# Analyzing Air Quality Improvement During COVID-19

CS591 K1 Final Demo

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(Group 8)

# Project Goals

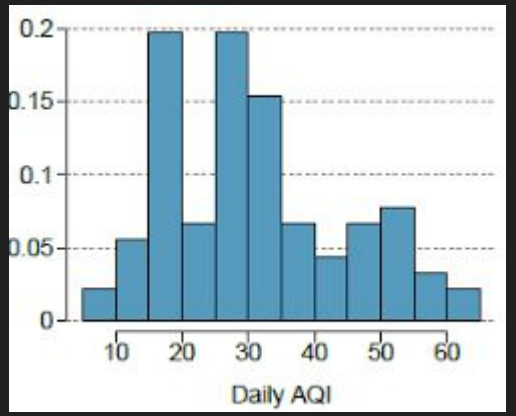
Our goal was to implement the following two queries accurately and with low latency. We hoped to obtain a high ranking on the leaderboard for the DEBS Grand Challenge based on correctness of results and processing performance.

## Query 1

The first query returns the top 50 cities in terms of air quality improvement as well as their current air quality indices. The AQI for each city is calculated from the average particles coming from geo-distributed air quality sensors over a sliding window of 24 hours. This query results in a ranking of the top 50 cities by their improvement over a 5-Day Average AQI compared to the previous year.

## Query 2

The second query results in a histogram of the longest streaks of good air quality up to the last 7 days, defined as the time span in seconds since a city flipped to a “good” AQI value. The histogram has 14 buckets of equal length from 0 to the maximum length. Both query 1 and query 2 run in parallel.



# Main Achievements

## Design Document Expectations

- Implement both queries in parallel correctly and efficiently.
- Success measured by tests the DEBS Grand Challenge provides and ranking compared to other teams.

## Did we achieve this?

- ✓ Implement q1
  - Correctly
  - Efficiently
- ✓ Implement q2
  - Correctly
  - Efficiently
- ✗ High leaderboard ranking

## Additional Achievements

- Increased our output
- Demonstrated our solution to the DEBS chairs and got our initial solution accepted
- Wrote a paper discussing our design and implementation

# Demo

# Experience & Challenges

## Learned About

- Flink's process window function
- Triggers and evictors
- Integrating our Flink application with gRPC


## Frustrated By

- Unclear query descriptions from DEBS Grand Challenge
- Unreliable communication with the DEBS Grand challenge chairs


## Challenges Faced

- Output per batch
- Integrating query 1 and query 2 after independent development of each