

# SG Car Wash Business

In association with Singapore Weather

Data Science Immersive Course  
Project 1



“ EVERYTIME YOU WASH YOUR CAR  
IS A RITUAL TO CALL OUT THE RAIN ”

- DEMAND FOR CAR WASH FALL DURING RAINY SEASON -

## RAINY WEATHER

Rainy weather can be a double-edged sword for wash businesses. On one hand, rain can help keep cars clean, reducing the need for a wash.

Car Wash Seasons • 6 min read

### CAR WASH WEATHER: A GUIDE FOR CAR WASH BUSINESSES

Car Wash   Drying   Salt   Rain

Published on August 8, 2023

Car Advice

### Do I Have to Wash My Car During the Rainy Season?

Published by Supatcha (Parn) on 8 Jun 2022

There's this common belief among drivers that you don't need to wash your car after it rains because the rain will clean the car for you. This is, however, completely incorrect.

# Problem Statement

## As a carwash shop owner,

There is an uprising among our employees about welfare provided. this situation leave us short in employees due to competitiveness in wages & welfare.

We are fixing this by considering uplift our employee welfare to be more competitive to the market by adding extra annual paid leave with affecting least on company's revenue.  
*(Giving that employees are hired in monthly scheme)*

It's being said that "**demand for car washes is typically lower during the rainy season than other time of the year\***." rainy season will be the condition for the usage of extra annual paid leave for our employees to affecting least on company's revenue.  
Hence, we are trying to **identify designated months applying to this condition**.

WE NEED  
BETTER WELFARE!!



Source: ..Professional Carwashing & Detailing magazine,  
"Weather's impact on carwashing" article, published March 2022.\*  
<https://www.carwash.com/weathers-impact-carwashing/>



# Plan

## Find out ➤

Which monsoon caused more rain portion & rain day ( $>0.2\text{mm}$ ) NorthEast or Southwest ?



Range months that actually rain hard  
Therefore, suitable for extra paid leave?

# Data Preparation

Import & Cleansing

DSI 03 | true digital academy

2

Datasets

Singapore Monthly Rainy Days  
Singapore Monthly Rainfall

Period: Year 1982-2022

0

Null  
Values

0

Duplicated  
Rows

2

Wrong  
Data-Type

1

Dataframe  
w/ Outliers

488 rows, 2 columns x2

EDA

Exploratory  
Data Analysis



Join via date

Add -> Average Rainfall  
per rainy day  
Add -> Growth Rate

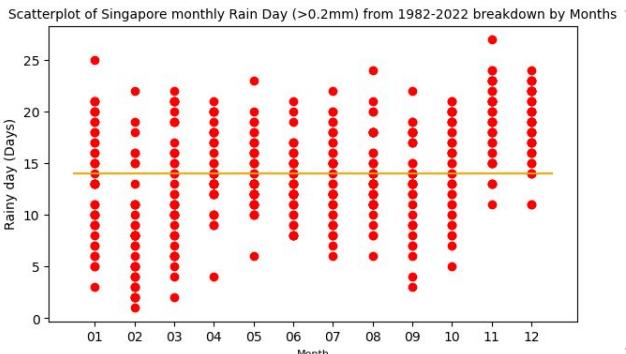
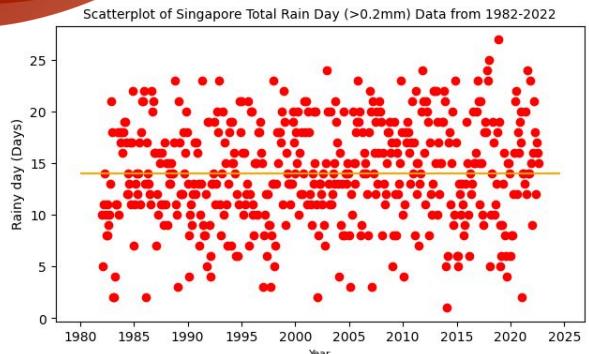
Data Cleansing

Fix Datatype -> Date/Time  
Extract columns Month, Year  
Keep -> Outliers



**\*\*Disclaimer:\*\*** As stated in Raw Data, the metrological station has been relocated quite a few then moved to Changi since 1984. I didn't remove the data from 1982 to 1984 since station relocation may not be a big deal in Singapore context which as total area of a bit more from Phuket province!

