Analysis Of Street Tree Data in New York City

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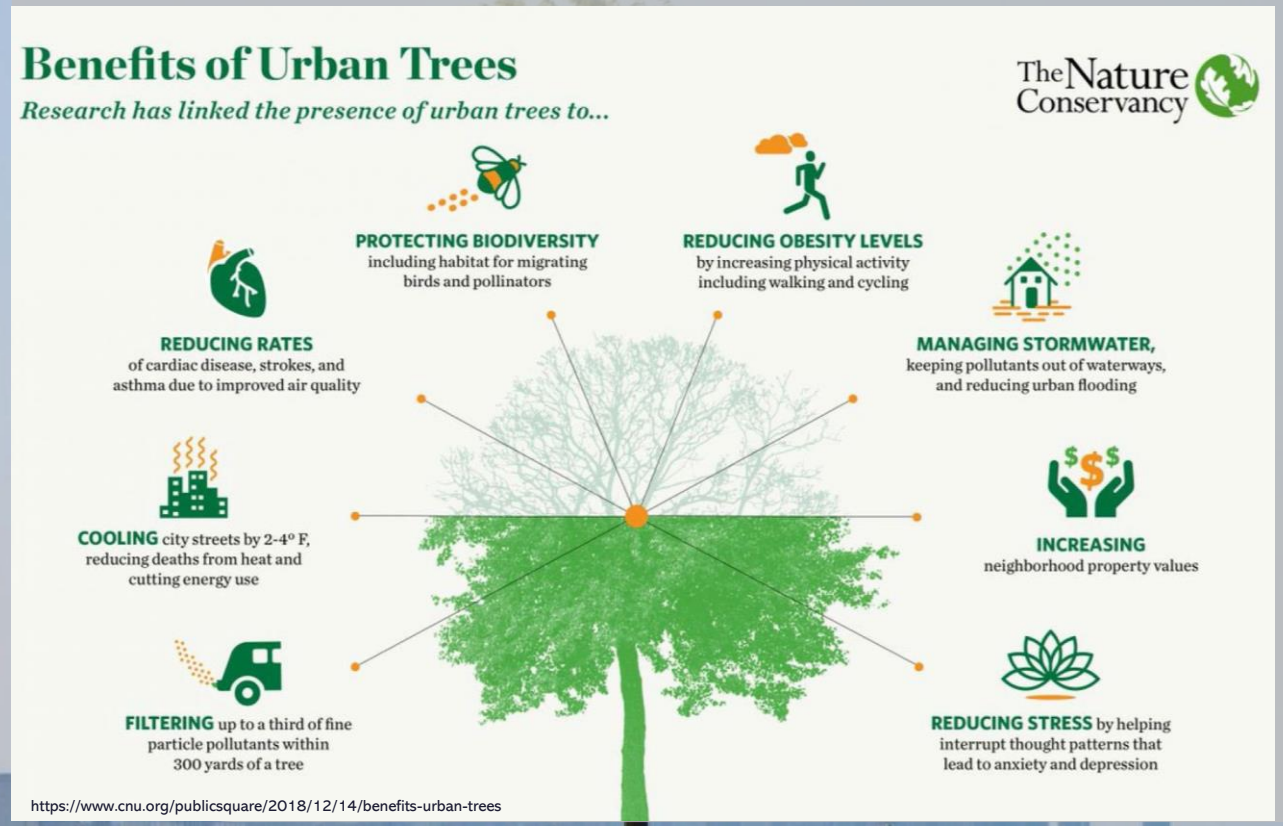
CSCI 118 Capstone Project

The goal of the project

- **The project aims to analyze and compare the number of trees and their condition across the boroughs of NYC.**



