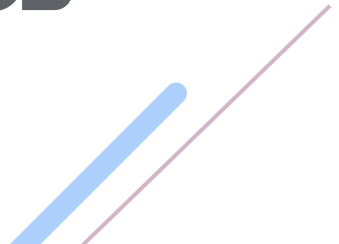
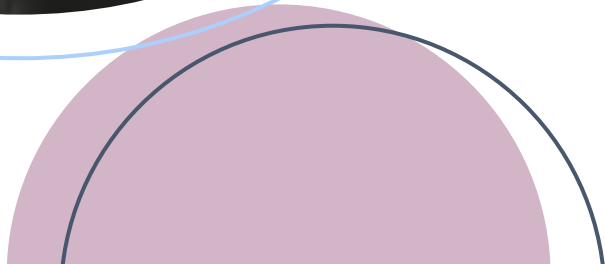




Rain & Allergies



Contents

Problem statement **01**

Data Import & Cleaning **02**

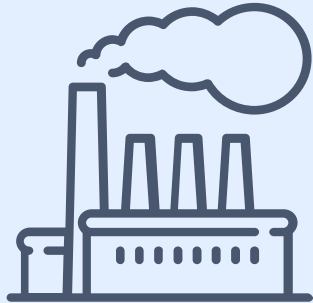
Exploratory Data Analysis **03**

04 Data Visualization

05 Recommendations



01. Problem statement

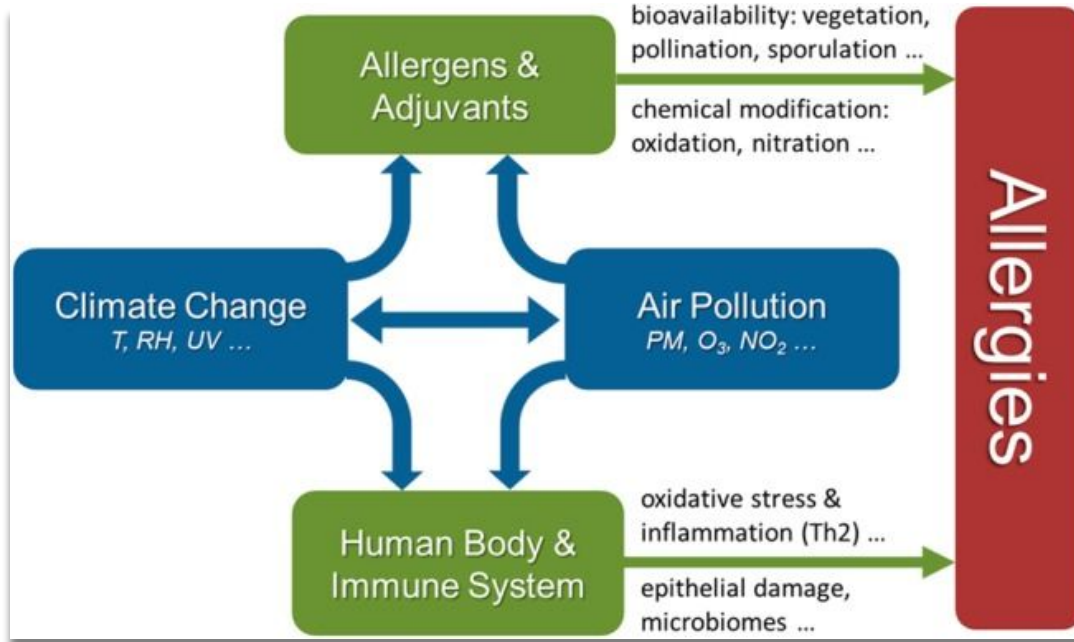


Why do allergies get worse when it rains?

For student from research club who need to understand why her allergies worse when it rains and decide to develop a comprehensive understanding of the interplay between rain and allergies,

To identify strategies for prevent or reduce allergies triggered by rain.

Background



Interplay of air pollution and climate change can promote allergies by influencing the human body and immune system, as well as the abundance and potency of environmental allergens and adjuvants.

