Air Pollution Solution - Air Aware Hackathon 2025

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The Problem

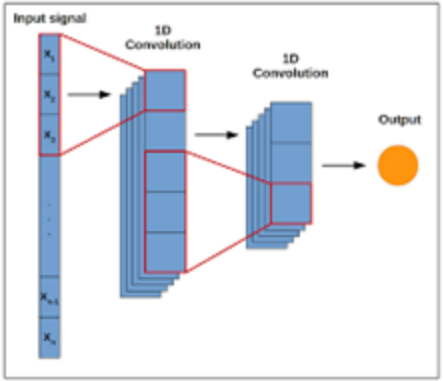
Air pollution has, and remains, a prominent Gordian knot in our world, being a stark reality of the effects of technological advancements. It demands a crucial solution to not just compromise, but to eradicate it completely. Vehicles and factories are contributing to this problem every day, and we haven't found a reliable method to control it yet. Air pollution poses threats to the health of humans, animals, plants, the environment and even the climate, harming ecosystems and crop yields and will slowly destroy the world we live in if nothing is done to combat it.

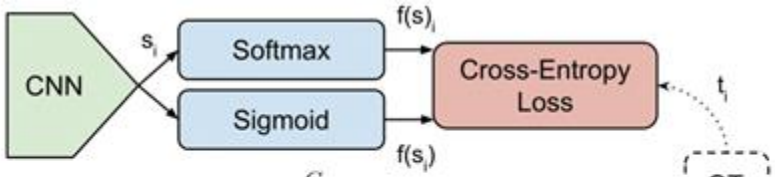
Our Approach and Solution

We have decided to train a CNN (Convolutional Neural Network) model to look at pictures of environments and determine how healthy or unhealthy the air in the pictures is. To accompany this, we have created a website that shows this as well as an interactive section that can determine AQI (Air Quality Index) based on the entered amount of chemicals in the air. Statistics on how much air pollution is caused due to different sources and an interactive globe may also be included for further information. All of this information can be used to help decide what should be removed or implemented to reduce air pollution as much as possible.

CNN Technical Implementation Details

- 10M param CNN
- Cross Entropy Loss
- Softmax/Sigmoid Activation
- 5 epochs
- Final Loss = 0.3



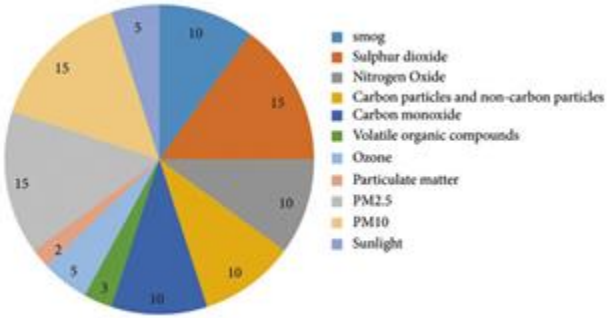


$$CE = -\sum_{i}^{C} t_i log(f(s)_i)$$

$$CE = -\sum_{i=1}^{C'=2} t_i log(f(s_i)) = -t_1 log(f(s_1)) - (1 - t_1) log(1 - f(s_1))$$

Insights from Data

99% of the world's population has been exposed to air pollution that exceeds the World Health Organisation's recommended limit. Additionally, in Australia, around 18% of air pollution was found to be caused by vehicles, especially road vehicles. This percentage could be significantly lowered if electric cars are used more, as they produce no tailpipe emissions, meaning they don't emit greenhouse gases at all while driving. 33% of air pollution was also caused by industrial processes, which could be reduced from most, if not all of these processes shifting from using fossil fuels to renewable energy, such as solar, wind or geothermal sources.



The Education Component

Our solution can be used to help others learn about air pollution and how prominent it really is in the world, using the help of the AQI to convey this. The data also brings to attention the fact that most countries are over the recommended AQI. Furthermore, information about the amounts of air pollution from different sources such as vehicles and factories will also help to determine the biggest contributors to the problem and assist in reducing or eliminating the impact of the sources.

Conclusion

Air pollution is a significant issue in the world that needs to be addressed as soon as possible. We have presented our own solution and a method to identify air pollution in different countries or environments, which can be used to understand and reduce, if not remove air pollution. Statistics of the amount of air pollution in areas and how much pollution comes from different sources have also been included for further understanding to combat air pollution.