https://www.cnu.org/publicsquare/2018/12/14/benefits-urban-trees

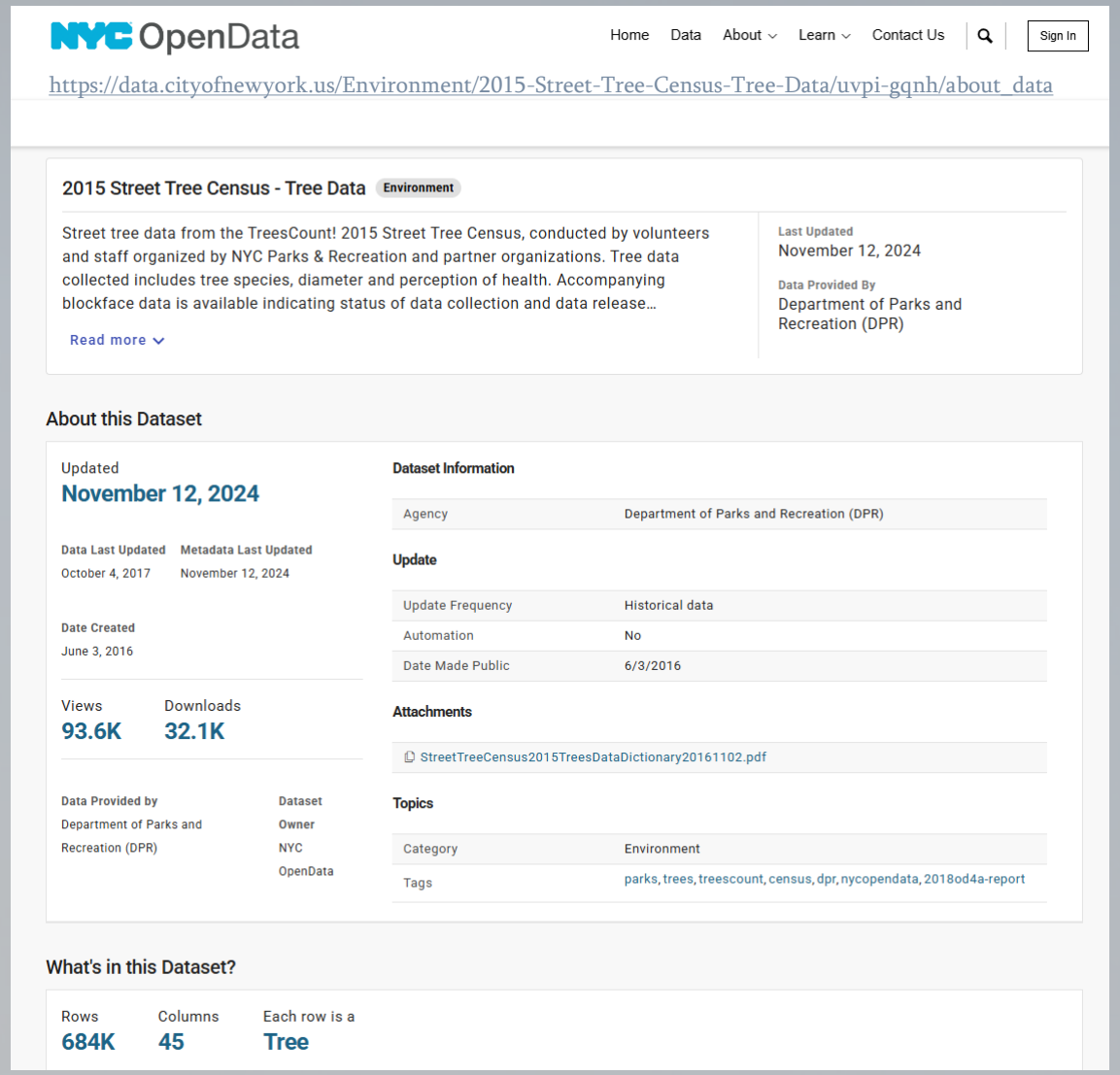
- ✓ Trees play an essential role in developing a healthy urban environment. Availability and quality of green spaces, such as parks, forests, and other natural areas, can significantly influence the overall quality of life for residents

https://www160.statcan.gc.ca/index-eng.htm

- ✓ This project interests me as a Human Geographer, as I find it fascinating to understand how environmental features shape human experiences and vice versa.

About the Data

- For the analysis, I used the 2015 NYC Street Tree Census data. The Data is provided by the Department of Parks and Recreation (DPR) and was last updated on November 12, 2024.
- The dataset consists of 684,000 rows and 45 columns. Each row representing an individual tree.
- The collected information includes tree species, identified issues, stewardship details, and perceptions of tree health.



