Project 1: Data Analysis of Restaurants in Washington DC

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Outline:

A client wants to open a restaurant in Washington DC. What type of restaurant should they open and where in DC ?

Our Analysis will answer **4 questions**:

- What is the most competitive restaurant type in each DC Quadrant?
- What is the average restaurant quality for restaurant types in each DC Quadrant?
- What are the best graded restaurants in DC ? Do they reflect their demographics ?
- Food trucks vs Restaurants, what to pick ?

What is the most competitive restaurant type in each DC Quadrant?

This data will help us find out which restaurant type may have been exhausted in DC and which restaurant types have opportunity to grow

What is the average/best restaurant quality for restaurant types in each DC Quadrant?

This data will help identify if there is a particular restaurant type that may be associated with lower food quality. If so, this may present an opportunity to stand out.

Do ethnic groups in DC impact restaurant types in each DC Quadrant?

With this question, we can identify any trends that may be related to DC's ethnicity. This will help us understand if a particular group of people impact the amount of a restaurant type in DC. If there is a trend, the new restaurant may have to serve those groups of people in someway with the new restaurant.

Understanding the problem: Methods used

What is needed?

- Total number of restaurants in DC
- Ratings of Restaurants type ratings
- Description of ethnic groups in DC

How do we find that?

- Find a good data source
- Determine quadrants
- Zip codes/Coordinates

Treatment + Analysis

- Loading data
- Combining fata
- Plot data
- Analyse

Sources of Informations

Retrieving data: Food

Yelp

Pros:

- Detailed
- Developer friendly
- Includes both Api and CSV files

Cons:

- No format
- Only allows 1000 data maximum per entry

Retrieving data: Population

United States Census

Pros:

- Very detailed
- Trusted

Cons:

- Cryptic Api calls
- Time consuming
- Does not include good coordinates for lower state level

Retrieving data: Population

DC Health

- Very detailed
- Trusted
- CSV files included

DC | HEALTH
GOVERNMENT OF THE DISTRICT OF COLUMBIA

- Very detailed
- Trusted
- CSV files included

Processing data

Loading data: Json and CSV

Json

```
#Call
data = json.loads(req.text)
print(json.dumps(data, indent=4))
```


```
{
    "businesses": [
        {
            "id": "6lBhCjv-imBpa3IYKVSCCA",
            "alias": "maxs-kosher-grill-washington",
            "name": "Max's Kosher Grill",
            "image_url": "https://s3-media4.fl.yelpcdn.com/bphoto/YFl3O-FV2LuRLy3vueGaCA/o.jpg",
            "is_closed": false,
            "url": "https://www.yelp.com/biz/maxs-kosher-grill-washington?adjust_creative=1m4MG5a37UVgnQoLAVWITw&utm_campaign
=yelp_api_v3&utm_medium=api_v3_business_search&utm_source=1m4MG5a37UVgnQoLAVWITw",
            "review_count": 5,
            "categories": [
                {
                    "alias": "kosher",
                    "title": "Kosher"
                },
                {
                    "alias": "falafel",
                    "title": "Falafel"
```

Loading data: Json and CSV

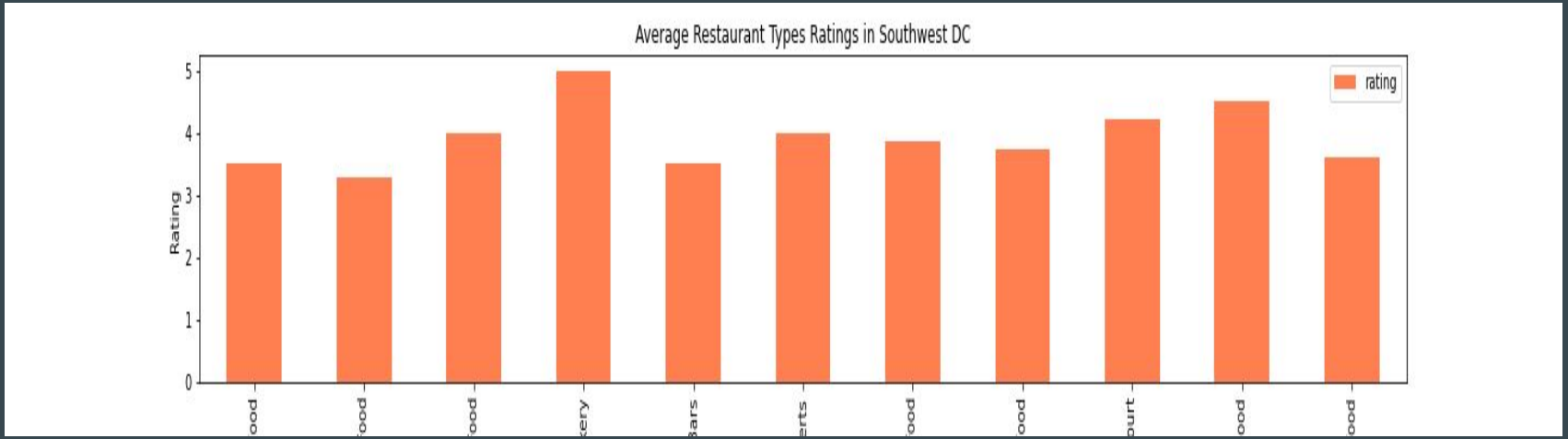
CSV

```
#Southwest Ethnicity Data
zip_20024_Hisp = pd.read_csv('DC_Health_Data/Hispanic_Latino_Population_by_Race_Zip_Code_20024.csv')
zip_20024_Non = pd.read_csv('DC_Health_Data/Non_Hispanic_Latino_by_Race_Zip_Code_20024.csv')

zip_20032_Hisp = pd.read_csv('DC_Health_Data/Hispanic_Latino_Population_by_Race_Zip_Code_20032.csv')
zip_20032_Non = pd.read_csv('DC_Health_Data/Non_Hispanic_Latino_by_Race_Zip_Code_20032.csv')

#Southeast Data
zip_20003_Hisp = pd.read_csv('DC_Health_Data/Hispanic_Latino_Population_by_Race_Zip_Code_20003.csv')
zip_20003_Non = pd.read_csv('DC_Health_Data/Non_Hispanic_Latino_by_Race_Zip_Code_20003.csv')

Ward_8_Hisp = pd.read_csv('DC_Health_Data/Hispanic_Latino_Population_by_Race_Ward_Ward_8.csv')
Ward_8_Non = pd.read_csv('DC_Health_Data/Non_Hispanic_Latino_by_Race_Ward_Ward_8.csv')
```