Climate parameters and air pollutants can influence the release, potency, and effects of allergens and adjuvants:

temperature (T), relative humidity (RH), ultraviolet (UV) radiation, particulate matter (PM), ozone and nitrogen oxides (O₃, NO_x)

02.Data Import & Cleaning

Step 1 : Choose Data from data.gov.sg

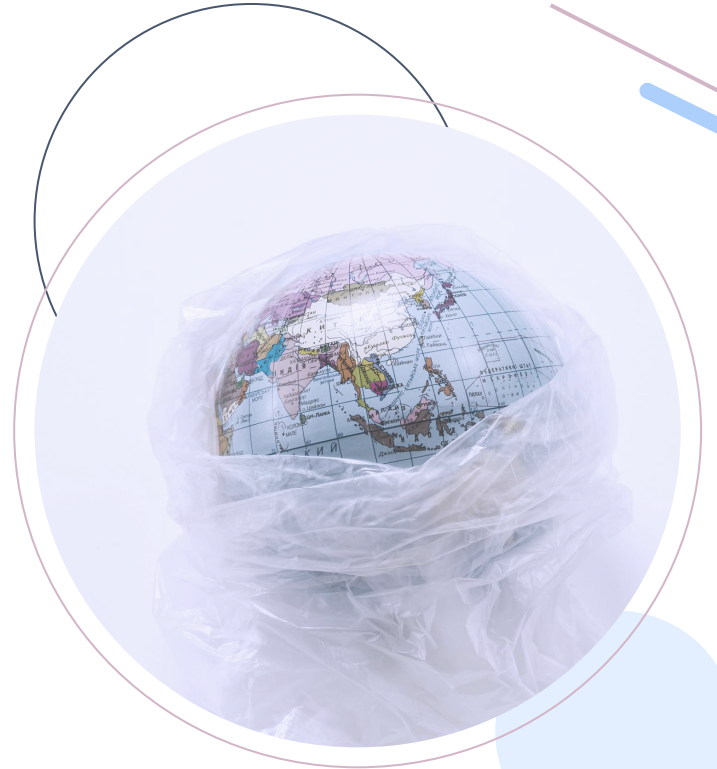
Step 2 : Import data by using Pandas

Step 3 : Check for missing values , datatype and any obvious issues

- No missing value

Step 4 : Fixing and cleaning data

- Change data 'month' to datetime type
- Create new columns for month and year
- Merge rain data
- Merge air pollution related data
- Find sum and mean for rain data
- Merge rain data and air pollution data
- Check and drop empty row
- Save cleaned dataframes as csv files.



