PROJECT 3

Looking at air quality indexes on a global scale

PRESENTED ON

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PRESENTED BY

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PRESENTED TO

Data-PT-East-April- 041524

TERM DEFINITIONS

The Air Quality Index (AQI) works by measuring the presence of five specific pollutants in the air and assigns a score on a scale of 500 based on the prominence of those pollutants.

Some of these pollutants were also included in our dataset:

1. Carbon Monoxide
2. Ground-Level Ozone
3. Nitrogen Dioxide
4. Particulate Matter (PM2.5)

AQI LEVEL	HEALTH ISSUES	WHAT DOES IT MEAN?
0-50	Good	The air quality is safe and poses no health risks to anyone.
51-100	Unhealthy	The air quality is fine. However, sensitive people are still prone to health risks due to minor pollutants present in the air.
101-150	Poor	People who are sensitive to the air pollution are at health risk. The air quality is safe for healthy fit people.
151-200	Severe	Fit and healthy people will catch hold of infections and viral due to many harmful air pollutants present in the air. Highly sensitive people are exposed to severe health risk.
201-300	Dangerous	The contaminated air threatens everyone with various health issues.
301-500	Hazardous	High Alert Emergency: This level of air quality is a serious threat to life both for sensitive and healthy people. It can severely affect the health or even lead to death.

PURPOSE

The purpose of our project was to analyze the AQI values of different cities and countries to gain a better understanding of the state of the air quality around the world.

Through this we hope to raise awareness about air pollution and its impact on health and the environment. We believe that by breaking down air quality data into more understandable bar charts and interactive maps, we can empower individuals and communities to make better informed decisions about their well-being.

INSPIRATION

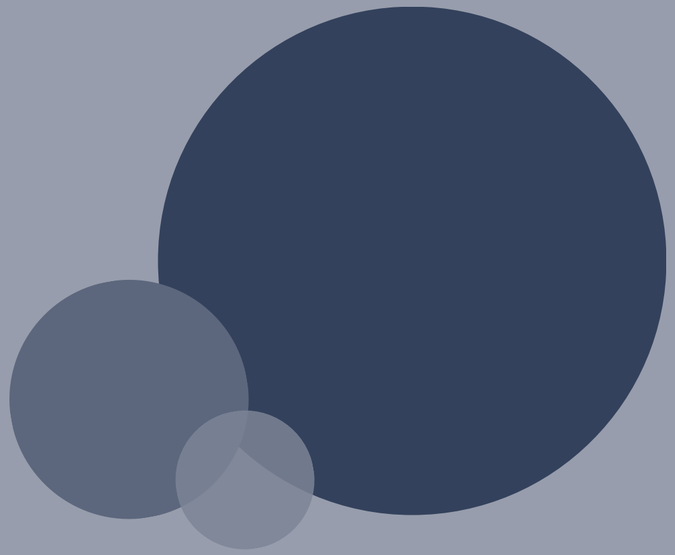
We selected our dataset because it contained data from countries all across the world and we were interested in observing the difference in air quality between different countries and continents.

Our dataset also included latitude and longitude columns. We knew this was something we wanted as the data in these columns could be used in our heat map to specify certain areas of interest.

Additionally, we selected our dataset because of its CSV format. We knew this would make it easy to import into Jupyter Notebook and turn it into a useable dataframe.

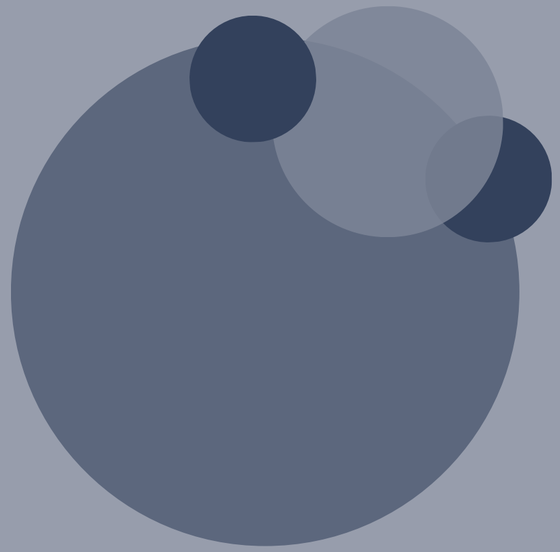
World Air Quality Index by City and Coordinates Dataset

DESIGN CONCEPTS



HEAT MAP W/ MARKERS

Plot all our data points using Lat/Long values and color code to correlating AQI category.