Methodologies:

colab

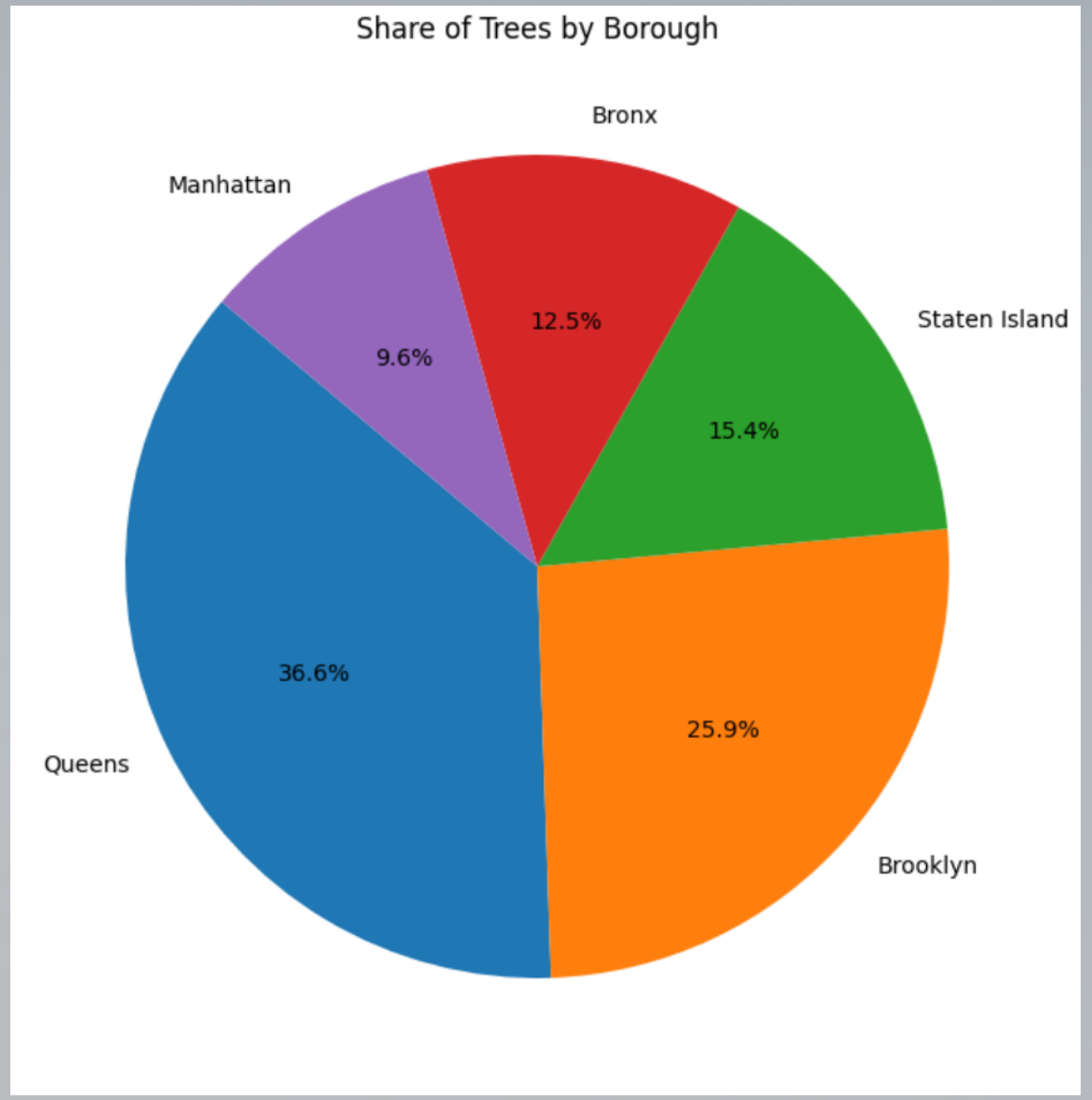
- To analyze the data, I used Python within a **Google Colab** notebook. I worked with the **Pandas** library for data cleaning, exploration, and transformation
- For visualizing trends and patterns in the dataset, I used **matplotlib** and **seaborn**
- In the data cleaning process, I converted non-standard missing values into standard ones and then dropped columns that were not useful for my analysis or had insufficient data