Framing the data: Pandas

	name	category	latitude	longitude	rating	address	State	Zipcode	initial
0	Surfside	Tacos	38.943537	-77.077791	3.5	4200 Wisconsin Ave NW	DC	20015	NW
2	Tabla	Georgian	38.931088	-77.023394	5.0	3227 Georgia Ave NW	DC	20010	NW
3	Viet Chopsticks	Vietnamese	38.945732	-77.064860	4.5	4304 Connecticut Ave NW	DC	20008	NW
5	Rosemary Bistro Cafe	French	38.955090	-77.070230	5.0	5010 Connecticut Ave NW	DC	20008	NW
6	Uptown Market	Grocery	38.947138	-77.064944	4.5	4465 Connecticut Ave NW	DC	20008	NW
...	...	...	...	...	...	...	...	...	...
934	Po Boy Jim	Bars	38.916570	-77.024275	3.5	1934 9th St NW	DC	20001	NW
936	Pi Pizzeria	Pizza	38.897154	-77.024709	4.0	910 F St NW	DC	20004	NW
940	LiLLiES Restaurant & Bar	Mediterranean	38.928427	-77.054125	3.5	2915 Connecticut Ave NW	DC	20008	NW
941	Angelico Pizzeria	Pizza	38.948699	-77.079876	3.5	4529 Wisconsin Ave NW	DC	20016	NW
947	Cafe Saint-Ex	American (New)	38.915423	-77.031673	3.5	1847 14th St NW	DC	20009	NW

Plotting Data:



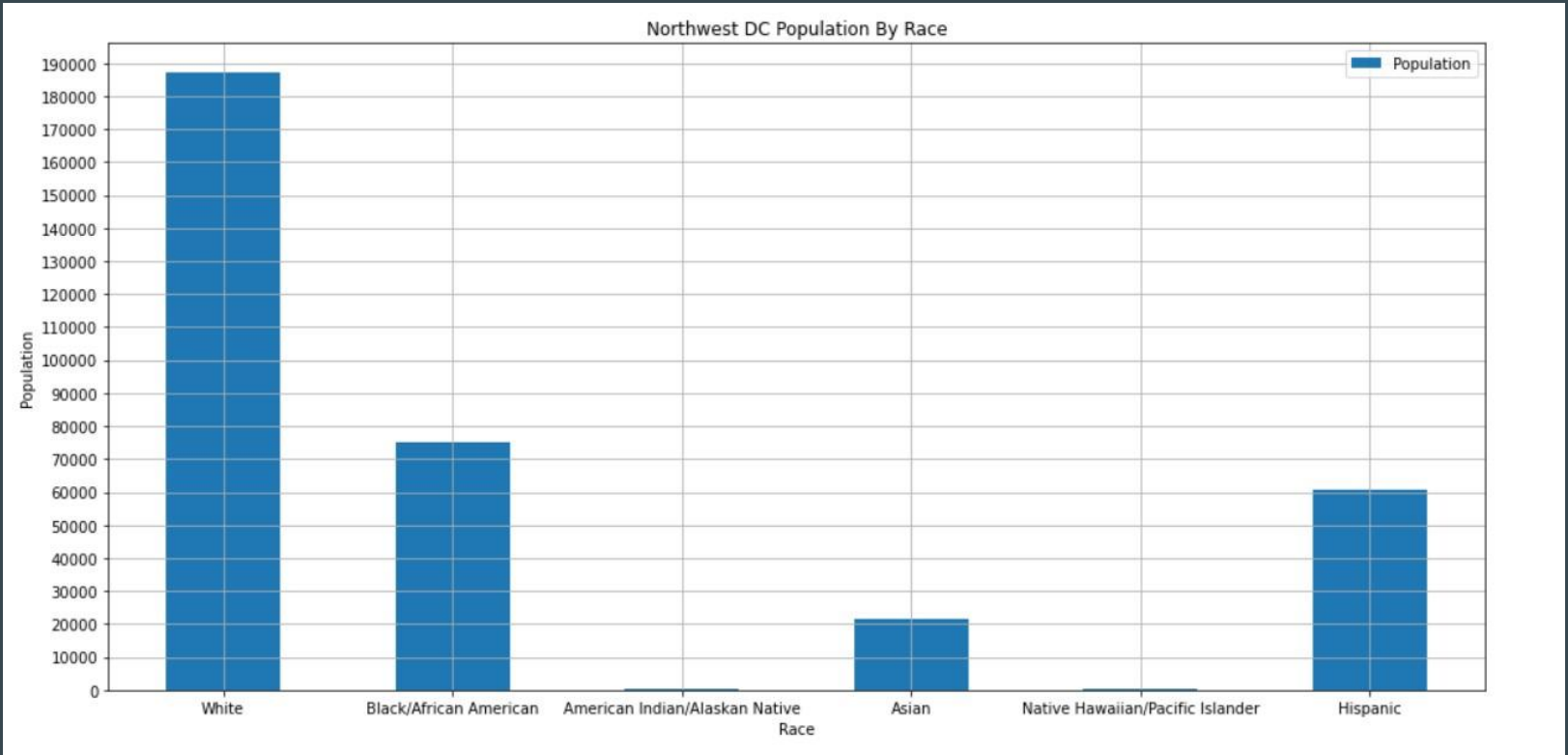
Analysis: Pandas, logic and a lot of courage

	rating
count	20.000000
mean	4.078740
std	0.275229
min	3.500000
25%	3.948005
50%	4.067254
75%	4.220395
max	4.600000

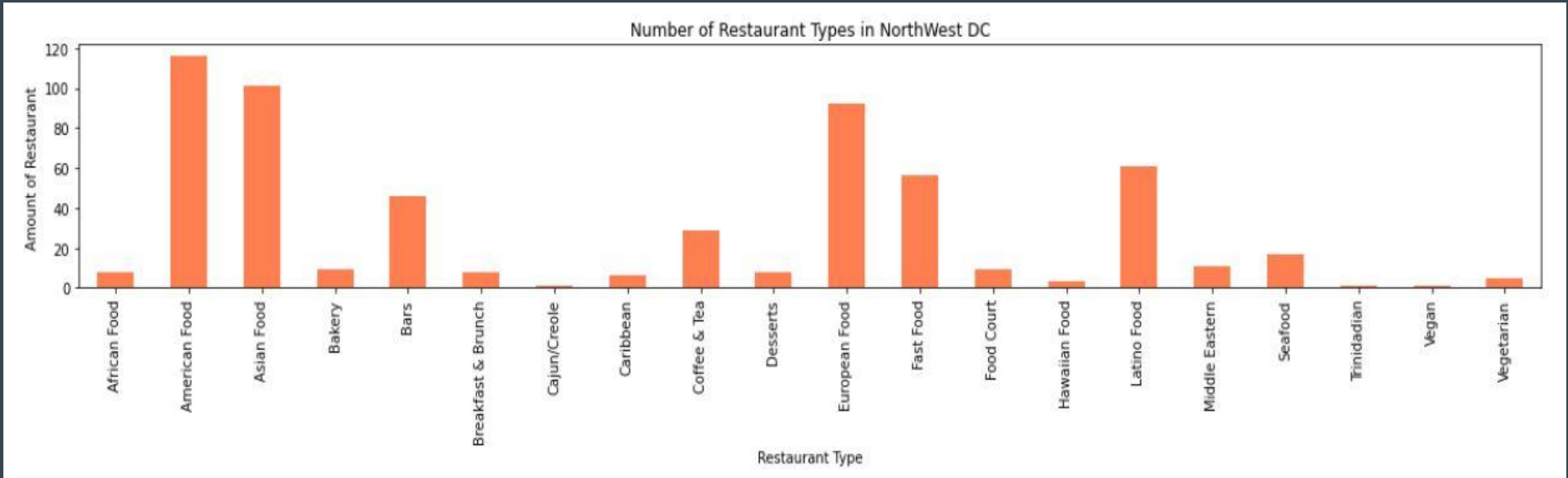
```
American Food          169
Asian Food             142
European Food          112
Fast Food               91
Latino Food             77
Bars                    61
Coffee & Tea            38
Seafood                 33
Food Court              24
African Food            19
Breakfast & Brunch      15
Bakery                  13
Desserts                13
Middle Eastern          12
Caribbean               10
Vegetarian               5
Hawaiian Food            5
Vegan                    4
Cajun/Creole             3
Trinidadian              1
Name: category, dtype: int64
```

