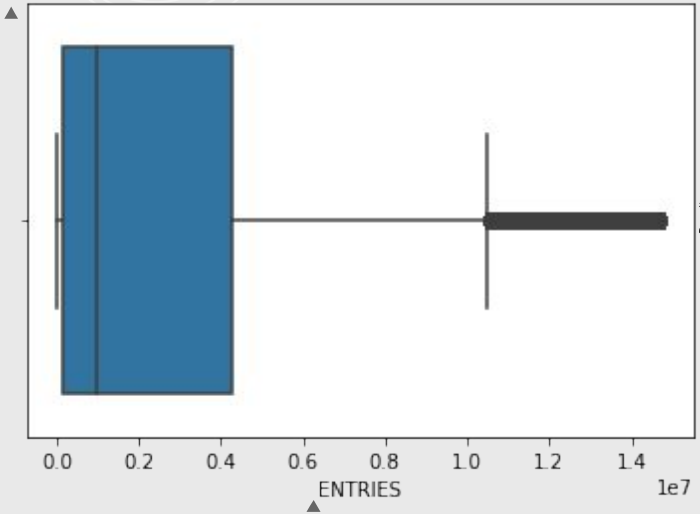
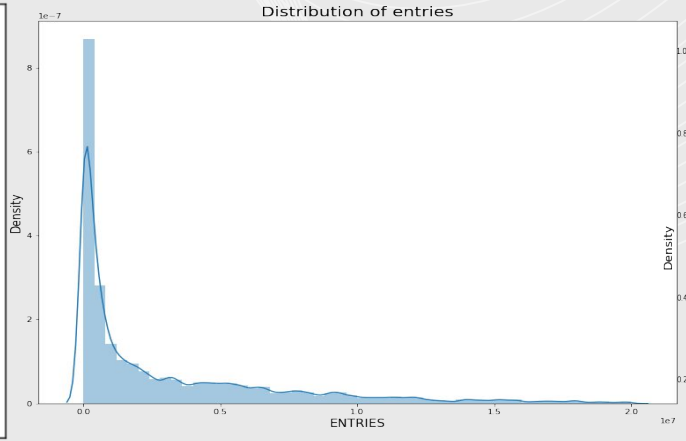
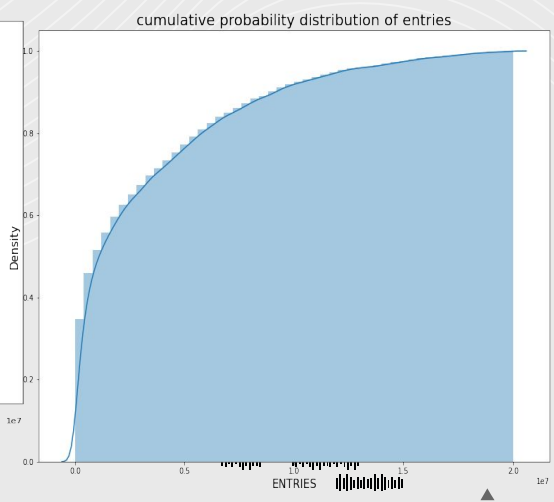
Working with outliers

Outliers threshold?

- Outliers after 15M entries for each turnstile (Using IQR)
- Empirically 20M was chosen to avoid loss of important information.
- Similar process was done to exits







1.1) Working with data - Hourly entries/exits

Challenges and solution

Observation:

1) If turnstile counting are reversed.
2) If counter increasing to more than limit of 900 per turnstile for each four hours.
3) If turnstile is suddenly overshooting in unusual behavior.

Hourly_Entries	
	430
DAY A	313

Same time different day

Hourly_Entries	
	899
DAY B	379

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1.2) Working with data - Hourly entries/exits

Challenges and solution

1) Solution to overshooting ?
   1.1) Get the median of same day at same time in different weeks.
   2.2) Removing outliers for each station.

