Coursera Capstone Project

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Is the Pittsburgh Oakland student campus a food desert? If so, how can it be improved?

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Introduction

Recently, the term “Food Desert” has been to describe the phenomenon around some areas, including college campuses. People in these food deserts often assert that there is limited access to cheap grocery stores near campus, and this has measurable impacts on things like obesity, nutrition, and overall quality of life; as healthy options are limited only to those who can afford them. For students, already infamous for consuming cheap ramen, this sort of food desert can pose a serious problem. I heard this issues from relative studding at Pittsburgh University.

In this research I would like to:

1) Verify the student’s assessment of situation, i.e., Oakland neighborhood of Pittsburgh is a food desert.
2) What choices student have in current situation.
3) Examine the benefits of opening a grocery store, both on students looking to buy produce and for any potential businesses looking to set up shop.

Data Sources and preparation

To obtain data connected with university residencies and grocery store location HTTP requests would be made to this Foursquare API server using the zip codes of the Oakland city neighborhoods to pull location information (Latitude and Longitude).

To limit output to reasonable number of venues in our search we restricting searches to Foursquare API

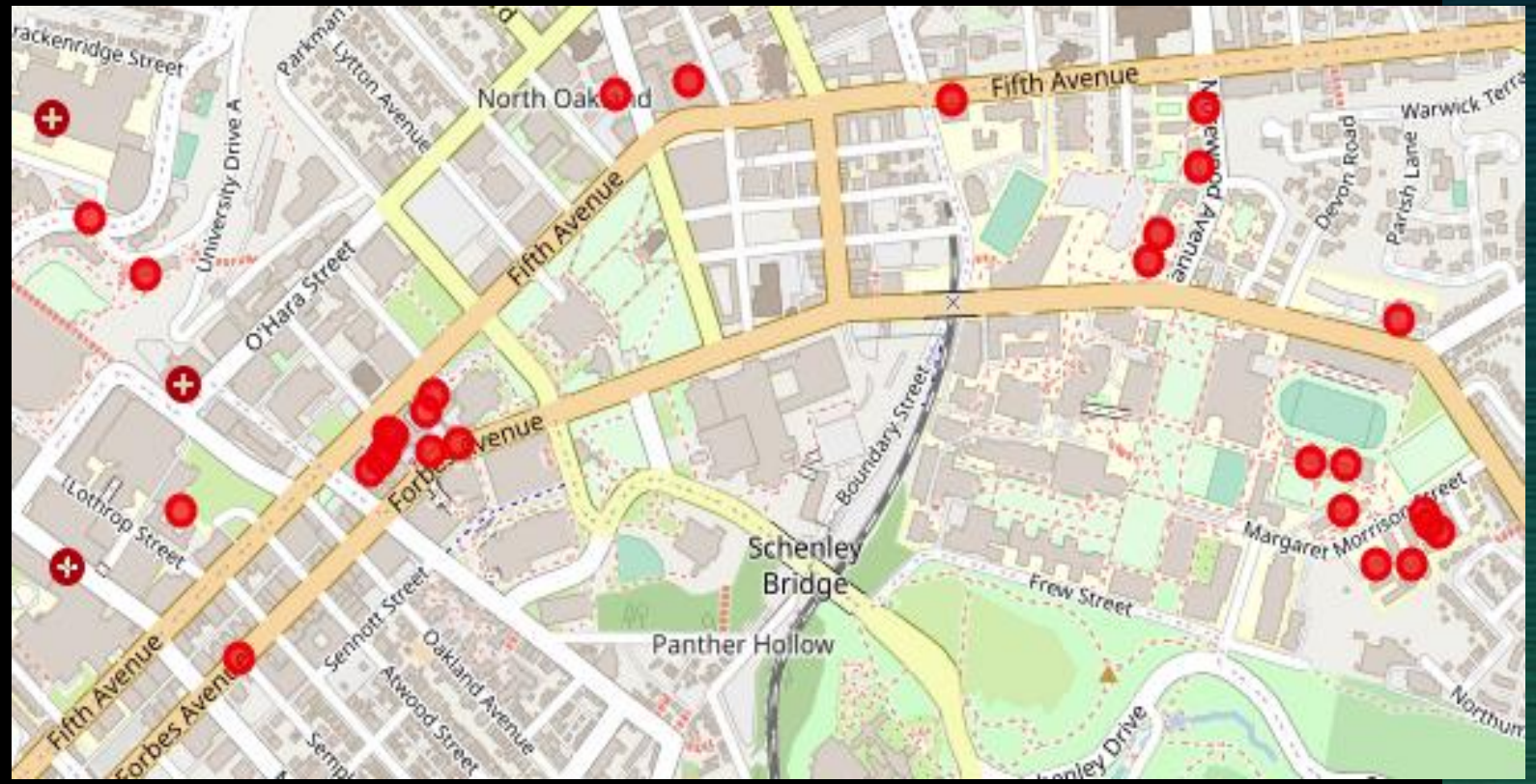
Codes residential halls “4bf58dd8d48988d1a3941735” and Grocery stores “4bf58dd8d48988d118951735” correspondingly.