Results

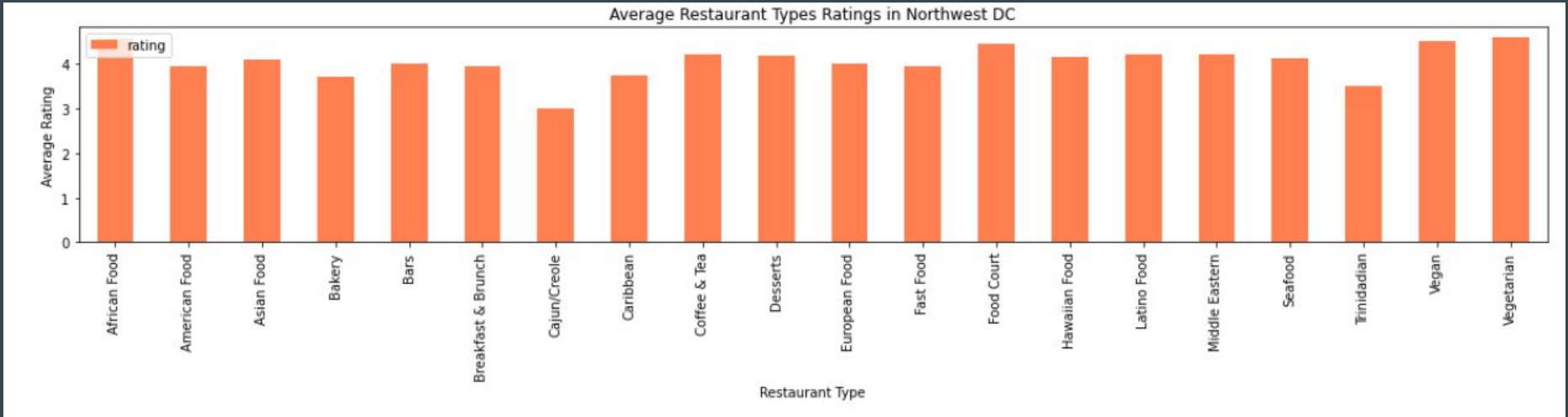
Northwest


Northwest DC Population By Race
Population
190000
180000
170000
160000
150000
140000
130000
120000
110000
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
White
Black/African American
American Indian/Alaskan Native
Asian
Native Hawaiian/Pacific Islander
Hispanic
Race

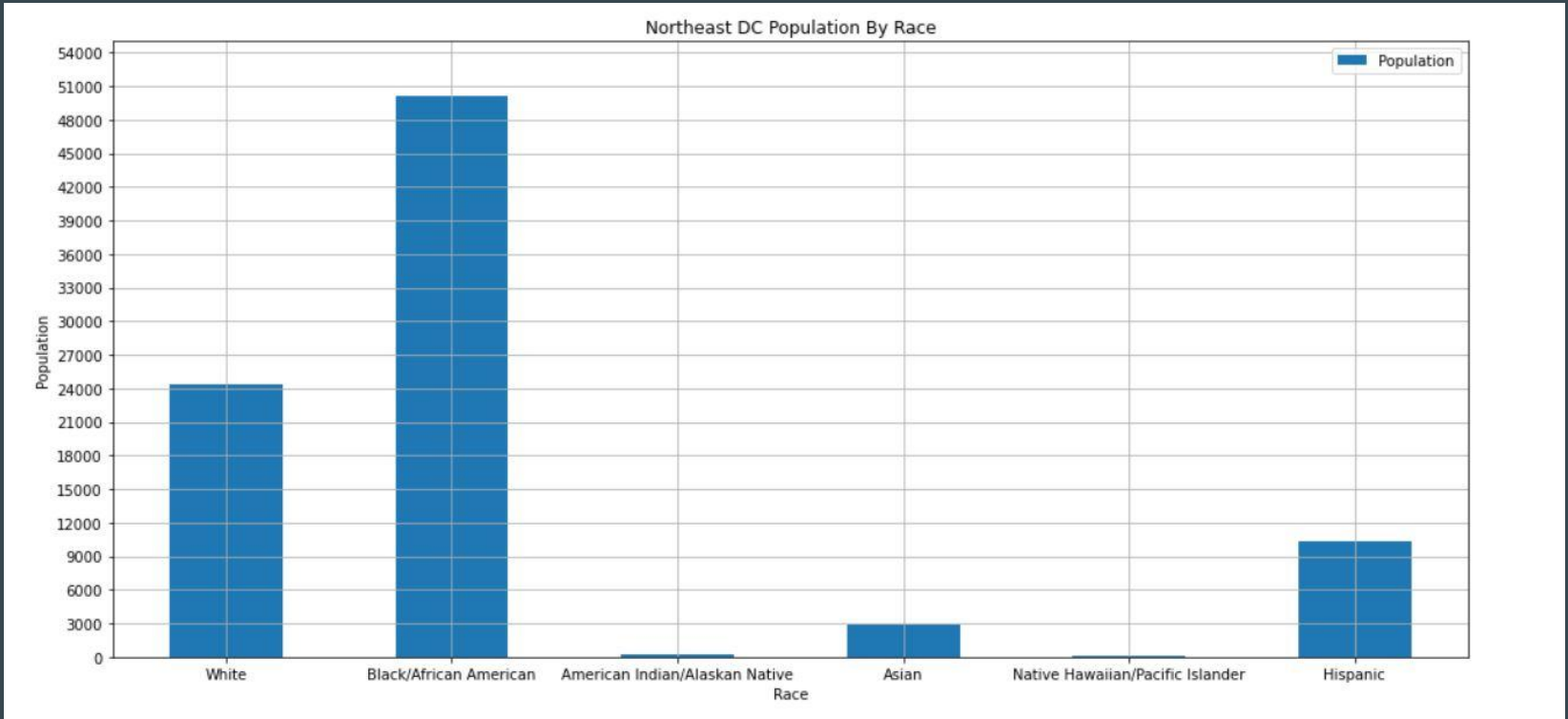
Northwest


Number of Restaurant Types in NorthWest DC
Amount of Restaurant
120
100
80
60
40
20
0
African Food
American Food
Asian Food
Bakery
Bars
Breakfast & Brunch
Cajun/Creole
Caribbean
Coffee & Tea
Desserts
European Food
Fast Food
Food Court
Hawaiian Food
Latino Food
Middle Eastern
Seafood
Trinidadian
Vegan
Vegetarian
Restaurant Type