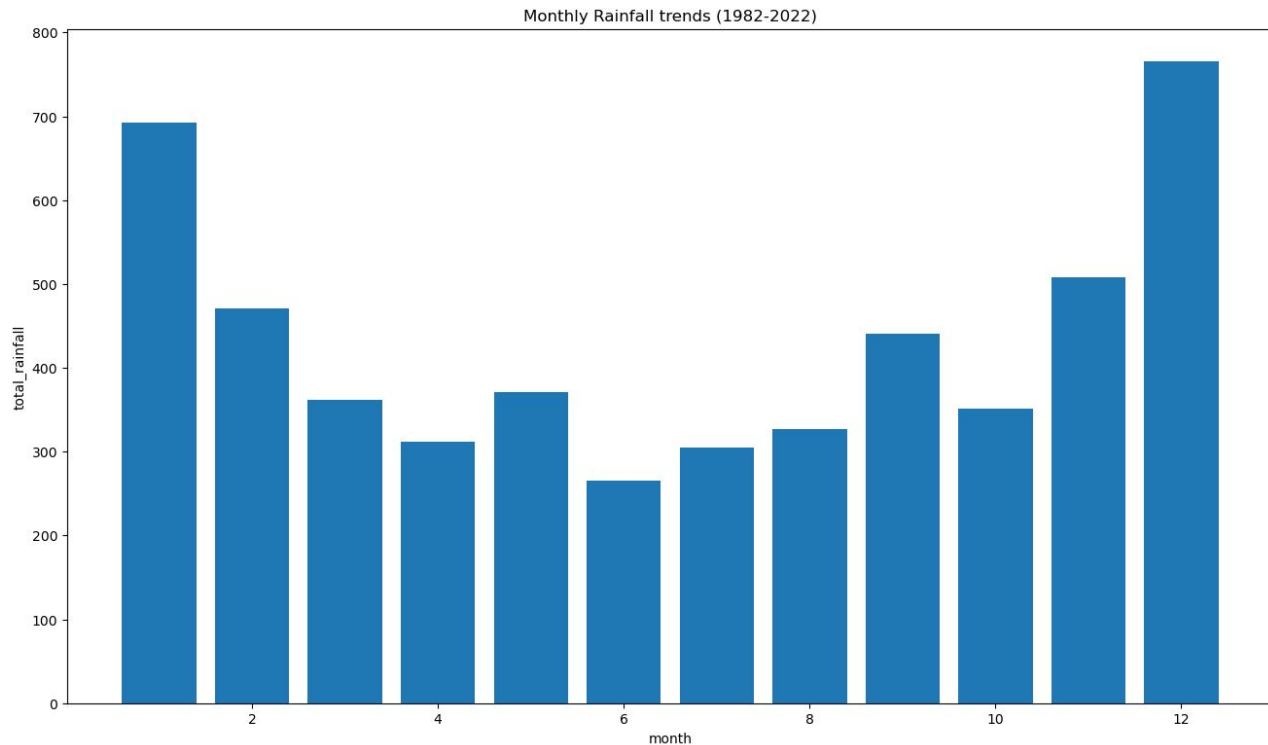
Data Dictionary

Feature	Type	Dataset	Description
year	int		Year of collecting data
rainydays	int	rainfall-monthly-number-of-rain-days	Monthly number of rain days from 1982 to 2022 if the total rainfall is 0.2mm/day or more.
totalrainfall	float	rainfall-monthly-total	Monthly total rain recorded in mm(millimeters) from 1982 to 2022
mean_sunshine_hrs	float	sunshine-duration-monthly-mean-daily-duration	The monthly mean sunshine hours in a day recorded
temp_min	float	SurfaceAirTemperatureMonthlyMeanDailyMaximum	The monthly mean daily minimum temperature recorded
temp_max	float	surface-air-temperature-monthly-mean-daily-minimum	The monthly mean daily maximum temperature recorded
rh_mean	float	RelativeHumidityMonthlyMean.csv	Monthly mean relative humidity
pm2.5_mean	float	AirPollutantParticulateMatterPM2.5	Annual means for PM2.5 ($\mu\text{g}/\text{m}^3$) are based on WHO Air Quality Guidelines (global update 2005).
o3_mean	float	air-pollutant-ozone.csv	Annual daily maximum 8-hr means for ozone ($\mu\text{g}/\text{m}^3$)
no2_mean	int	AirPollutantNitrogenDioxide	Annual means for nitrogen dioxide ($\mu\text{g}/\text{m}^3$)

