

SG Car Wash Business

In association with Singapore Weather

Data Science Immersive Course
Project 1

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

It's being said that **demand for car washes is typically lower during the rainy season** than during 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.

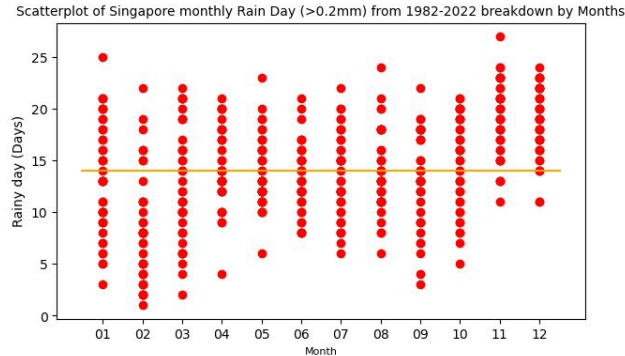
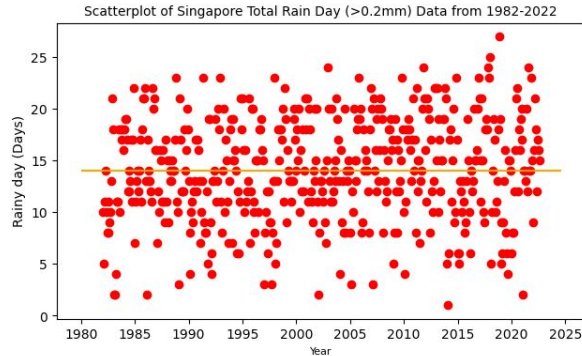
Hence, we are trying to identify designated months for this condition..

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



****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!

RAINDAY~



1.1 (UpperLeft)

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

1.2 (UpperRight)

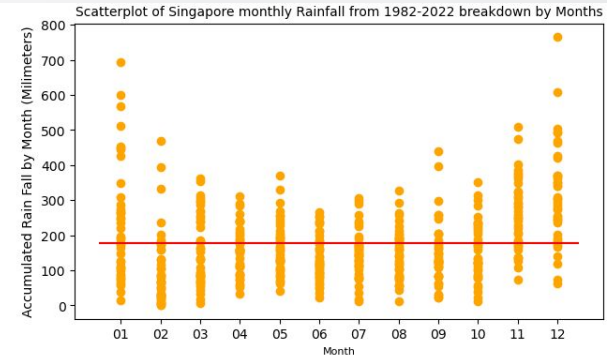
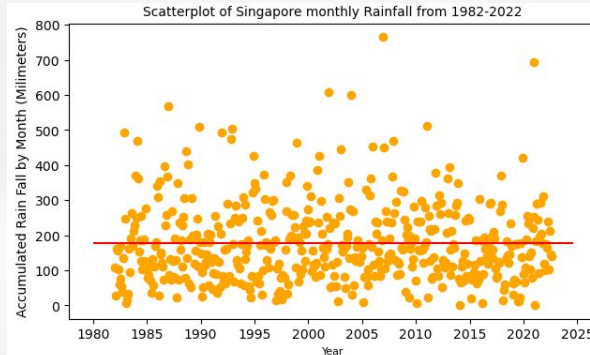
Average Rainy Days doesn't differ much among months this may because of the amount rain accum to to count as a Rainy Day may be too low (>0.2mm)

2.1 (LowerLeft)

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

#2.2 (LowerRight)

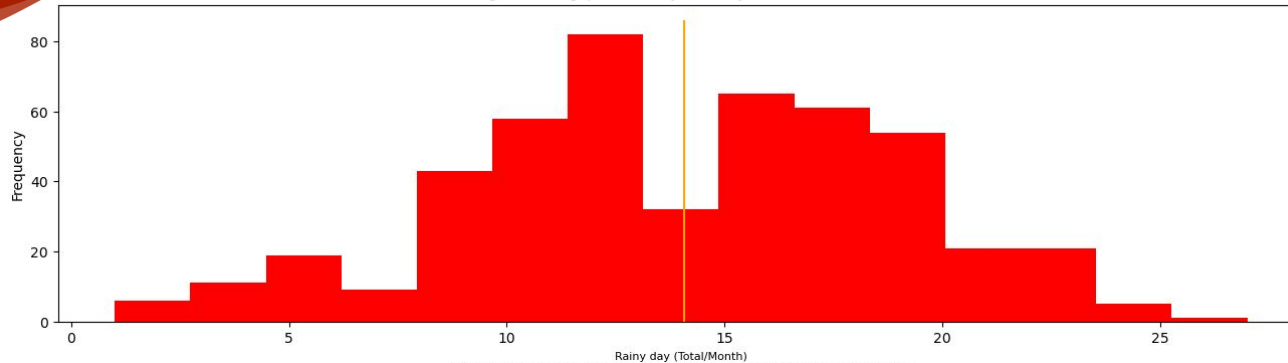
It shows that Rain seasons in Singapore could be around October to February which are sync with the Northeast Monsoon that occurs from December to early March. although, Southwest Monsoon from June to September doesn't seem to differ from the other