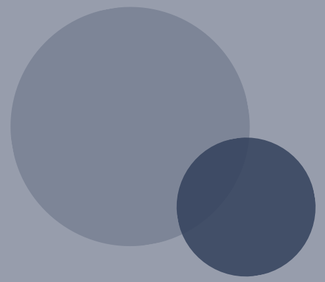
AQI CATEGORY BAR CHART

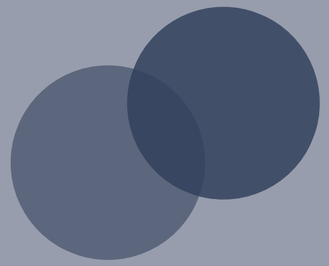
Compare the counts of each AQI Category.

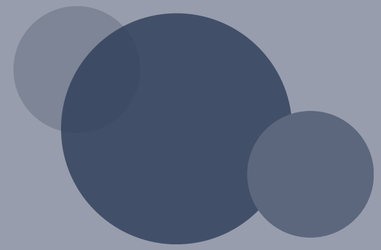
BEST & WORST CITIES BAR CHART

Compare the top ten best and worst cities in terms of AQI values.

RESEARCH QUESTIONS







1

Which cities rank the worst overall in air quality?

2

Where across the world is the best air quality located?

3

Are the AQI, CO, and Ozone values similar amongst the countries?

LIVE DEMONSTRATION

LIMITS + BIAS

- Country labels weren’t always correct in our dataset. Our bar charts were affected by this because they have a country filter on them.
- Our dataset was quite large which was beneficial for our bar charts but took away from the impact of our heat map.
- AQI Indexes vary country to country and don’t necessarily measure all the same pollutants or categorize the same way.
- Natural disasters such as volcanic eruptions and wildfires can dramatically affect air quality and skew data.

CONCLUSION

Given our research, we found that the worst air quality, all with AQI's of 500, came from cities in Pakistan, Russia, South Africa and from Durango, Colorado. While the air quality in the majority of these cities can be attributed to emissions from industrial practices, Durango is an outlier, with it's air quality not a result of industrial pollution but an effect of traveling smoke from wildfires.

On the opposite end of the spectrum, looking at where the best air quality is located globally, Ecuador is our clear winner, taking up three of our five top city placings. Additionally, 55% of all their AQI readings were labeled as 'Good', the highest rating possible.

The similarities between AQI values between countries is relative depending on which countries we are looking at. For example, the majority of countries in Europe have their cities classified as 'Good' or 'Moderate'. Whereas countries like 'China' and 'India' have lower city counts of 'Good' and 'Moderate' AQI scores, and additionally have many city counts with AQI scores ranging from 'Unhealthy' to 'Hazardous'. There are many factors to explain for this but the primary two are population and associated transportation pollution and more significantly, industrial pollution.

FUTURE WORK

We would like to focus our future work on further analyzing the air quality within the United States.

Adjust our current dataset:

- clean data to ensure all US cities are correctly labeled with the United States as their country.
- drop all the rows containing data from other countries
- add a state column and label all states accordingly.

Integrate two APIs:

- AirNow API
  - provided by the Environmental Protection Agency (EPA) which contains up-to-date and live AQI reading data.
- OpenFEMA API
  - contains up-to-date information on natural disasters within the United States.
  - Cross-reference with AirNow API to observe relationships between natural disasters and air quality in affected and surrounding areas.