03.Exploratory Data Analysis

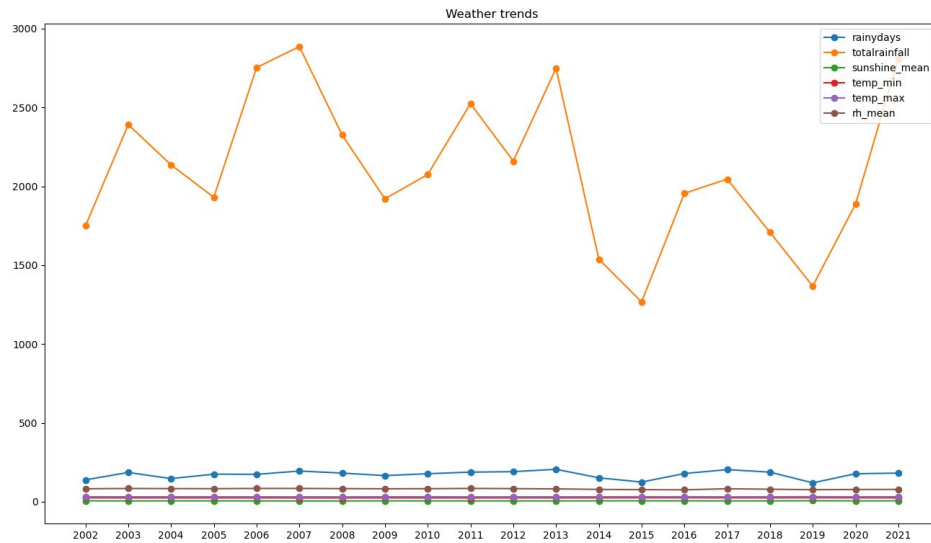
	year	no2_mean	so2_mean	pm2.5_mean	rainydays	totalrainfall	mean_sunshine_hrs	temp_min	temp_max
count	21.000000	21.000000	21.000000	21.000000	21.000000	21.00000	21.000000	21.000000	21.000000
mean	2012.000000	24.095238	84.904762	17.619048	170.428571	2069.37619	5.844246	25.190079	31.603770
std	6.204837	1.757975	30.225659	3.787825	25.910560	494.88300	0.366687	0.335520	0.343349
min	2002.000000	20.000000	30.000000	11.000000	120.000000	1267.10000	5.241667	24.708333	31.091667
25%	2007.000000	23.000000	65.000000	15.000000	152.000000	1748.90000	5.575000	24.975000	31.283333
50%	2012.000000	25.000000	83.000000	18.000000	178.000000	2045.60000	5.875000	25.100000	31.666667
75%	2017.000000	25.000000	98.000000	20.000000	188.000000	2391.20000	6.066667	25.358333	31.858333
max	2022.000000	27.000000	149.000000	24.000000	206.000000	2886.20000	6.783333	25.916667	32.300000

04.Data Visualization



>> Monthly rainfall trends from data year 1982-2022

Have most rainfall on first month of the year and the end of year.

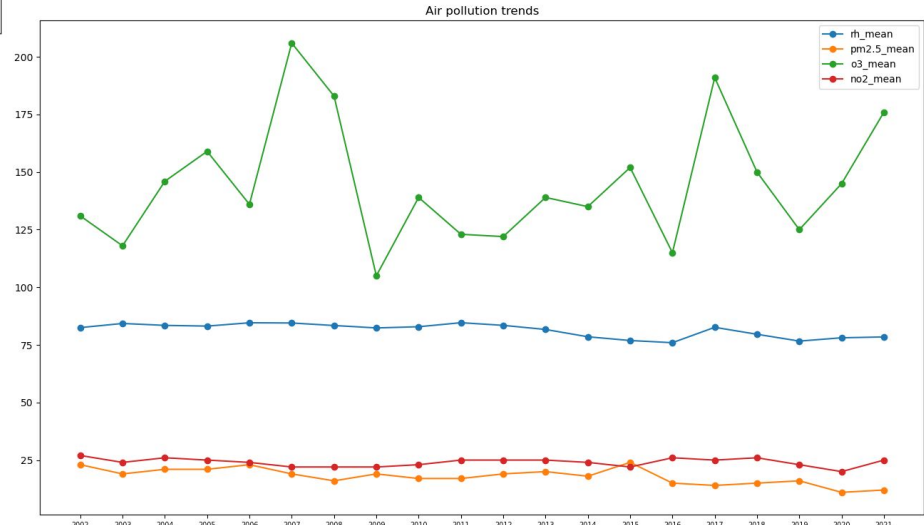


>> Weather Trends

- Weather are correlated to each other
- Total rainfall has a strong correlation to rain days

