MINIMIZING POLLUTION TO A CERTAIN LEVEL WITH THE HELP OF BIG DATA

Aditya Sharma*1, Swastik Rastogi*2, Mahesh Kumar Tiwari*3

*1,2Student, Department Of Computer Science & Applications, National Post Graduate College, Lucknow, Uttar Pradesh, India.

*3Assitant Professor, Department Of Computer Science & Applications, National Post Graduate College, Lucknow, Uttar Pradesh, India.

ABSTRACT

Nowadays pollution is becoming a major threat to living being, over 7 million deaths a year happen due to air pollution. A study by WHO (World Health Organization) in 2016 claimed that 98 per cent of densely populated cities in economically underdeveloped are exposed to the highest levels of urban air pollution. It can cause severe health problems like emphysema, asthma, lung damage, headache, nausea, chest pain, dry throat, etc. Big data is a field which deals with a large amount of data. Big data can help us overcome the amount of pollution increasing everyday by taking important measure by analyzing it.

Keywords: Pollution, Big Data, Deaths.

I.   INTRODUCTION

Introduction of any contaminated particle into atmosphere or environment is known as pollution. These contaminated particle are also known as carbon monoxide, nitrogen dioxide, ground level ozone, particulates, sulfur dioxide, hydrocarbons and lead. Nowadays every human is getting affected by pollution. It could not be removed completely from planet Earth but it could be minimized to certain levels.

According to OECD Estimates by 2050 outdoor air pollution will become the top cause of environmentally related death [1].

A study by the World Health Organization (WHO) in 2016 claimed that 98 per cent of densely populated cities in economically underdeveloped countries are exposed to the highest levels of urban air pollution. This increases the risk of strokes, heart diseases, lung cancer and pulmonary respiratory diseases, such as asthma [2]

If we collect the data of pollution around the globe then it will take form of massive data, in other words it will be known as Big Data about global air quality.

The good part is that we can use that data to minimize and reduce pollution around the globe in various ways.

II.   METHODOLOGY

Today across the world the level of pollution is getting higher day by day. Ambient Air Pollution is the cause of around 4.2 million deaths per year due to strokes, heart disease, lung cancer, etc. [3]

In Delhi, poor quality air irreversibly damages the lungs of 2.2 million or 50 percent of all children. [4]

A. The Earth releases its own natural carbon, from plants, oceans and living things in the natural carbon cycle. These carbon emissions are easily absorbed back into the Earth. But after humans started extracting fossil fuels, we upped the amount of carbon in our atmosphere and only 40% of it can be reabsorbed. [5]

B. Some of the most polluting industries are:-

- Energy
- Transportation
- Industry
- Residential, Commercial and Institutional sectors
- Agriculture [5]

C. Data measuring airborne pollutants, public health and environmental factors are increasingly being stored and merged. These big datasets offer great potential.[6]

D. Information about pollution in a country should be presented on that country's map and this data should be shared with other countries as well to take action on it together. [7]

AirVisual[8] and Waqi[9] are very good initiatives which shows real time map of pollution around the globe. [7]

III. MODELING AND ANALYSIS

First COVID-19 Wave Lockdown

From 25 March 2020 – 14 April 2020, Phase 1 of COVID-19 lockdown was implemented by Government of India. As everyone were inside their home and all of the factories and workplaces were closed so the pollution level came down to "good" from "bad" or "severe"

Let us study the historical pollution data of Delhi which is one of the major and most polluted Indian cities.

Table 1. AQI data of a week before lockdown

Date	PM 2.5	PM 10	O3	NO2	SO2	CO
16/03/2020	119	93	40	27	8	7
17/03/2020	120	102	41	32	6	7
18/03/2020	135	108	42	30	7	5
19/03/2020	142	116	51	40	9	6
20/03/2020	157	100	45	30	8	8
21/03/2020	134	84	39	18	6	2
22/03/2020	135	77	45	17	7	6

Table 2. AQI data of the lockdown week

Date	PM 2.5	PM 10	O3	NO2	SO2	CO
23/03/2020	112	63	33	13	6	2
24/03/2020	103	51	29	8	5	2
25/03/2020	75	54	21	5	6	2
26/03/2020	82	37	22	5	5	1
27/03/2020	65	28	25	6	5	1
28/03/2020	59	46	29	4	5	
29/03/2020	77					

Here we can clearly see that just in a single day after implementing lockdown the numbers fell down drastically.

By analyzing the big data of the areas under the control of the authorized government body, few steps can be taken like:-

* Complete weekend lockdown in the affected area
* Timing based lockdown
* Rerouting

1) Complete weekend lockdown in the affected area

The Government can implement a weekend lockdown in the affected areas as on weekend people usually spend their time in their home.

2) Timing Based lockdown

The Government can implement a timing based lockdown or a curfew for few hours in the affected area which will be enough to settle the pollutants present in the air.

3) Rerouting

The Government can pass a mandate for not to visit or pass through the affected areas because of which no one will be able to use the roads in that area which will eventually help in controlling the pollutants.

IV. RESULTS AND DISCUSSION

We can clearly see that implementing lockdowns after taking decisions by the help of big data can be a boon for tackling air pollution. As it is not possible to implement lockdown throughout the entire country for once in a week as it will affect the Indian as well as Global economy, so following steps can be taken instead of a complete lockdown. The government can even take step as per the industry which is causing polluting the most.

V. CONCLUSION

It is clear that Government can take few steps by analyzing the big data about pollution to control it. This should be taken care of that the lockdown should not be for very long period (2-3 days) because it will affect the lifestyle of the people and the economy as well.

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