RAINY DAY~



### 1.1 (UpperLeft)

Average Rainy Days doesn't show significant pattern over period of time.

### 1.2 (UpperRight)

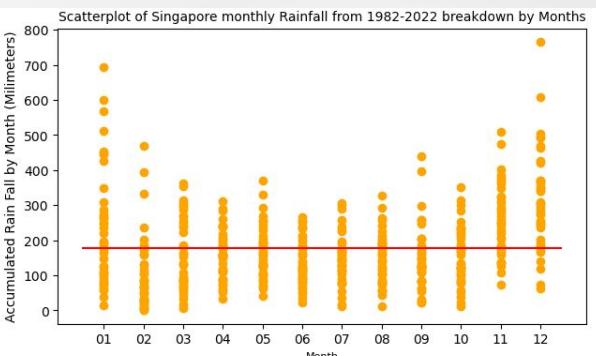
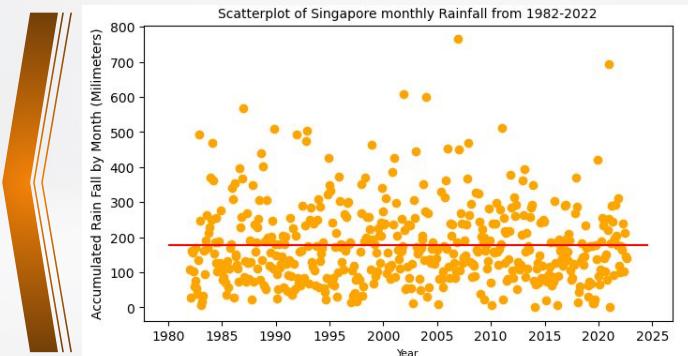
Average Rainy Days doesn't differ much among months this may because of the amount rain accum to count as a Rainy Day may be too low (>0.2mm)

### 2.1 (LowerLeft)

Average Accumulated rain doesn't show significant pattern over period of time.

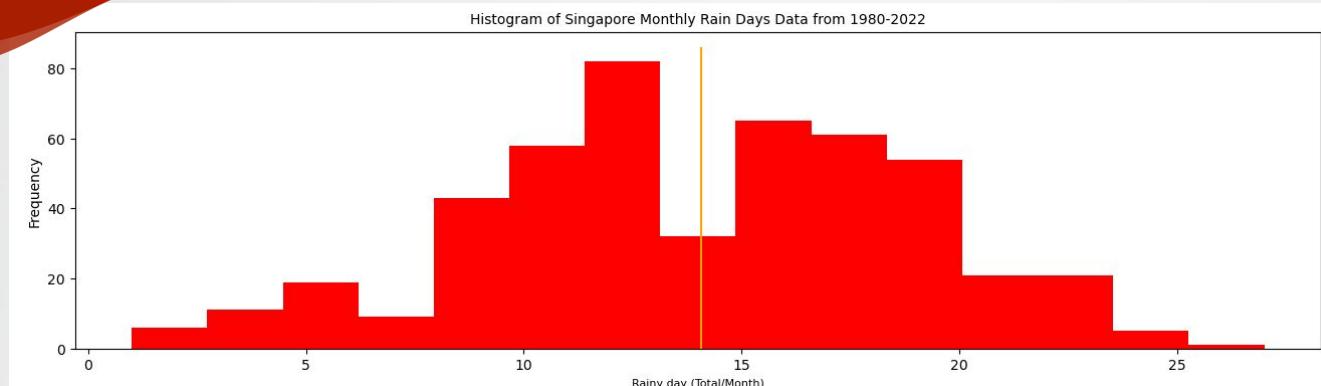
### #2.2 (LowerRight)