Findings and conclusions

Tree Distribution by Borough (Total and Percentage)

- The analysis shows that there are a total of 683,788 trees in the New York City boroughs. The largest number of trees is in Queens, followed by Brooklyn, Staten Island, the Bronx, and Manhattan.

borough	Trees by borough	Borough Tree %
Queens	250551	36.64
Brooklyn	177293	25.93
Staten Island	105318	15.40
Bronx	85203	12.46
Manhattan	65423	9.57

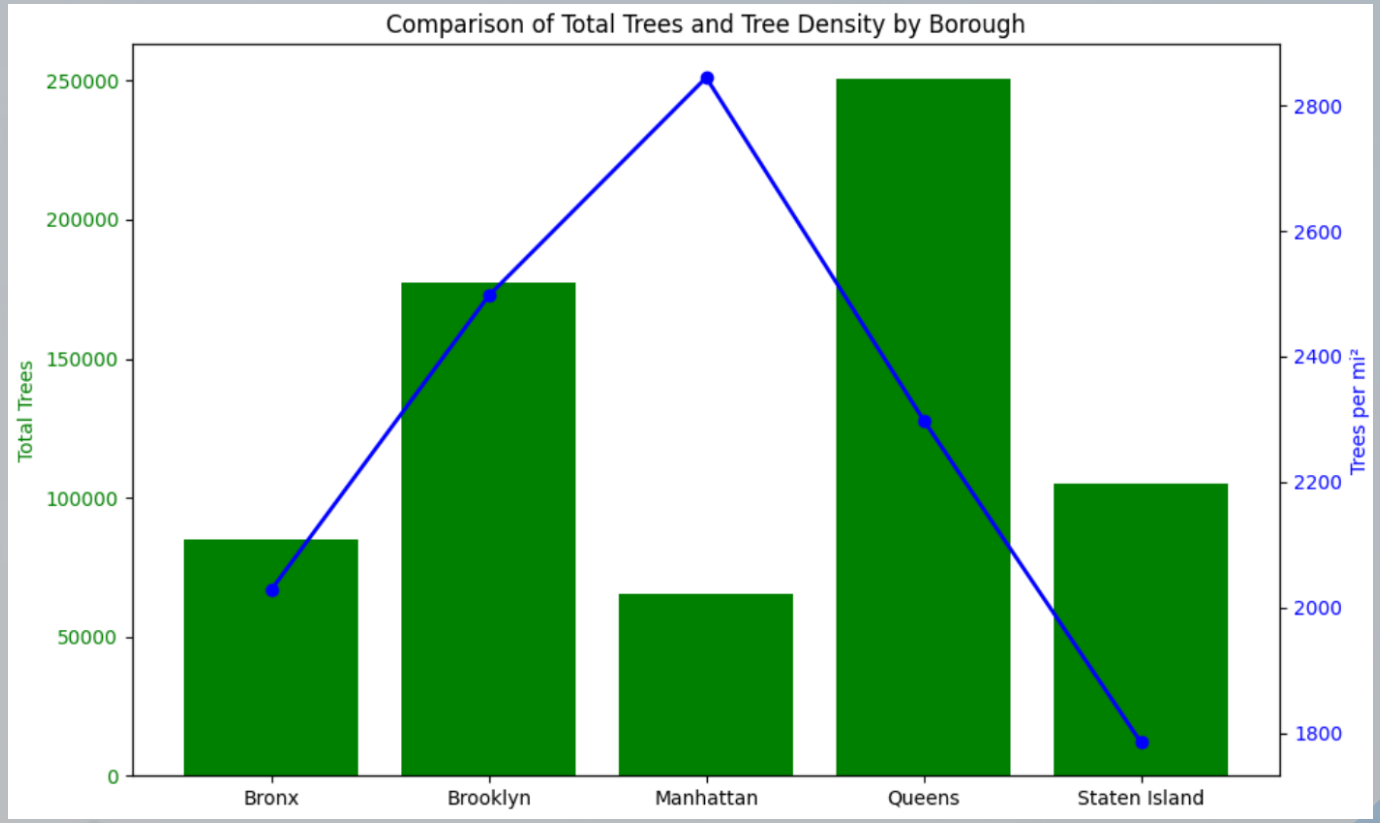


Findings and conclusions

Tree density per square mile by borough

	Total Trees	Area (mi²)	Trees per mi²
Bronx	85203	42	2028.64
Brooklyn	177293	71	2497.08
Manhattan	65423	23	2844.48
Queens	250551	109	2298.63
Staten Island	105318	59	1785.05

- Although Manhattan has the fewest trees overall, an analysis of tree density per square mile by borough shows that Manhattan has the most trees per square mile, followed by Brooklyn, Queens, the Bronx, and Staten Island.