STATION	Fixed_Hourly_Entries
34 ST-PENN STA	4352214
34 ST-HERALD SQ	3256149
125 ST	3132274
86 ST	2907853
23 ST	2849891
42 ST-PORT AUTH	2721105
FLUSHING-MAIN	2686299
14 ST-UNION SQ	2644451
JKSN HT-ROOSVLT	2592408
TIMES SQ-42 ST	2445775
96 ST	2295068

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1.2) Working with data - Hourly entries/exits

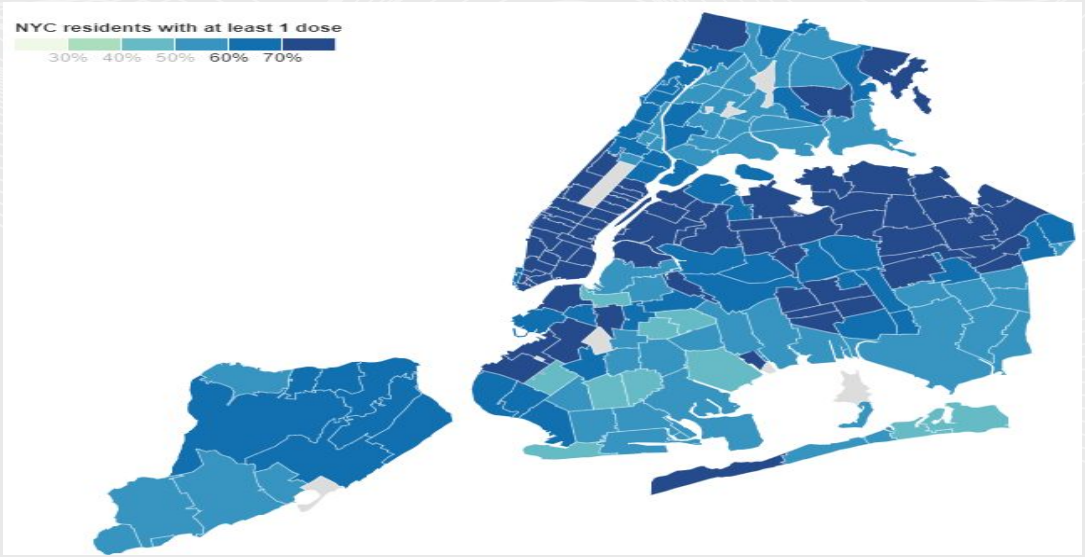
Results by removing only outliers for the whole dataset.

	STATION	entries of station (4months)	Monthly exits of station (4months)
0	34 ST-PENN STA	4091308	5042959
1	GRD CNTRL-42 ST	3277735	4428445
2	34 ST-HERALD SQ	3064163	3495343
3	23 ST	3016865	3464967
4	FULTON ST	2721699	3346058
5	59 ST	2536612	2705119
6	14 ST-UNION SQ	2448403	3207576
7	JKSN HT-ROOSVLT	2443236	2251527
8	86 ST	2419090	2886234
9	TIMES SQ-42 ST	2284576	3402594
10	125 ST	1913196	2458149

Rank	Station/Complex
1	Times Sq-42 St
2	Grand Central-42 St
3	34 St-Herald Sq
4	14 St-Union Sq
5	Fulton St
6	34 St-Penn Station
7	34 St-Penn Station
8	59 St-Columbus Circle
9	74-Broadway
10	Flushing-Main St

Source: MTA website - 2020

NYC-health vaccine dataset



Observation from data:

1) The total percentage of fully vaccinated: 61%

2) Total station in areas that has more than 70% vaccinated: 52

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Mapping MTA dataset to NYC COVID dataset

MTA DATA SET

STATION	ENTRIES (Daily)	EXI
34 ST-PENN STA	32471	400
GRD CNTRL-42 ST	26014	351
34 ST-HERALD SQ	24319	277
23 ST	23943	275
FULTON ST	21601	265