ACCUM. RAINFALL~

RAINDAY

Histogram of Singapore Monthly Rain Days Data from 1980-2022



Mean of
no_of_rainy_days is

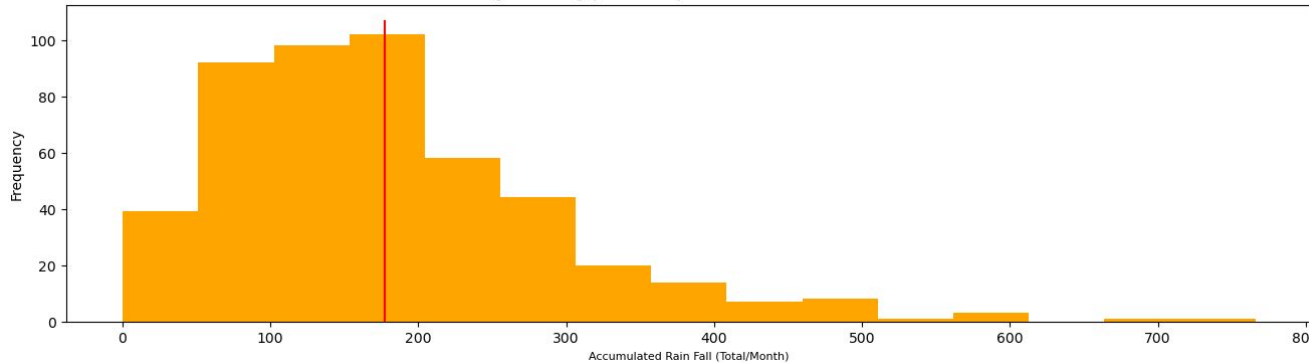
14.06

Standard Deviation of
no_of_rainy_days is

4.94

ACCUM. RAINFALL

Histogram of Singapore Monthly Rainfall Amount from 1980-2022



Mean of
total_rainfall is

177.16

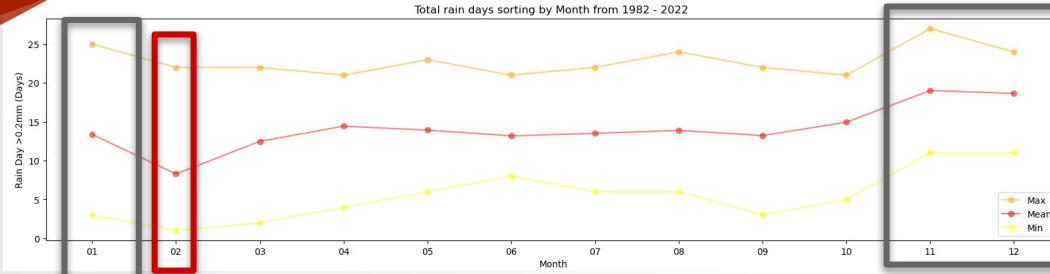
Standard Deviation of
total_rainfall is

113.79

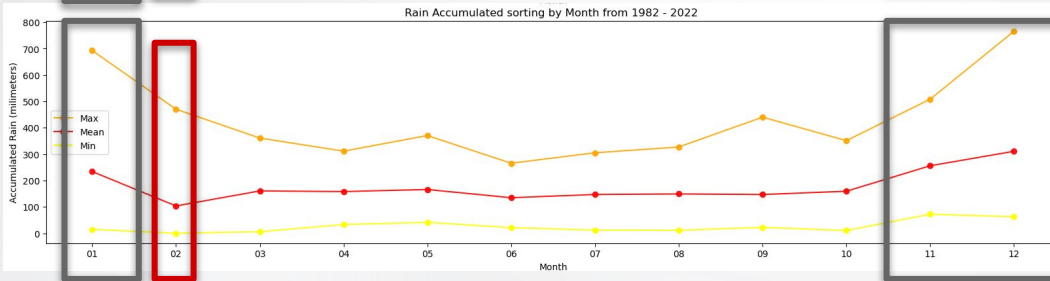
(Upper Graph) This shows that average of Rainy day sits around 14 days a month this backup our hypothesis that >0.2 mm may not reflect severity of the rain in a rain day and the graph seem to approach normal dist.