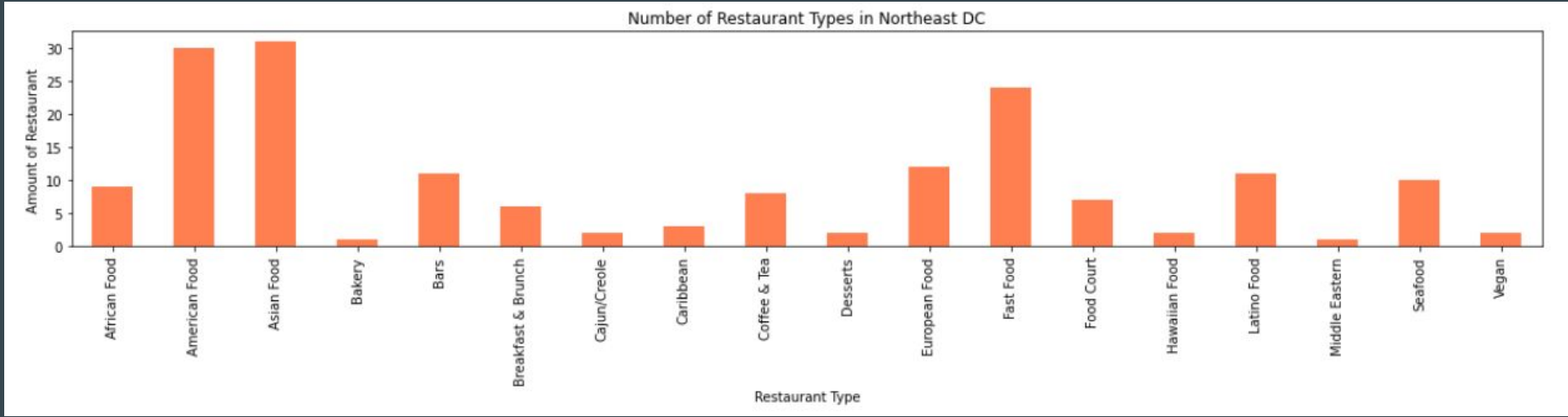
Northwest


Average Restaurant Types Ratings in Northwest DC
rating
Average Rating
0
1
2
3
4
African Food
American Food
Asian Food
Bakery
Bars
Breakfast & Brunch
Cajun/Creole
Caribbean
Coffee & Tea
Desserts
European Food
Fast Food
Food Court
Hawaiian Food
Latino Food
Middle Eastern
Seafood
Trinidadian
Vegan
Vegetarian
Restaurant Type

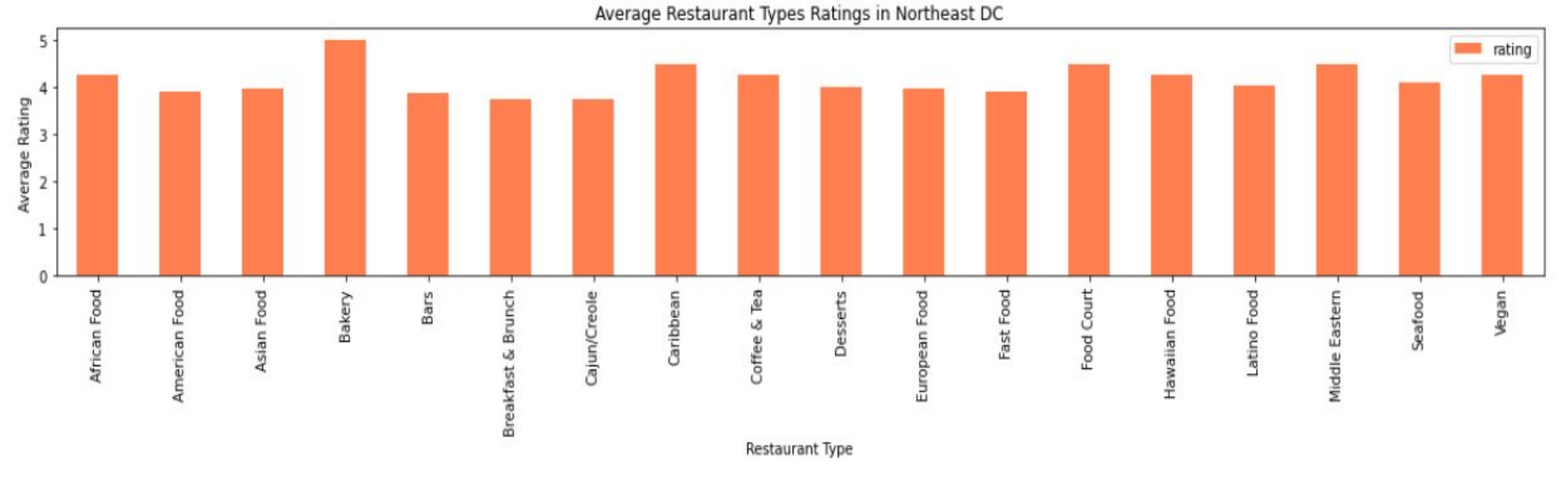
Northeast


Northeast DC Population By Race
Population
54000
51000
48000
45000
42000
39000
36000
33000
30000
27000
24000
21000
18000
15000
12000
9000
6000
3000
0
White
Black/African American
American Indian/Alaskan Native
Asian
Native Hawaiian/Pacific Islander
Hispanic
Race