It shows that Rain seasons in Singapore could be around October to February which are sync with the Northeast Monsoon that occurs from December to early March. although , Southwest Monsoon from June to September doesn't seem to differ from the other



ACCUM. RAINFALL~

RAINDAY



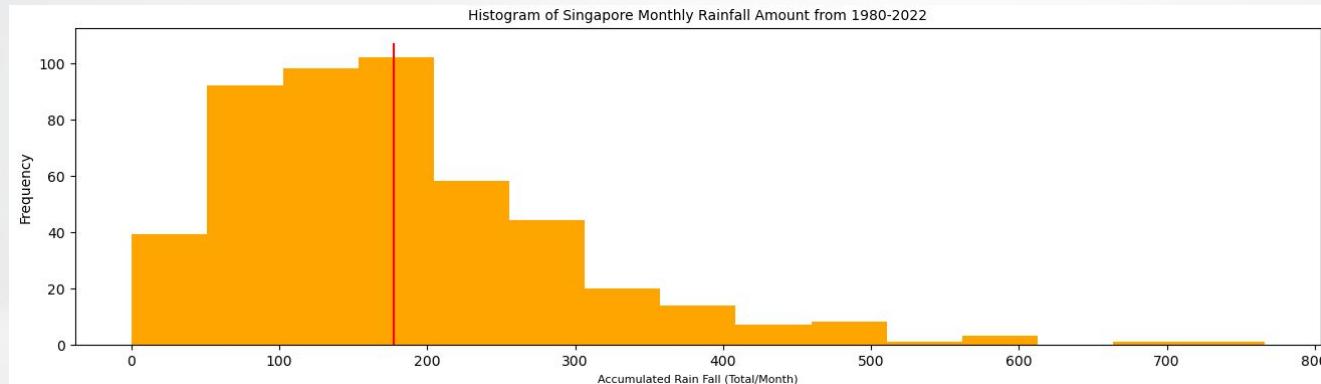
Mean of  
no\_of\_rainy\_days is

**14.06 days**

Standard Deviation of  
no\_of\_rainy\_days is

**4.94 days**

ACCUM. RAINFAL



Mean of  
total\_rainfall is

**177.16 mm**

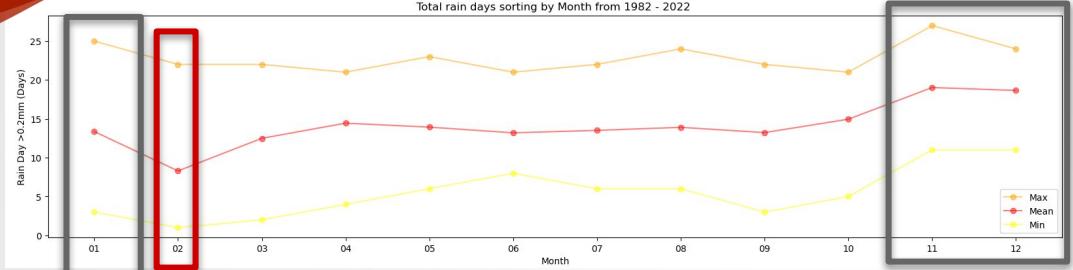
Standard Deviation of  
total\_rainfall is

**113.79 mm**

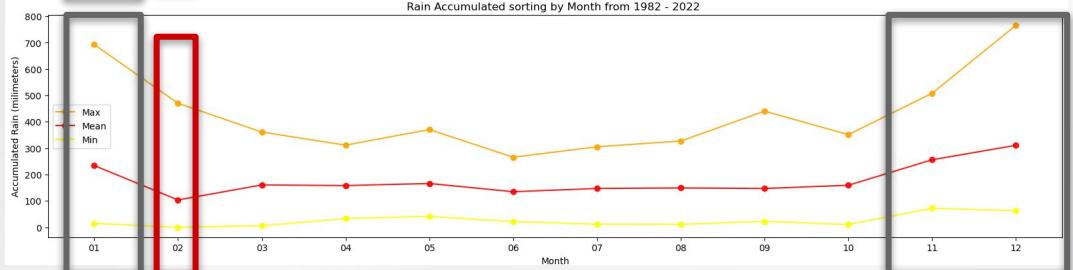
**(Upper Graph)** This shows that average of Rainy day sits around 14 days a month this backup our hypothesis that >0.2 mm may not reflect severity of the rain in a rain day and the graph seem to approach normal dist.