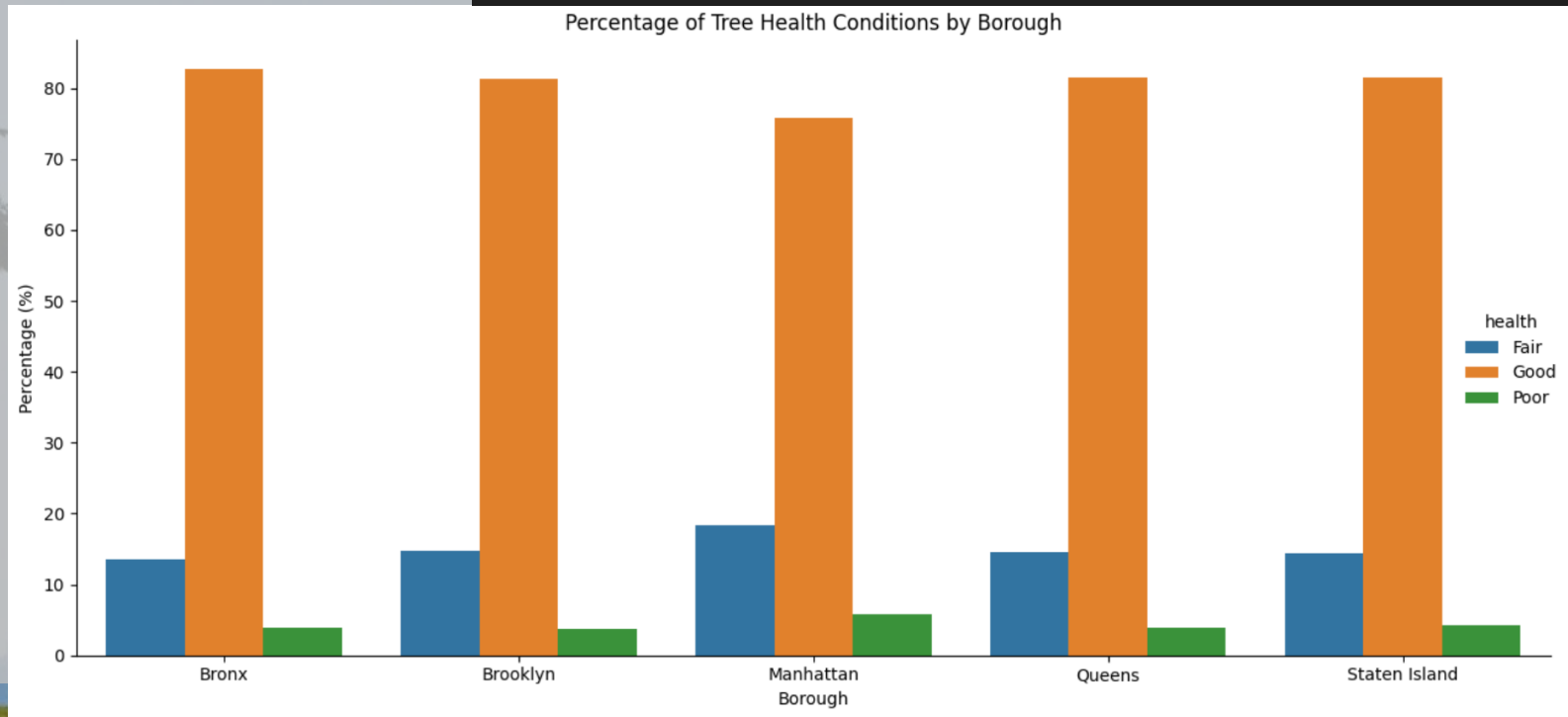


Findings and conclusions

Tree Health Condition Breakdown (Good, Fair, Poor) by Borough, Total and Percentage