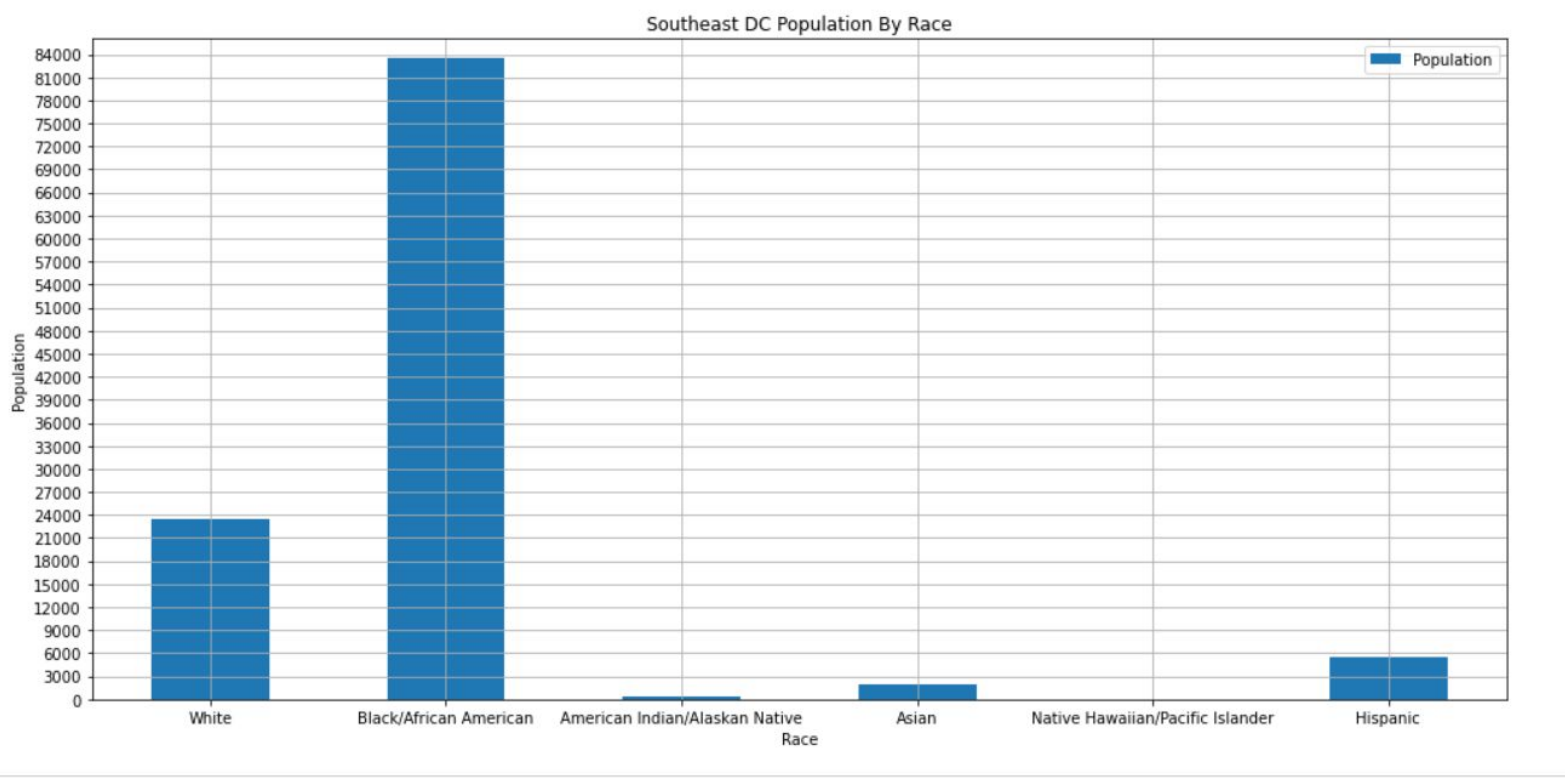
Northeast


Number of Restaurant Types in Northeast DC
Amount of Restaurant
0
5
10
15
20
25
30
African Food
American Food
Asian Food
Bakery
Bars
Breakfast & Brunch
Cajun/Creole
Caribbean
Coffee & Tea
Desserts
European Food
Fast Food
Food Court
Hawaiian Food
Latino Food
Middle Eastern
Seafood
Vegan
Restaurant Type

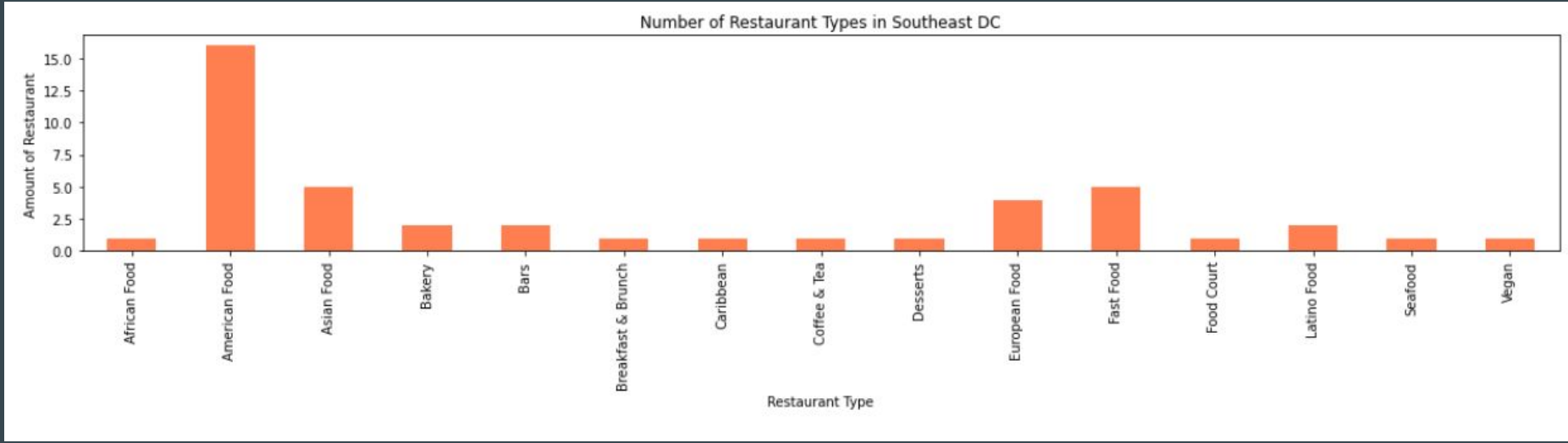
Northeast


Average Restaurant Types Ratings in Northeast DC
rating
Average Rating
0
1
2
3
4
5
African Food
American Food
Asian Food
Bakery
Bars
Breakfast & Brunch
Cajun/Creole
Caribbean
Coffee & Tea
Desserts
European Food
Fast Food
Food Court
Hawaiian Food
Latino Food
Middle Eastern
Seafood
Vegan
Restaurant Type

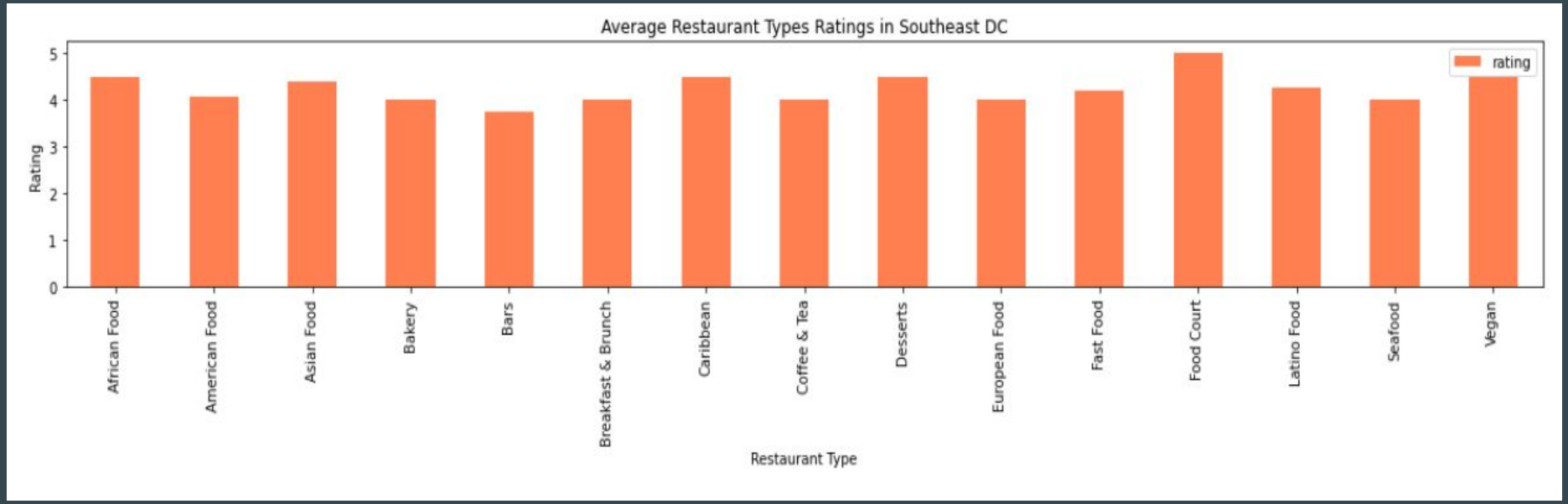
Southeast


Southeast DC Population By Race
Population
84000
81000
78000
75000
72000
69000
66000
63000
60000
57000
54000
51000
48000
45000
42000
39000
36000
33000
30000
27000
24000
21000
18000
15000
12000
9000
6000
3000
0
White
Black/African American
American Indian/Alaskan Native
Asian
Native Hawaiian/Pacific Islander
Hispanic
Race