This approach makes output reasonably readable few dozens of output records instead of hundreds

This dataset is spread over the large area and to make output more realistic we dividing the whole dataset on several residential subclusters and make calculation for center of each subcluster separately. Using these subclusters will determine if the stores we are interested in are in reasonable walking distances.

Methodology

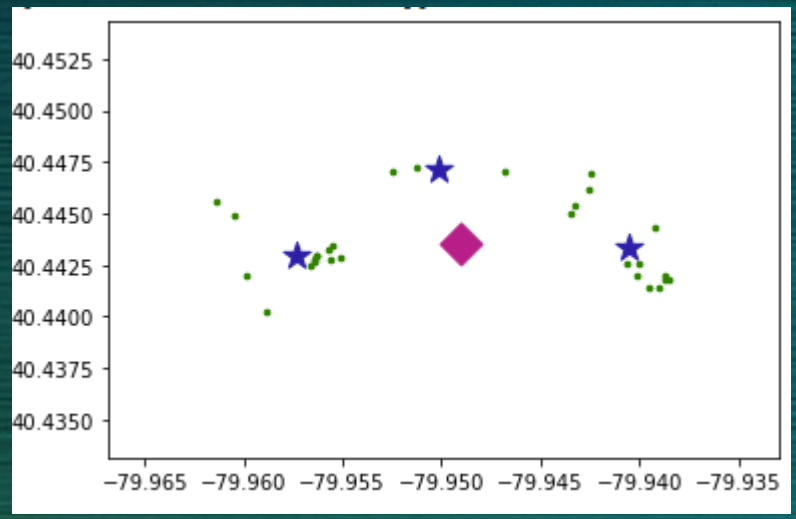
Combined Housing Data

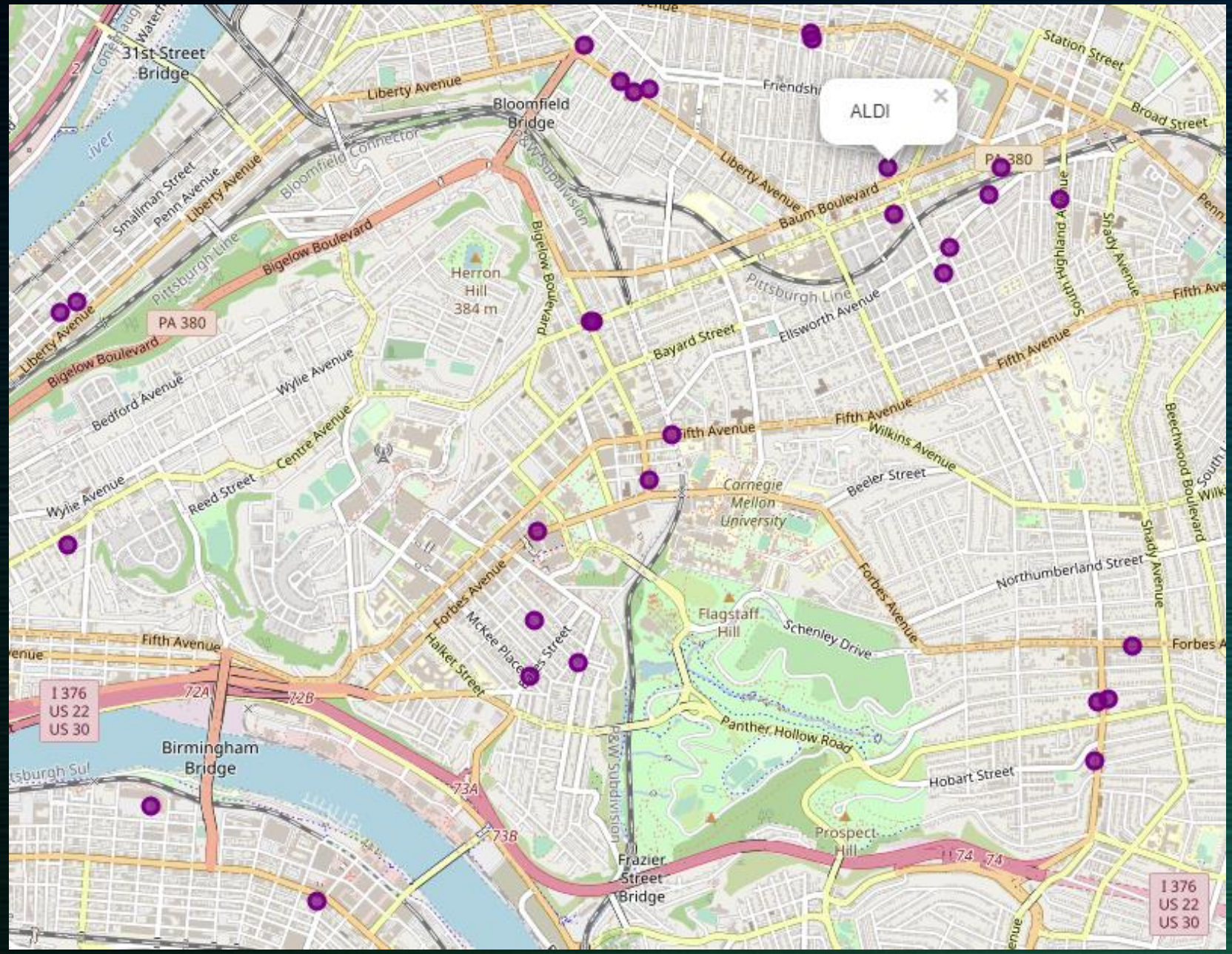


Combined data divided into 3 subclusters using K-mean clustering algorithm.

Blue stars represent subcluster centers.

Center of whole set is shown as purple diamond.



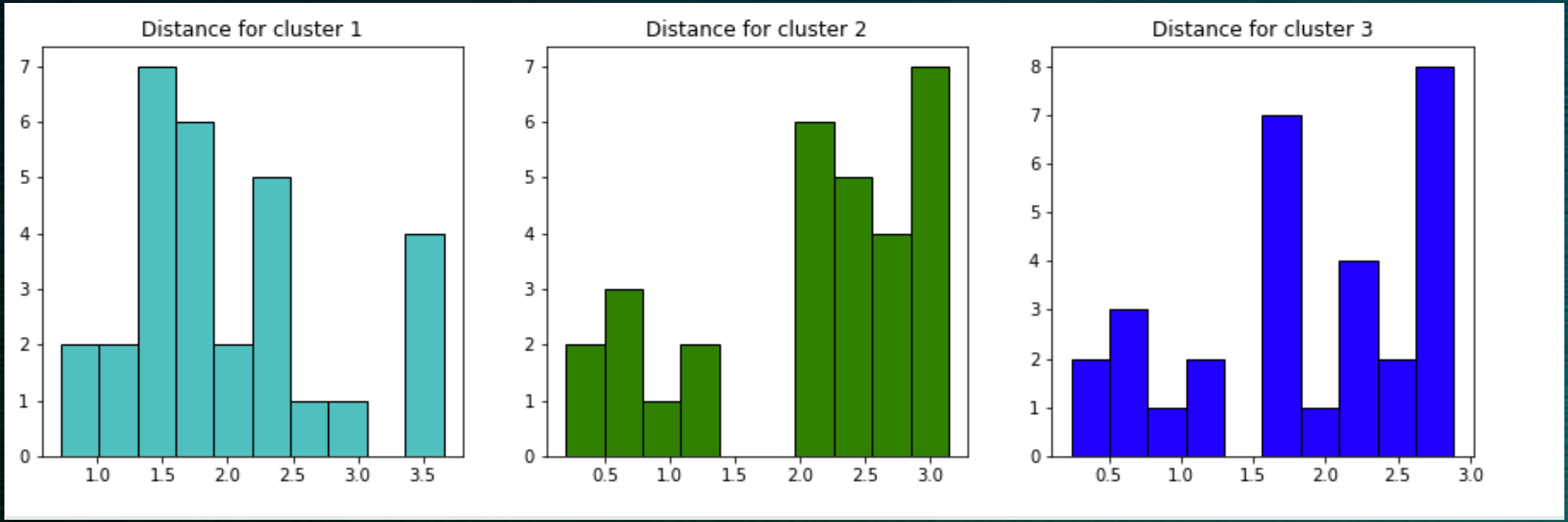


Stores obtained using previously mentioned API code considered in radii 3.0km from center of the whole residency set (purple dots)