	STATION	ENTRIES (Daily)	PERC_FULLY
207	GRD CNTRL-42 ST	26014	93
54	34 ST-HERALD SQ	24319	99
11	14 ST-UNION SQ	19432	69
228	JKSN HT-ROOSVLT	19391	84
310	TIMES SQ-42 ST	18132	100
...	...	...	...
292	ROCKAWAY PARK B	274	53
131	BEACH 98 ST	180	53
124	BEACH 105 ST	121	53
145	BROAD CHANNEL	112	46
272	ORCHARD BEACH	5	66

COVID-19 vaccine set

RHOOD_NAME	BOROUGH	ZIPCODE	Label	PERC_FULLY
loMad/West	Manhattan	10001	10001, 10118	99
/Lower East Side	Manhattan	10002	10002	76
amercy/Greenwich	Manhattan	10003	10003	69
District	Manhattan	10004	10004	100
District	Manhattan	10005	10005	84

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Insights

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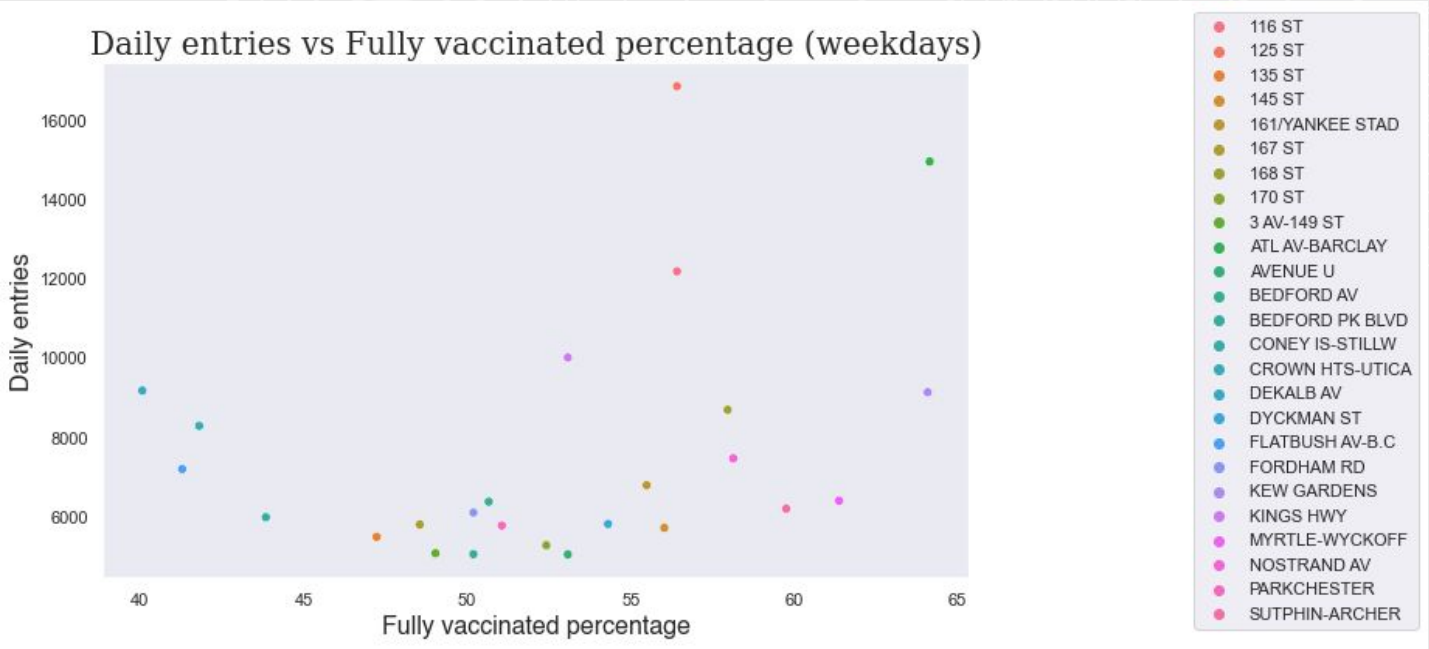
Daily entries vs. vaccine percent by station