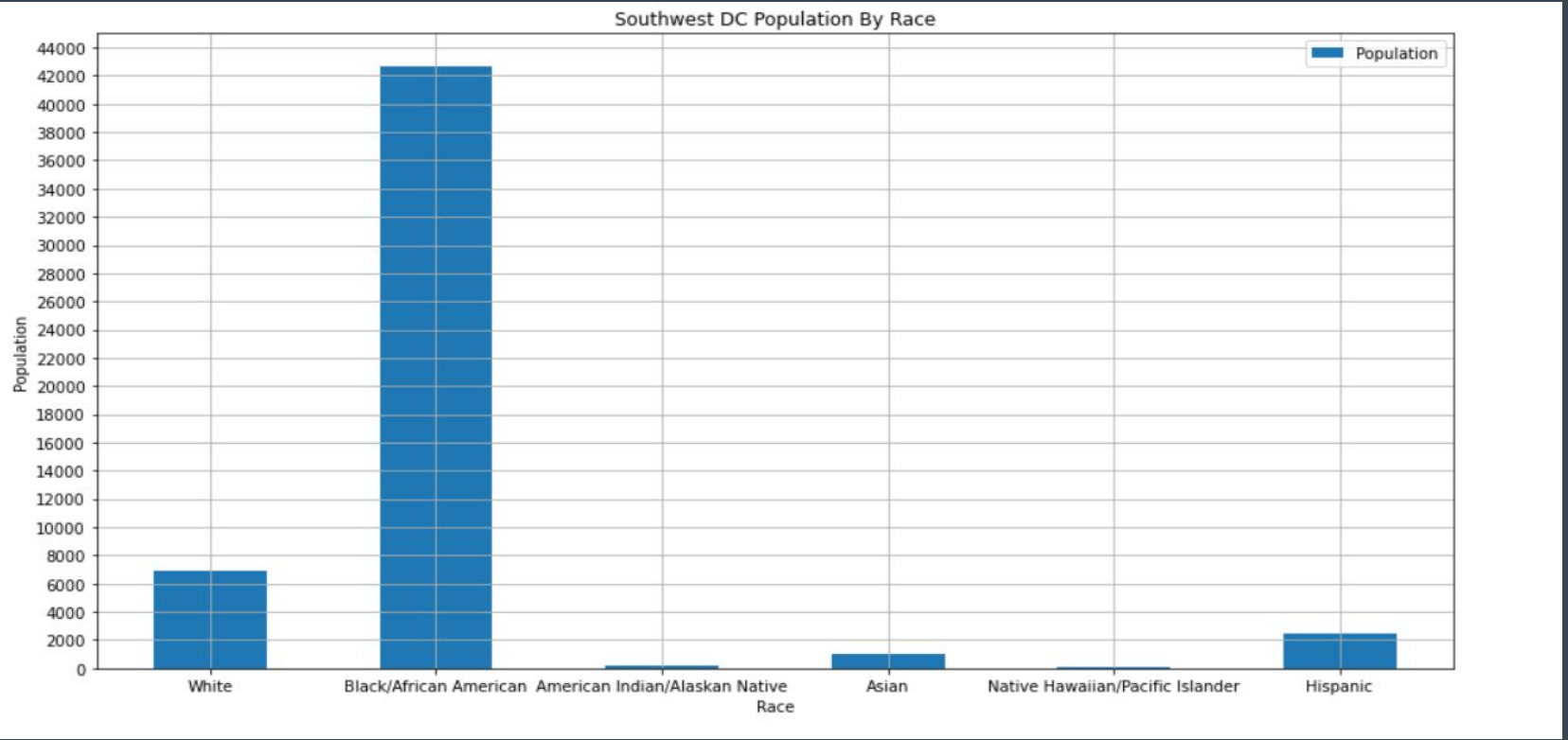
Southeast


Number of Restaurant Types in Southeast DC
Amount of Restaurant
15.0
12.5
10.0
7.5
5.0
2.5
0.0
African Food
American Food
Asian Food
Bakery
Bars
Breakfast & Brunch
Caribbean
Coffee & Tea
Desserts
European Food
Fast Food
Food Court
Latino Food
Seafood
Vegan
Restaurant Type

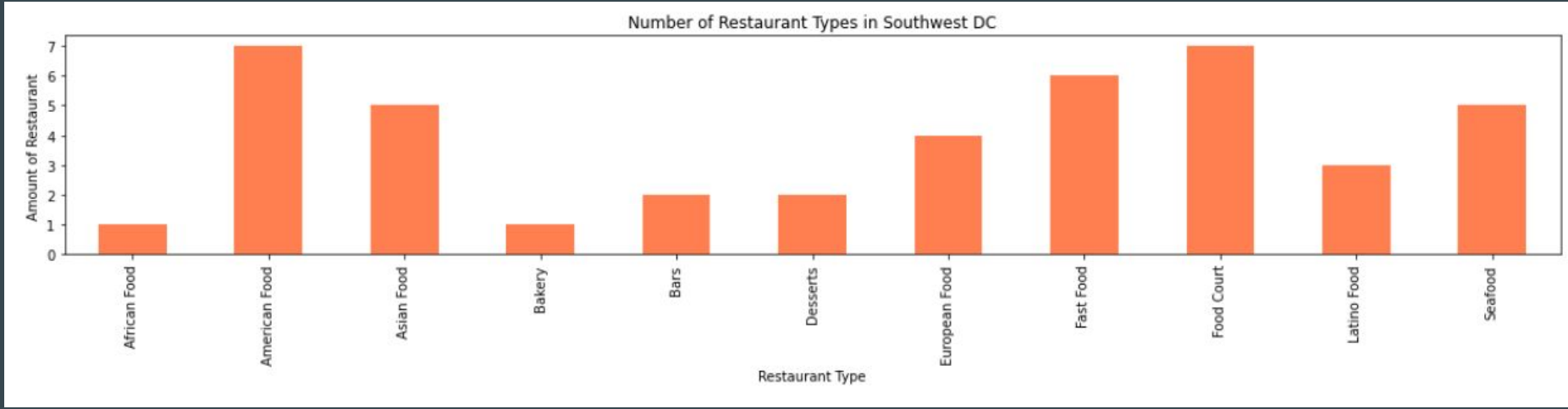
Southeast


Average Restaurant Types Ratings in Southeast DC
rating
Rating
0
1
2
3
4
5
African Food
American Food
Asian Food
Bakery
Bars
Breakfast & Brunch
Caribbean
Coffee & Tea
Desserts
European Food
Fast Food
Food Court
Latino Food
Seafood
Vegan
Restaurant Type