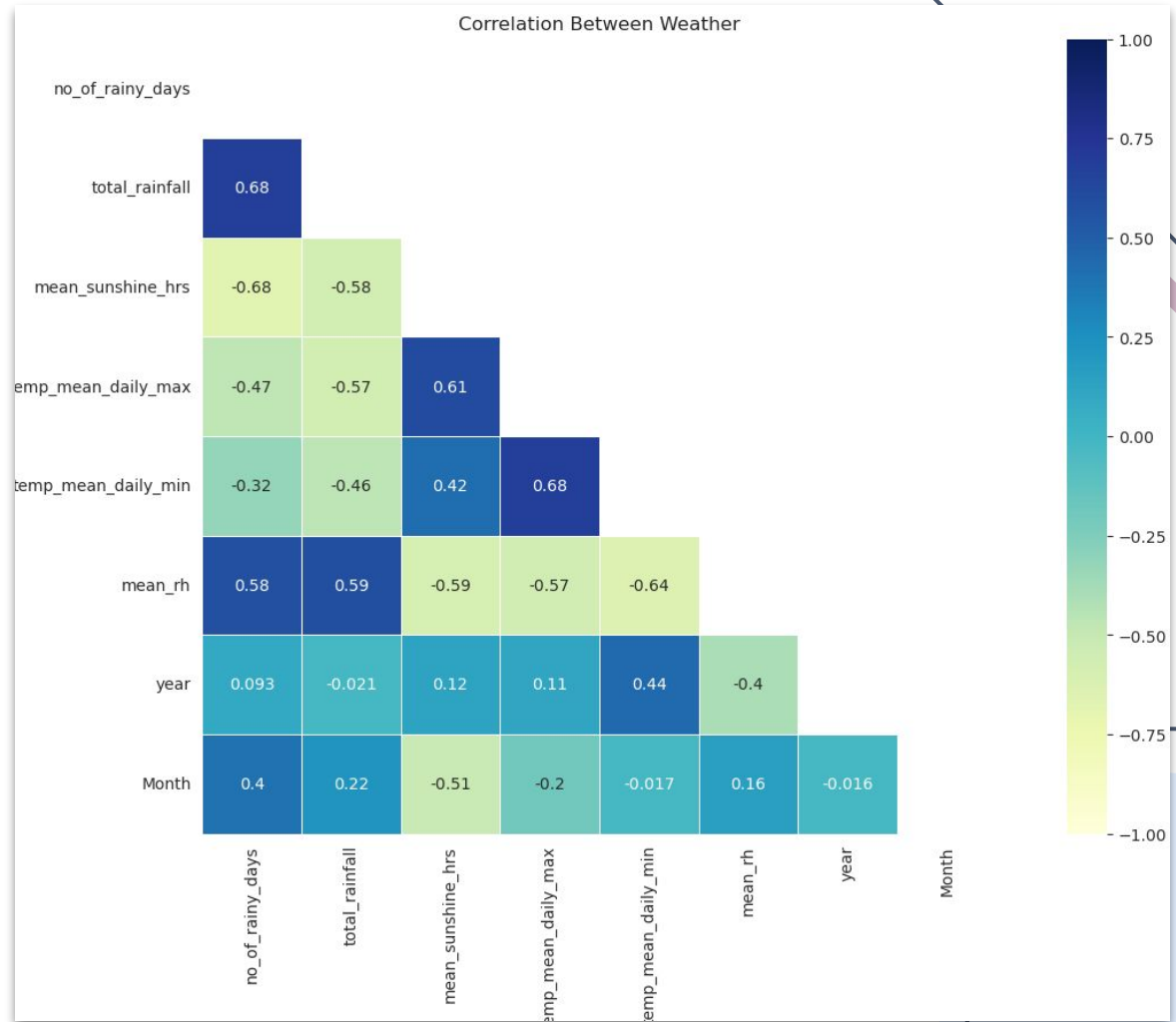
Air pollution Trends <<

- Air pollution are correlated to each other
- Ozone has a strong correlation to pm2.5
- Air pollution tends to rise naturally especially Ozone