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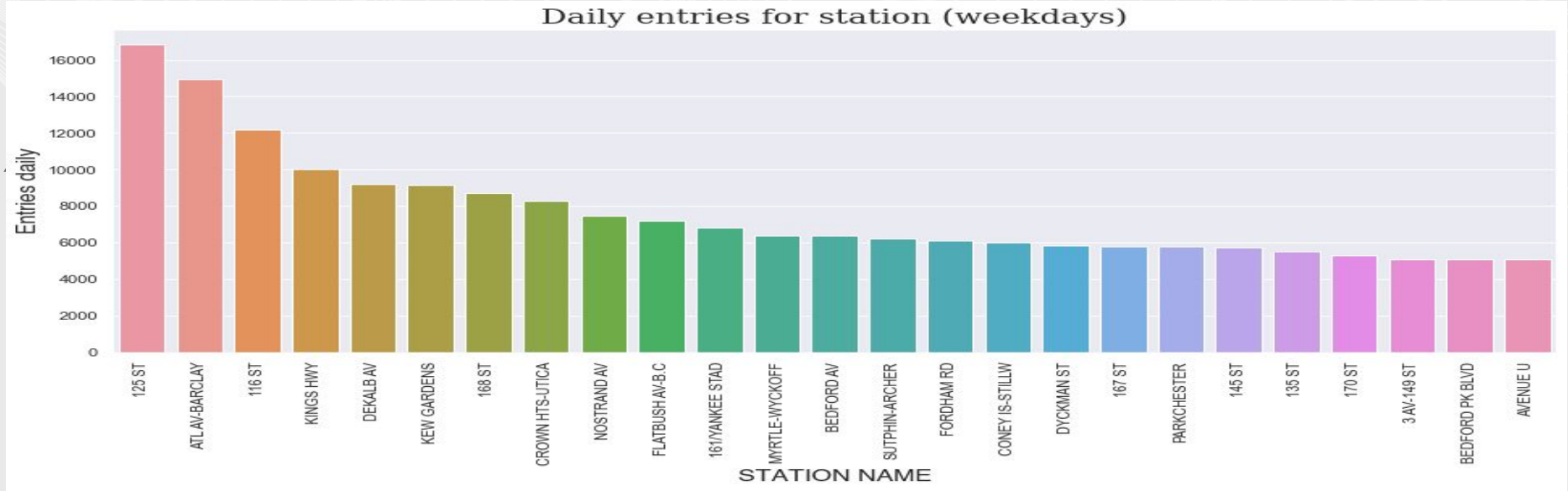
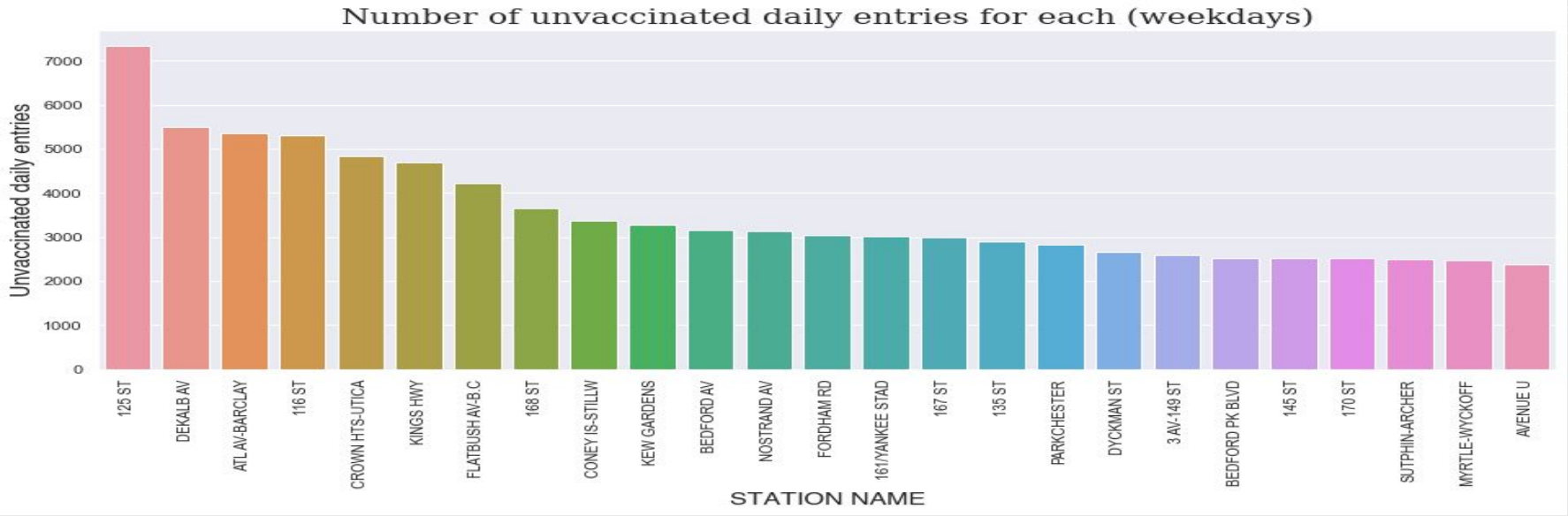
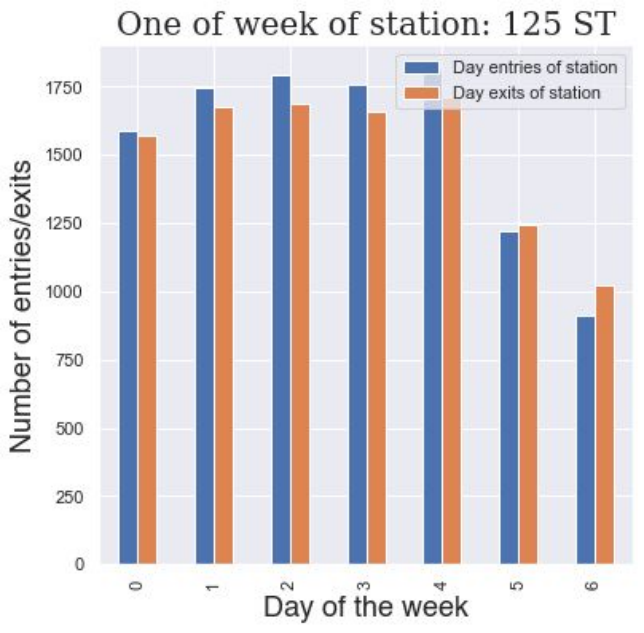
Daily entries for stations - weekdays