	borough	health	tree_id	borough_total	percent
0	Bronx	Fair	10887	80585	13.51
1	Bronx	Good	66603	80585	82.65
2	Bronx	Poor	3095	80585	3.84
3	Brooklyn	Fair	25073	169744	14.77
4	Brooklyn	Good	138212	169744	81.42
5	Brooklyn	Poor	6459	169744	3.81
6	Manhattan	Fair	11460	62427	18.36
7	Manhattan	Good	47358	62427	75.86
8	Manhattan	Poor	3609	62427	5.78
9	Queens	Fair	34549	237974	14.52
10	Queens	Good	194008	237974	81.52
11	Queens	Poor	9417	237974	3.96
12	Staten Island	Fair	14535	101442	14.33
13	Staten Island	Good	82669	101442	81.49
14	Staten Island	Poor	4238	101442	4.18

- It should be noted that tree health is generally consistent across all boroughs
- However, Manhattan is slightly behind the other bureaus in terms of tree health

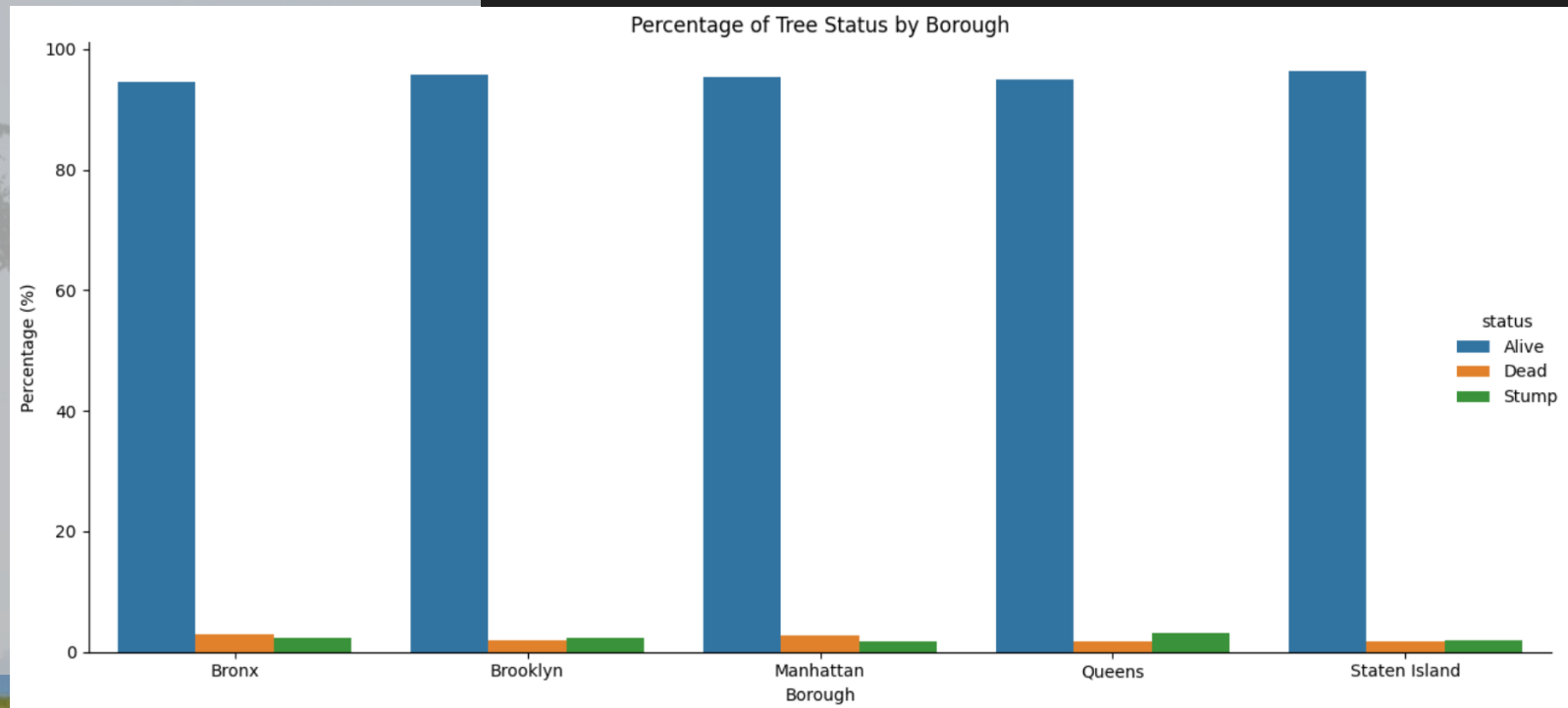


Findings and conclusions

Tree status Breakdown (Alive, Dead, Stump) by Borough, Total and Percentage

	borough	status	tree_id	borough_total	percent
0	Bronx	Alive	80585	85203	94.58
1	Bronx	Dead	2530	85203	2.97
2	Bronx	Stump	2088	85203	2.45
3	Brooklyn	Alive	169744	177293	95.74
4	Brooklyn	Dead	3319	177293	1.87
5	Brooklyn	Stump	4230	177293	2.39
6	Manhattan	Alive	62427	65423	95.42
7	Manhattan	Dead	1802	65423	2.75
8	Manhattan	Stump	1194	65423	1.83
9	Queens	Alive	237974	250551	94.98
10	Queens	Dead	4440	250551	1.77
11	Queens	Stump	8137	250551	3.25
12	Staten Island	Alive	101443	105318	96.32
13	Staten Island	Dead	1870	105318	1.78
14	Staten Island	Stump	2005	105318	1.90