**(Lower Graph)** This shows that average accumulated rainfall (mm) is around 177.163 per month. anything beyond this point could consider as is Rain seasons and the graph is right-skewed

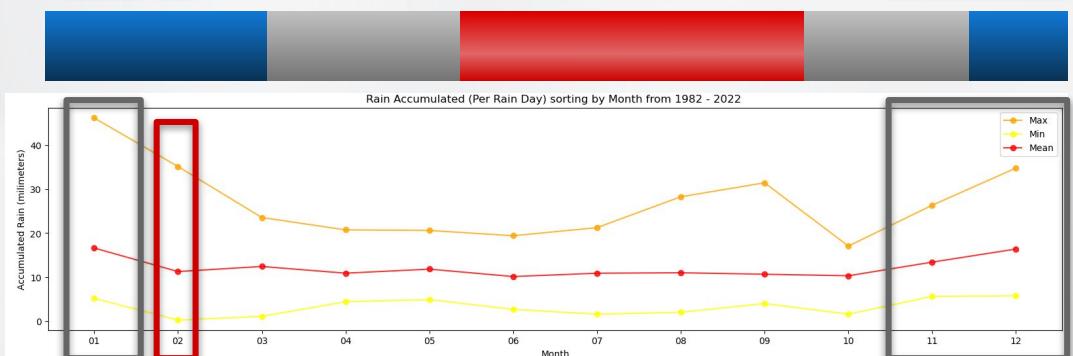
RAINDAY



ACCUM. RAINFALL



RAINFALL/RAINDAY



Color



Period

Northeast Monsoon



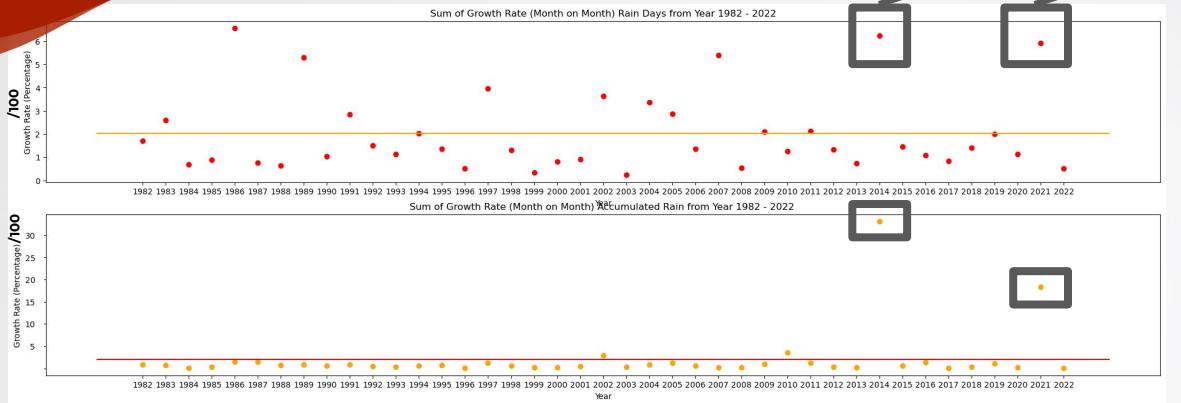
Southwest Monsoon



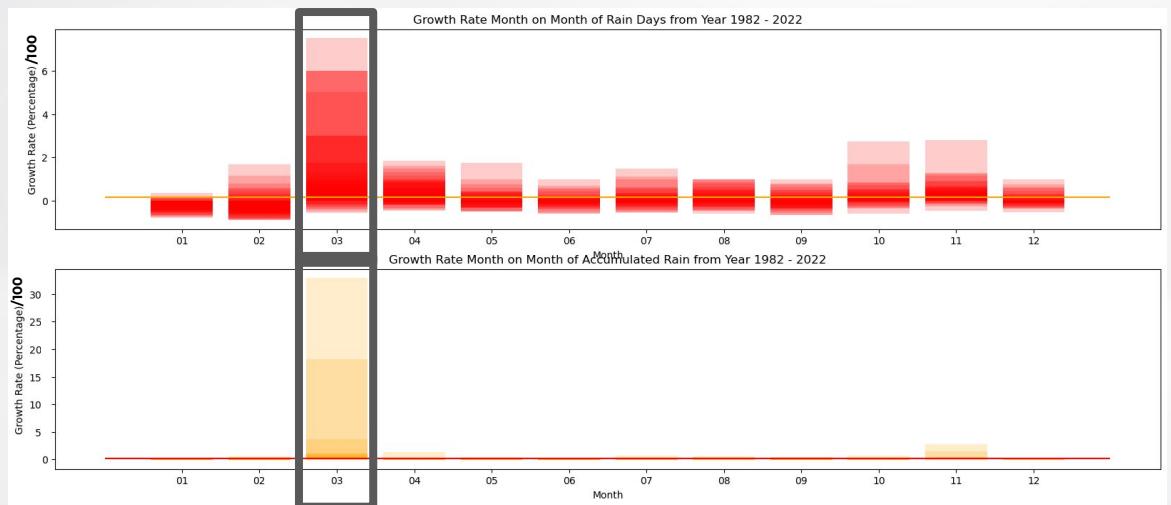