(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

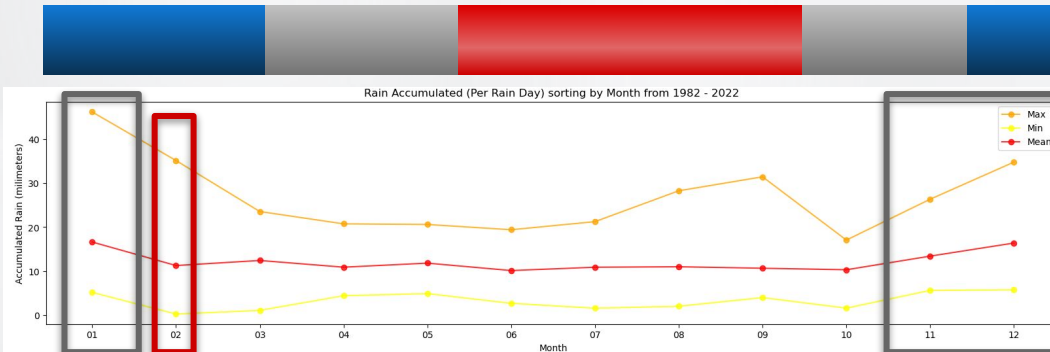
RAINDAY



ACCUM. RAINFALL



RAINFALL/RAINDAY



Color

Period



Northeast Monsoon



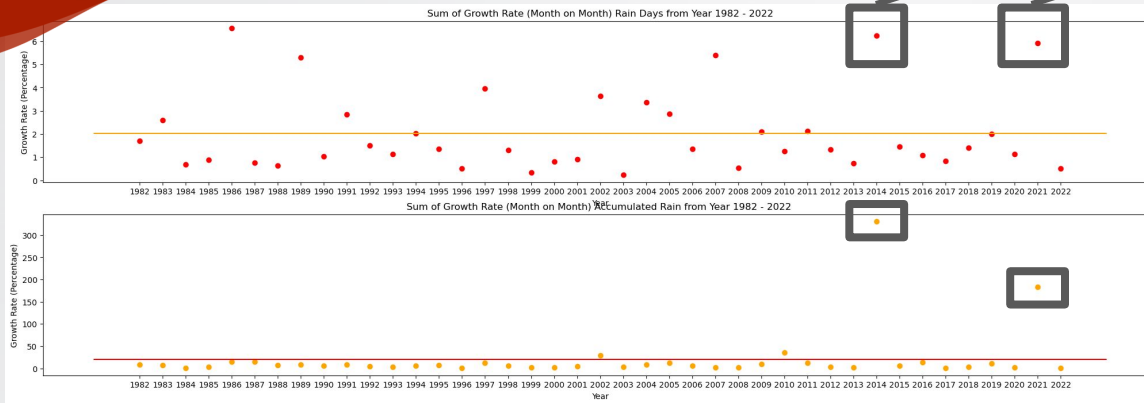
Southwest Monsoon



Other Period

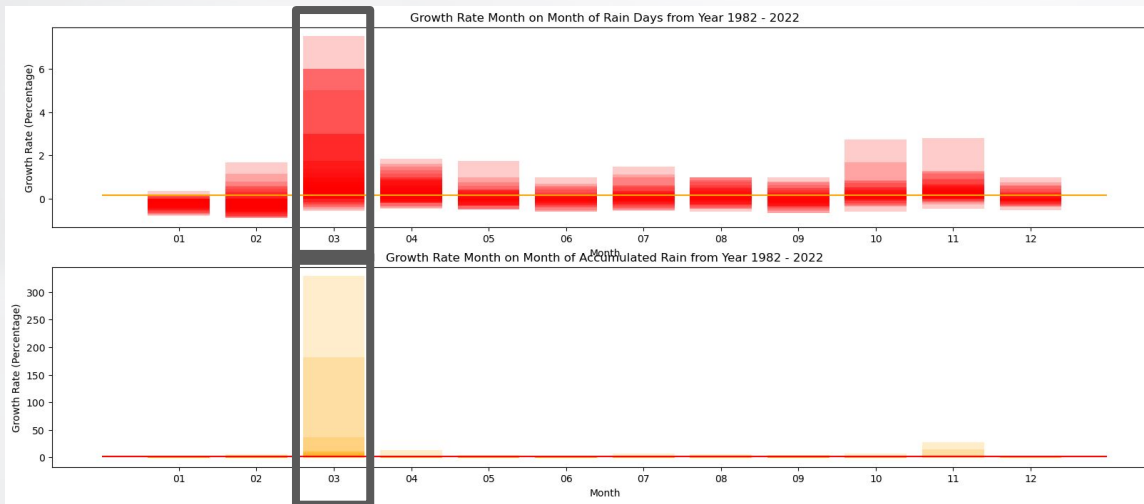
the Northeast Monsoon that occurs from December to early March. although , Southwest Monsoon from June to September

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.



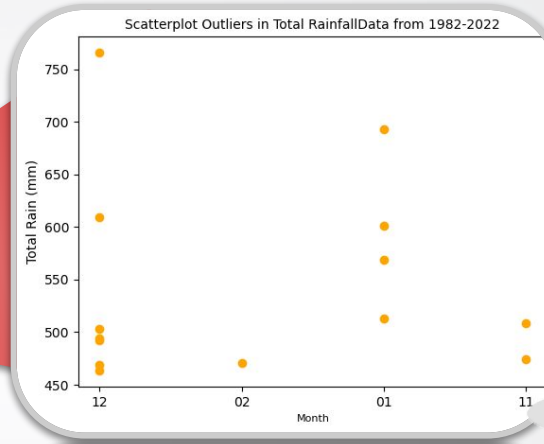
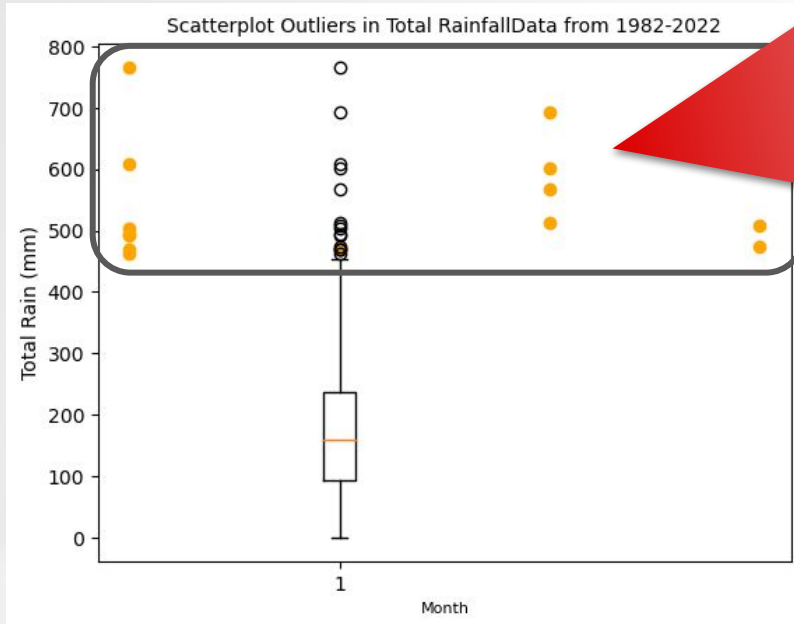
date	year	GR_NumRainDays	GR_TotalRainfall
2014-03-01	2014	5.0	329.0
2021-03-01	2021	6.0	181.4

date	year	GR_NumRainDays	GR_TotalRainfall
2014-02-01	2014	-0.800000	-0.997347
2021-02-01	2021	-0.882353	-0.998557



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.



After quite a few EDA, It is certain that The Northeast Monsoon that occurs from December to early March is cause more 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 October, 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 Thn 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 carwash data over period of time could be perks more and help making smarter decision (if available; in this case 'no')