- Most trees across all boroughs are alive and in good health



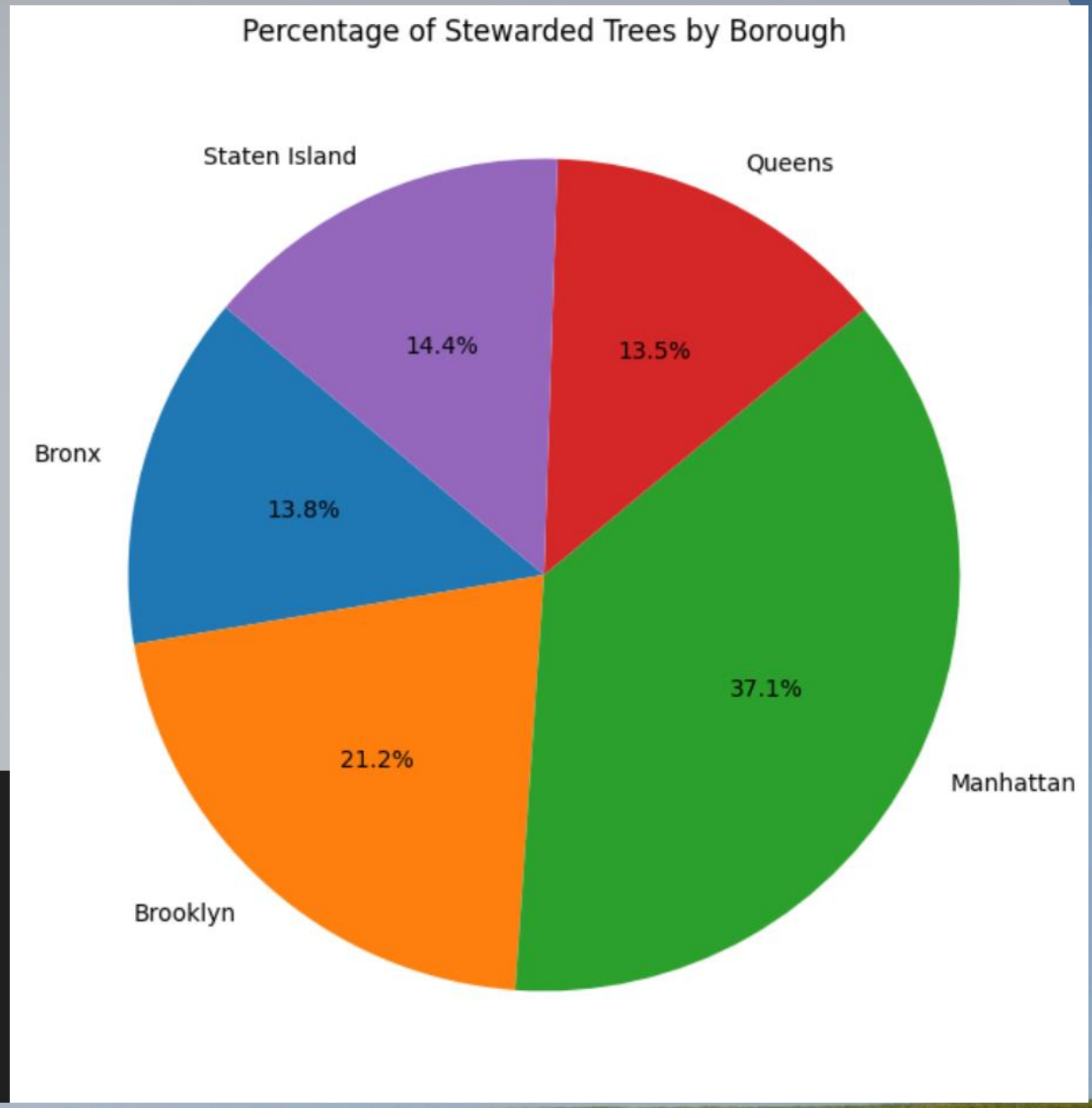
Findings and conclusions

Stewarded trees by borough, Total and Percentage

- For this analysis, I modified the existing data. The original data type for the existing column was text, so I converted it into integer to calculate both the number and percentage of stewarded trees by borough. The conversions were as follows: "None" was changed to 0; "1or2" became 1; "3or4" was assigned a value of 3; and "4orMore" was changed to 4.

- As we can see, the most stewarded trees are in the Manhattan area

borough	Total Trees	Stewarded Trees	Stewarded %
Bronx	85203	15734	18.47
Brooklyn	177293	50460	28.46
Manhattan	65423	32546	49.75
Queens	250551	45273	18.07
Staten Island	105318	20337	19.31



Findings and conclusions

Tree data collected by each user type within each borough, Total and Percentage

- As we can see, tree inventory data was collected not only by municipal organizations, such as NYC Parks Staff and TreesCount Staff, but also by a group of volunteers. The highest volunteer participation was in Manhattan (66.86%) and Brooklyn (43.85%)."

	borough	user_type	tree_id	percent
0	Bronx	NYC Parks Staff	24653	28.93
1	Bronx	TreesCount Staff	47329	55.55
2	Bronx	Volunteer	13221	15.52
3	Brooklyn	NYC Parks Staff	36200	20.42
4	Brooklyn	TreesCount Staff	63343	35.73
5	Brooklyn	Volunteer	77750	43.85