Other Period

the Northeast Monsoon that occurs from December to early March, although, Southwest Monsoon from June to September

It is certain that  **The Northeast Monsoon** that occurs from December to early March is **cause more severity in terms of rains collected** than the Southwest Monsoon from June to September.

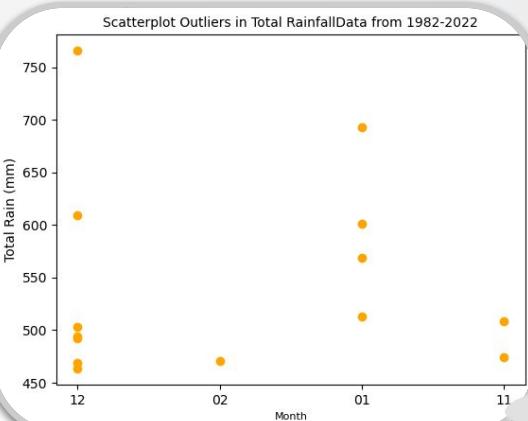
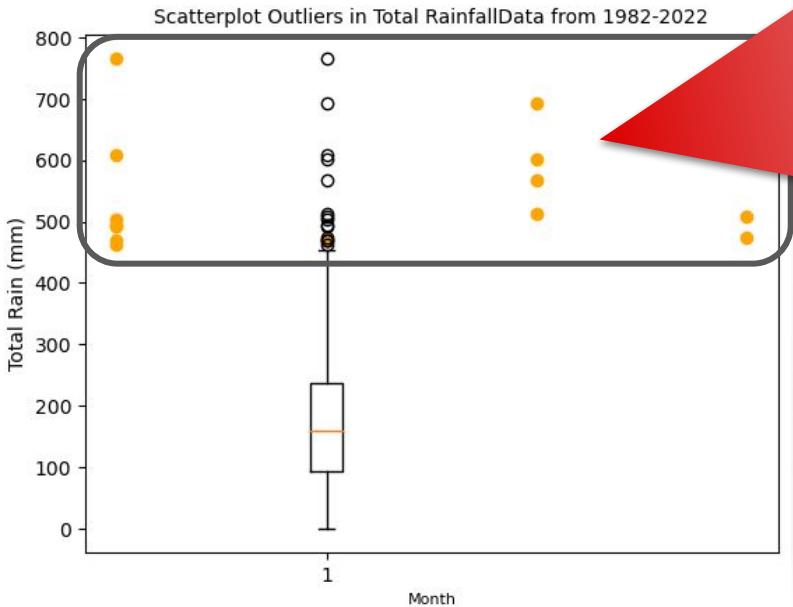