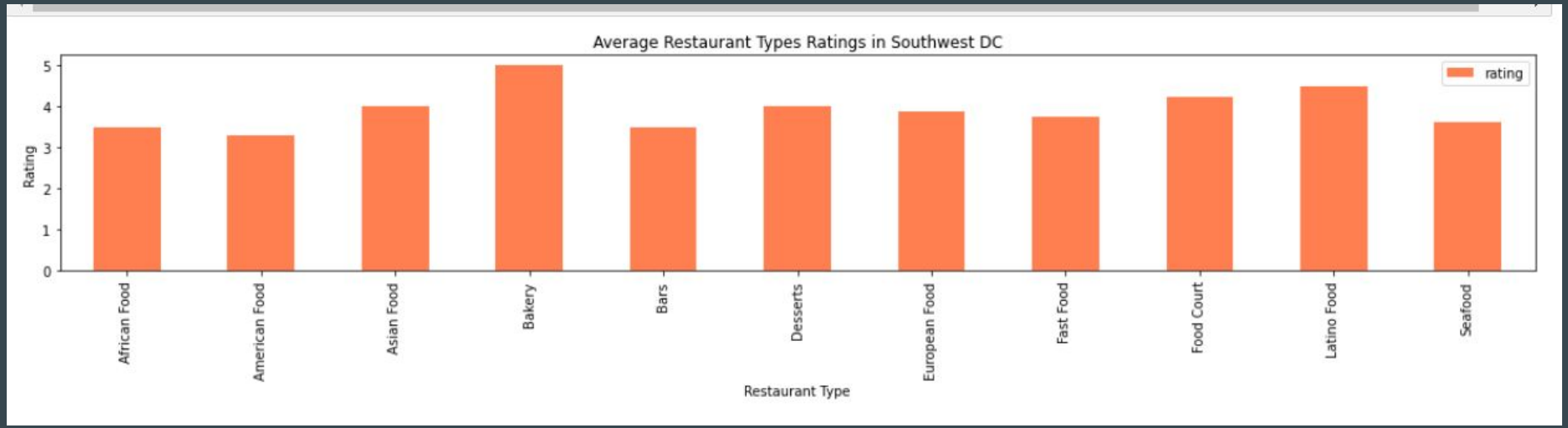
Southwest


Southwest DC Population By Race
Population
44000
42000
40000
38000
36000
34000
32000
30000
28000
26000
24000
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
White
Black/African American
American Indian/Alaskan Native
Asian
Native Hawaiian/Pacific Islander
Hispanic
Race

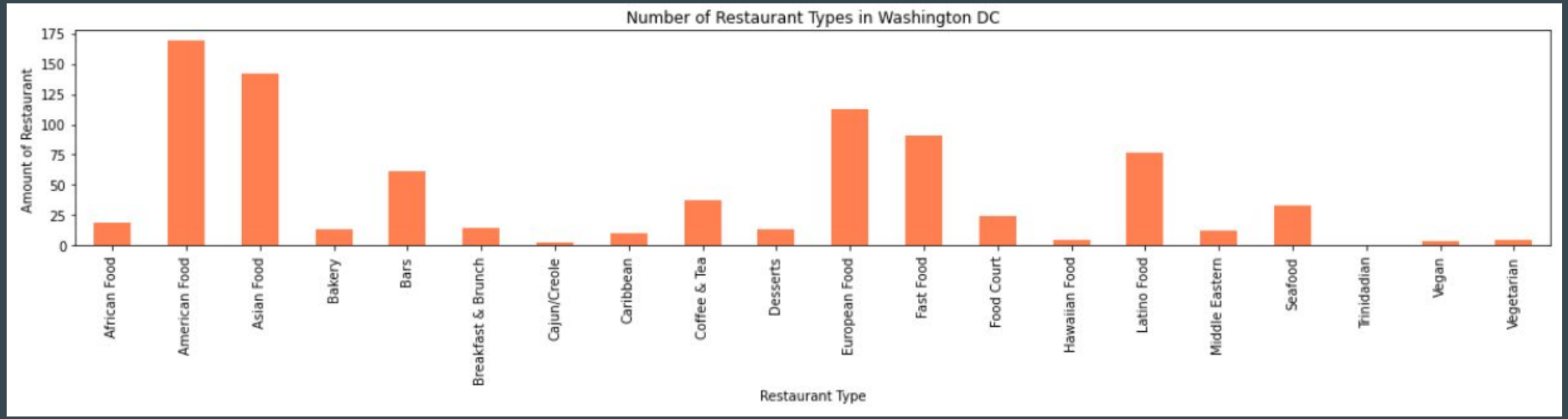
Southwest


Number of Restaurant Types in Southwest DC
Amount of Restaurant
0
1
2
3
4
5
6
7
African Food
American Food
Asian Food
Bakery
Bars
Desserts
European Food
Fast Food
Food Court
Latino Food
Seafood
Restaurant Type

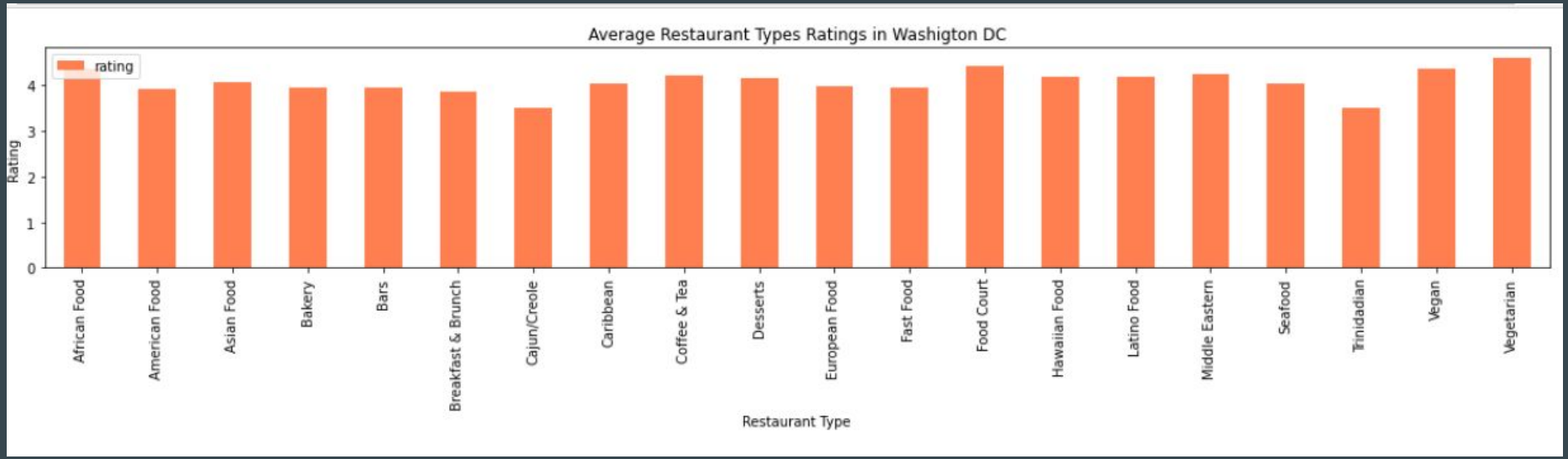
Southwest


Average Restaurant Types Ratings in Southwest DC
rating
Rating
0
1
2
3
4
5
African Food
American Food
Asian Food
Bakery
Bars
Desserts
European Food
Fast Food
Food Court
Latino Food
Seafood
Restaurant Type