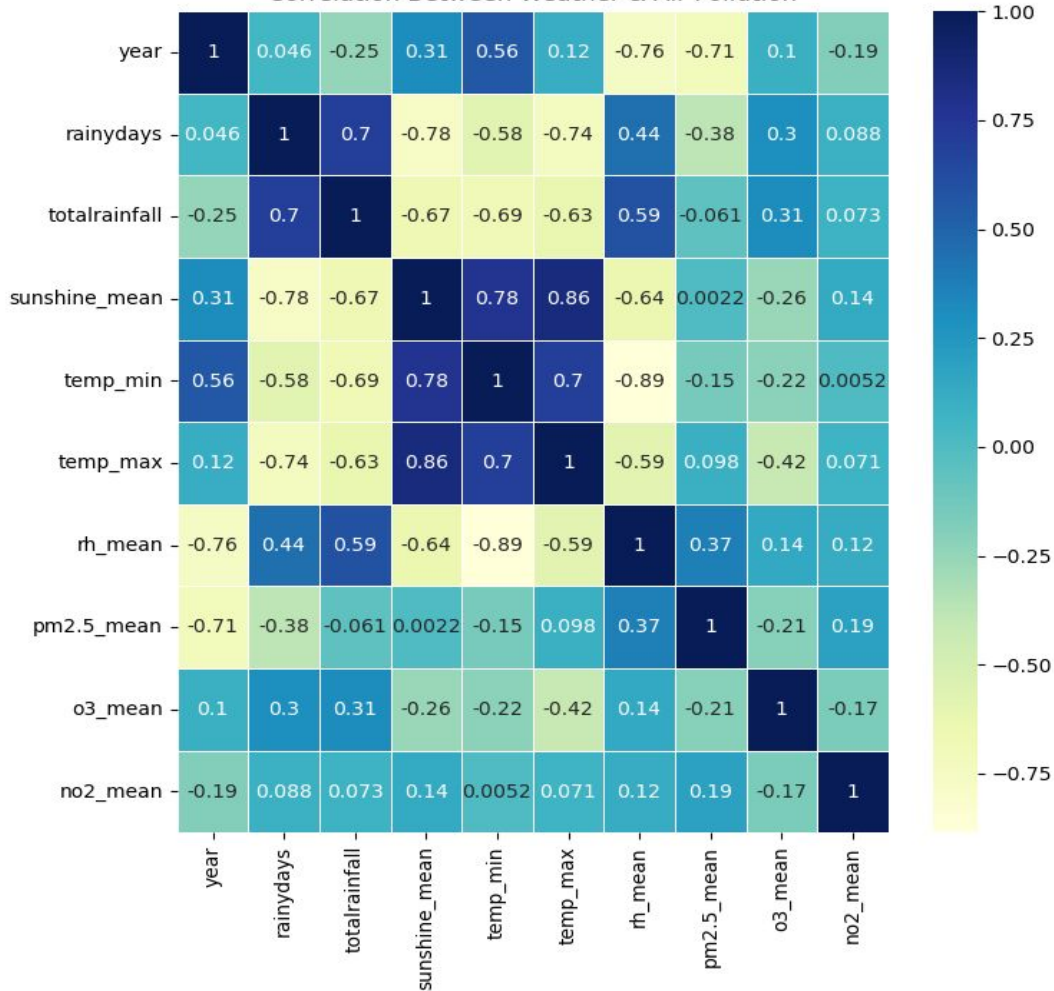


Correlation Between Weather

- Sunshine hours has a strong correlation to temperature.
- Total rainfall has a correlation to rain days and relative humidity
- Rain days has a correlation to relative humidity



Correlation Between Weather & Air Pollution



Correlation Between Weather & Pollution

- Total rainfall and rain days has a correlation to ozone.
- Relative humidity has a correlation to pm2.5.



Conclusions

The interaction between rain and weather allergies is complex and has some influenced by air pollutants like particulate matter (PM_{2.5}) and ozone.

Prolonged exposure to both air pollution and allergens can have cumulative health effects, potentially worsening respiratory conditions and leading to chronic health issues.

Recommendations

It's essential for individuals with allergies and respiratory conditions to monitor air quality and weather conditions especially on first month of year and the end of the year, take necessary precautions, and seek medical advice and treatments to manage symptoms effectively. Additionally, efforts to reduce air pollution and limit exposure to pollutants can contribute to improved respiratory health and the prevention of allergic diseases.



THANK YOU