Number of unvaccinated for each stations - weekdays



Analysis of entries/exits



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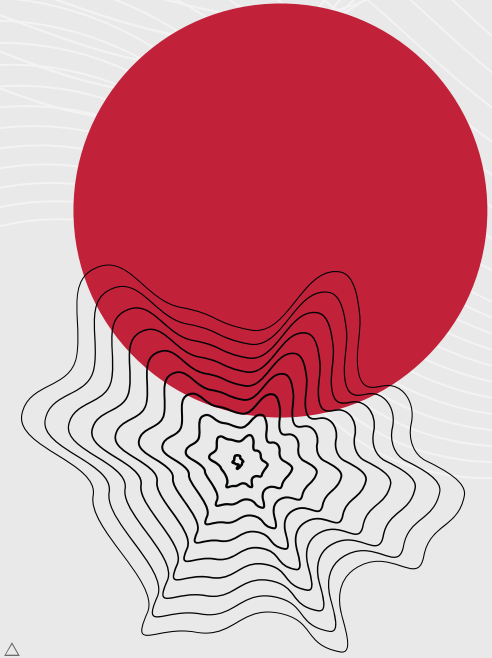
THANKS!



Future works:

1) Automated weekly reports of best vaccine centers.
2) Use dashboards i.e. using Tableau.

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