From the map it is possible to observe few stores close to central are and most far away.

Results

After creating create a function which calculates distance between stores and subclusters centers (see Jupyter notebook) we have been obtaining distances from residential hall set to grocery stores (Distance1, Distance2 and Distance3 correspondingly)



From the first glance residential halls clusters have stores close to dorm.

However the real picture can be obtained if we analyze and discus what kind of grocery store are close to residential clusters: same data presented in a table

Store Name	Distance1	Distance2	Distance3
Merante Groceria	1.467014	0.724521	1.247984
Sultan Bey	1.364247	1.096482	0.559960
WFH Oriental Market | Wing Fat Hong	3.603276	2.301148	2.701576
Centre Ave Shop N Save	3.490205	2.067533	2.722389
ALDI	1.397531	2.478500	1.729673
Fuel On	1.518976	2.566369	1.812981
Green Market	2.274671	2.238652	1.698694
Bottom Dollar	2.324191	2.808702	2.111720
Giant Eagle Supermarket	1.744074	3.053141	2.664249
Panda Supermarket	1.741149	3.107215	2.657395
Giant Eagle Supermarket	3.375393	2.129016	2.887022
Engel's Market	1.857324	3.085169	2.765936
Shur Save	2.497859	2.364941	1.876770
R. Market	2.015972	3.142916	2.392073

Store Name	Distance1	Distance2	Distance3
Las Palmas 2	1.327975	0.471583	0.988822
Kohli's Indian Groceries	0.715185	0.773415	0.257046
Whole Foods Market	1.974436	2.986873	2.229191
Seoul Mart	0.716726	0.956715	0.237151
ALDI	1.762701	2.565146	1.811791
Bombay Food Market	1.356590	1.105445	0.559568
Forbes Street Market	1.225021	0.198352	0.619682
Donatelli's Italian Food Center	2.201166	2.208588	1.647775
ALDI	2.347614	2.824773	2.129996
Oakland Mini Market	1.231662	0.750943	1.118326
ALDI	2.927489	1.984998	2.683571
Groceria Italiana	2.188782	2.242953	1.664177
Market District Supermarket	1.556009	2.440281	1.682335
S & D Polish Deli	3.657603	2.340364	2.760410
Murray Avenue Kosher	1.702014	3.003147	2.621548
Tokyo Japanese Store	1.833952	2.865285	2.108694

Discussion

Code defined in Foursquare API includes results not just for grocery stores but also for restaurants (bakeries) which sell food as secondary business. They can provide some outstanding ethnic food, but they are significantly more expensive than ordinary grocery stores. If one does not care about the price tag, a lot of food is still available near campus, but for a college student who is expected to be buried in debt it is not the most viable choice(Forbes Street Market is around 25% more expensive than average grocery store). Expect to waste half a day waiting for a bus (both directions) or else prepare to walk for upwards of an hour total with a backpack to inexpensive stores which are little bit far. For most students, especially those with jobs outside of studying, it is waste of precious time.

However, this situation can be also considered an opportunity for any discount store to open at new location at somewhere between cluster centers.

6. Conclusion

For students originating from families with a moderate income, the university campus and surrounding area do not provide easy or cheap food options. However, considering the total number of students ~34,000 (Pitt) and ~ 13,000 (Carnegie-Mellon) and making the assumption that half of them will use a new hypothetical store in the neighborhood (we can make opening such store economically attractive. Middle size grocery store with `8,000-14,000 sq. feet of retail area and gross sales volume of 600$ per sf/per year which around average ($11-12/per sf per week) for grocery food sale industry, would be profitable. For example, Aldi, Trader Joe, Save-A-Lot, or other stores in same price range can be a good fit for this location. But we should consider its dependency from regulations which are out of scope of this work.