| date       | year | no_of_rainy_days | total_rainfall |
|------------|------|------------------|----------------|
| 2014-03-01 | 2014 | 6                | 66.0           |
| 2021-03-01 | 2021 | 14               | 182.4          |
| date       | year | no_of_rainy_days | total_rainfall |
| 2014-02-01 | 2014 | 1                | 0.2            |
| 2021-02-01 | 2021 | 2                | 1.0            |



**Sum of Growth Rate each year and Average of Growth Rate MoM** &

After we are plotting growth rate in 2 aspects, to see if there any significant pattern change over year it seems 2014, 2021 have something to say. We then breakdown to months Then extract from data frame seeing that between Feb and March has significant % Change. Then we found out that **February is the least rainy month in both terms of rain days and accumulated rainfall.**



## Rainfall Outliers

From all the data accumulated rainfall has some outliers during December through February which implies that these months have record of heavily rain accumulated which in sync with the Northeast Monsoon.



# Conclusion

After quite a few EDA, It is certain that **The Northeast Monsoon that occurs from December to early March is cause more rain severity in terms of rains** than the Southwest Monsoon from June to September.

So, we suggest that condition to set rules for **extra paid leaves for employee welfare should be around November, December and January**; Although, this shouldn't extend to February since February has shown to be the least rain month of the year to effect least with business since It is proven\* that rain can associate with demand for Car Wash.

Else; **It can put it in marketing perspective**; rainy season can also be a perfect chance to run promotional campaign of alternative car washing related service like car detailing / rain stain repellent coating Then have employee benefits from it for extra incentive for such services. So, both owner and employee can enjoy benefits both side.

\*\*It would help a lot of there is sales in car wash data over period of time could be perks more and help making smarter decision (if available; in this case 'no')

Give 3 Extra Paid Leave that only limit to Nov, Dec and Jan usage

## Market SG Annual Paid Leave

7 8 9 10 11 12 13 14 15 16 17

## Our Offer

7 8 9 **10 11 12 13 14 15 16 17**



Condition for extra 3 days

Paid Leave in Singapore starting a minimum of seven days per year, and an additional one day for every year of service, up to 14 days\*

Jan Feb Mar Apr May Jun  
Jul Aug Sep Oct Nov Dec

| Feature                 | Type       | Dataset                              | Description   |
|-------------------------|------------|--------------------------------------|---|
| <b>total_rainfall</b>   | float      | rainfall-monthly-total               | Total rainfall in mm  |
| <b>no_of_rainy_days</b> | int        | rainfall-monthly-number-of-rain-days | Total numbers of rainfall days by month   |
| <b>Avg_rf_perday</b>    | float      | sgrf                                 | Average rainfall per day (only day that rains 0.2mm or more )                             |
| <b>sgrf</b>             | dataframe  | no_of_rainy_days                     | dataframe of total numbers of rainfall days by month                                      |
| <b>sgtr</b>             | dataframe  | total_rainfall                       | dataframe of total rainfall in mm   |
| <b>sd</b>               | dictionary | total_rainfall + no_of_rainy_days    | dictionary of total rainfall in mm and total numbers of rainfall days by month            |
| <b>sgrf2</b>            | dataframe  | total_rainfall + no_of_rainy_days    | dataframe of total rainfall in mm and total numbers of rainfall days by month             |
| <b>GR_NumRainDays</b>   | column     | sgrf2                                | column that shows average growth rate Month on Month of rain days (>0.2mm) from 1982-2022 |
| <b>GR_Totalrainfall</b> | column     | sgrf2                                | column that shows average growth rate Month on Month of accumulated rain from 1982-2022   |

# Thank you