Washington DC



Washington DC



Trend analysis

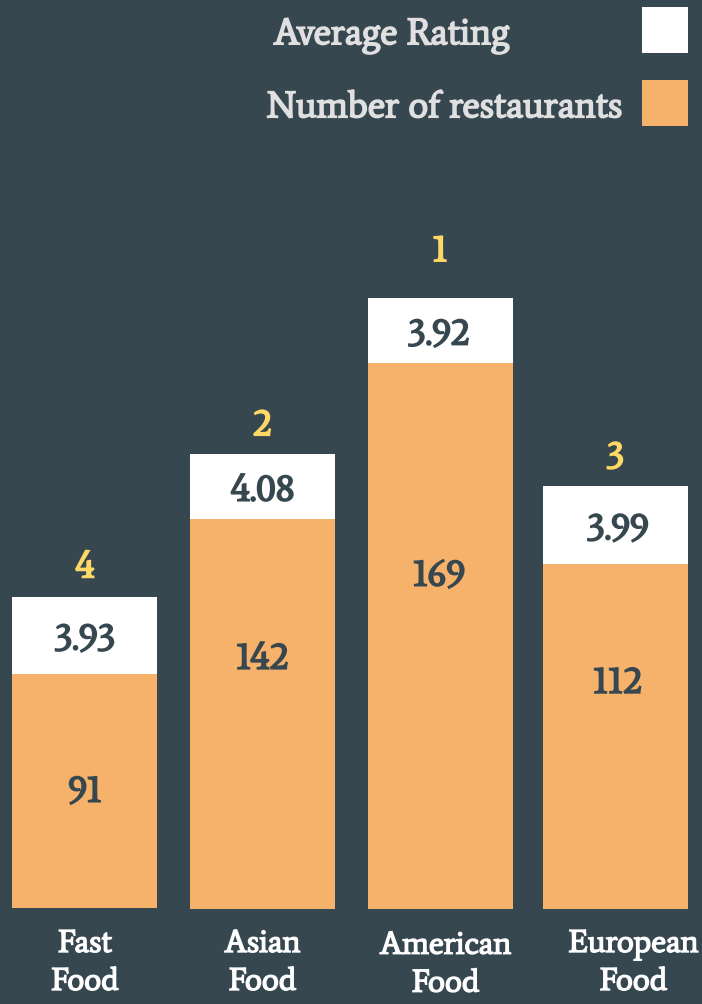
Findings

- Most competitive restaurant types across each quadrants are American and Asian restaurants.

- Least competitive market for restaurant types are foreign and niche restaurants.

- All restaurant types have an average rating of **3 stars** or more but the restaurant types in Southwest DC have lower average ratings than any other quadrant.

- Despite the competitive nature of Asian restaurants, there are few Asians living in DC compared to White or African American. African Americans are majority in every DC quadrant except in Northwest DC which is majority white. In Northwest DC, there were more european restaurants than any other quadrant.



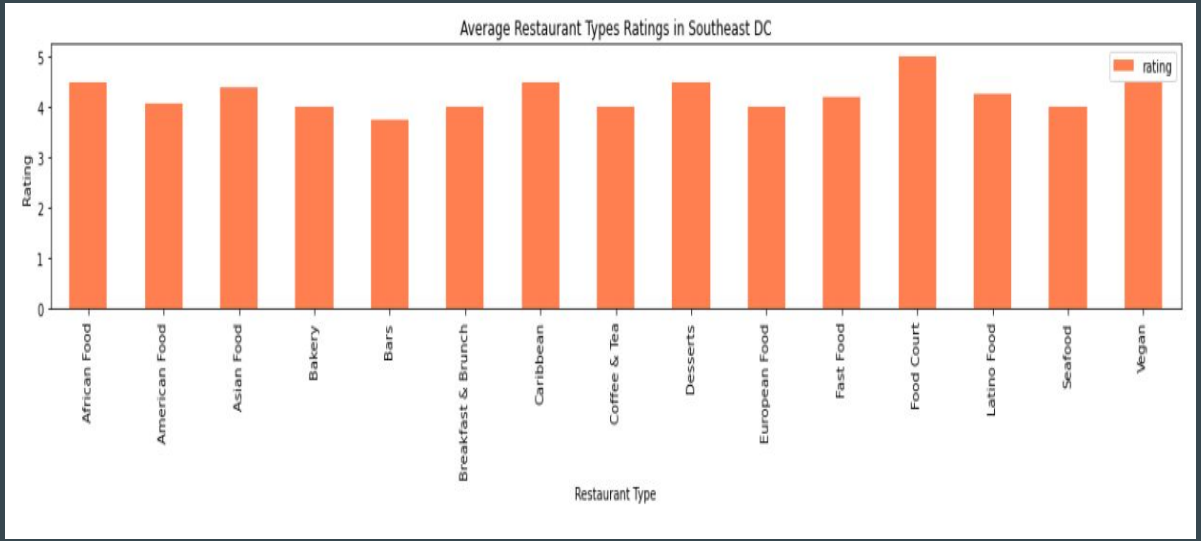
Food Trucks

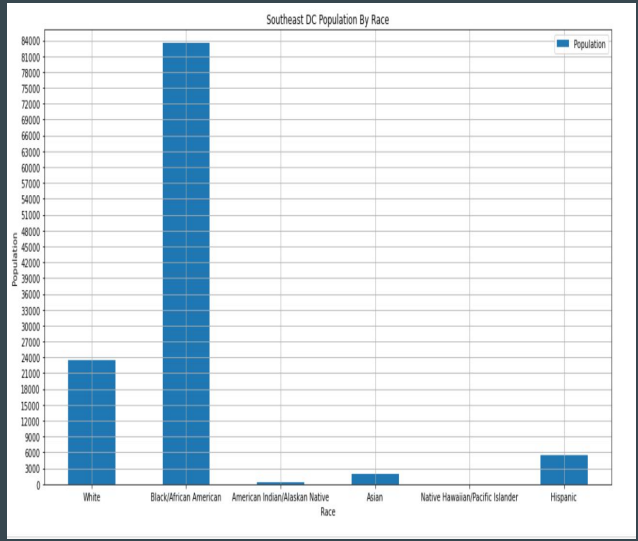
- Food trucks do not have a fixed location
- Can sell everywhere and attract tourists !
- Higher average rating than all restaurants with a 4.34 out of 5 !

And the winner is....

A niche restaurant in Southeast !

A **niche** restaurant in SOUTHEAST DC or a Food Truck are the best options in terms of ratings and competition.





Insights:

There is more research to be done to build a stronger recommendation.

We didn't anticipate African Americans being the majority in every quadrant of DC except Northwest

An interesting find is that Asian food is just as competitive as American Restaurants

Another find is that Southeast DC is the only location without a much diversity in restaurant types but yet as the highest amount of African americans.

Problems encountered:

- The Ethnicity Data was only limited to Zip codes and Wards which made it difficult to get a very accurate representation of the four quadrants. Some wards and zip code spanned across multiple quadrants.
- Troubleshooting our code was quite a challenge !
- Retrieving Data

Future improvements:

If we had more time, we would:

- Collect more data from different database
- Plot restaurants in a map for better visualisation
- Cleaning more of the data (create sub-categories)
- Diving more into the categories

Questions ?

Thank you for listening!