6	Manhattan	NYC Parks Staff	7351	11.24
7	Manhattan	TreesCount Staff	14330	21.90
8	Manhattan	Volunteer	43742	66.86
9	Queens	NYC Parks Staff	34701	13.85
10	Queens	TreesCount Staff	139002	55.48
11	Queens	Volunteer	76848	30.67
12	Staten Island	NYC Parks Staff	67081	63.69
13	Staten Island	TreesCount Staff	32280	30.65
14	Staten Island	Volunteer	5957	5.66

Findings and conclusions

https://magazine.columbia.edu/article/incredible-environmental-benefits-nyc-trees

- To sum up, the overall number of trees (over half a million) and their health condition across all NYC boroughs are quite impressive. It seems that both the municipality and local residents are actively involved in identifying issues (some were flagged during the survey) and in keeping the city green.
- At the start of this analysis, I didn't expect the trees to be in such remarkably good health—and the large number of trees is impressive as well

References:

- https://data.cityofnewyork.us/Environment/2015-Street-Tree-Census-Tree-Data/uvpi-gqnh/about_data
- https://www.nymtc.org/portals/0/pdf/CPT-HSP/NYMTC%20coord%20plan%20NYC%20CH03.pdf
- Pictures:
- https://www.cnu.org/publicsquare/2018/12/14/benefits-urban-trees
- https://www160.statcan.gc.ca/index-eng.htm
- https://magazine.columbia.edu/article/incredible-environmental-benefits-nyc-trees
- https://medium.com/@deepaksharma2494/20-pandas-functions-to-complete-80-of-your-data-science-tasks-cefa535a629e