Impact of Adverse Weather Conditions on Singapore's Tourism Industry

General Assembly Data Science Immersive Project 1

Singapore

A warmer Singapore could spell trouble for its tourism industry, say experts

To mitigate the effects of the heat, various tourist attractions have put in place initiatives to keep people and places cool.

FILE: Tourists shield themselves with umbrellas on a hot day at the Merlion Park in Singapore on Jun 21, 2017. (Photo: REUTERS/Edgar Su)

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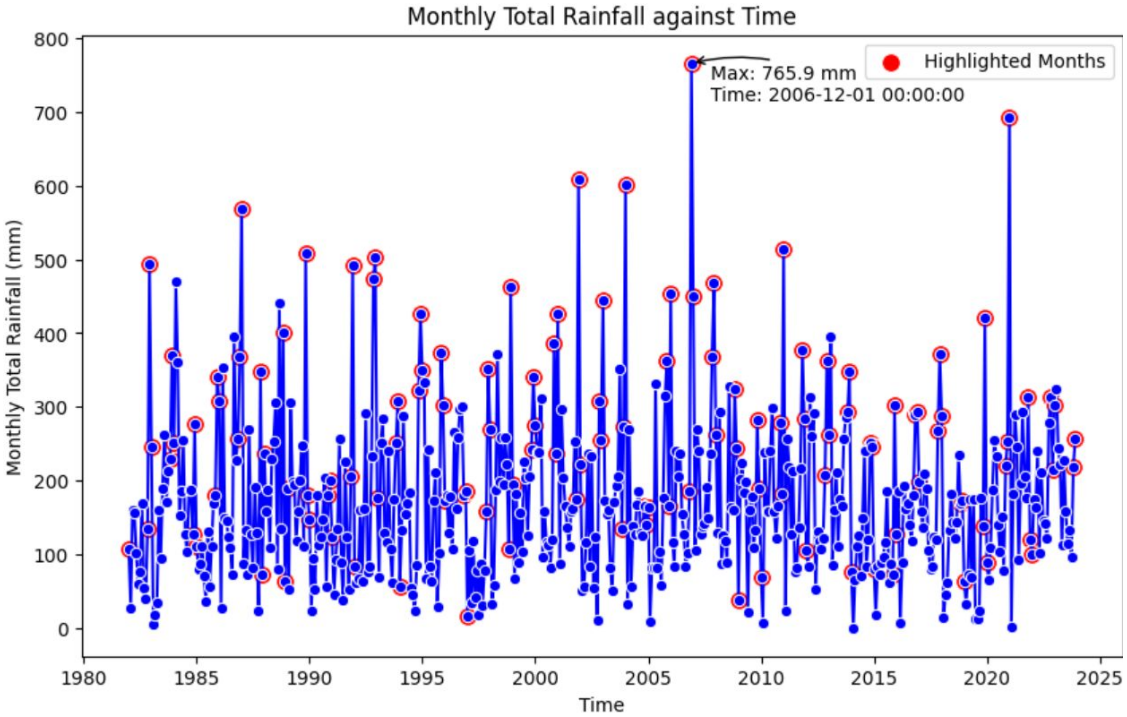
Source: CNA
https://www.channelnewsasia.com/singapore/sg-tourists-climate-change-heat-sea-level-rise-warmer-weather-ecotourism-green-4050806

Background and Problem Statement

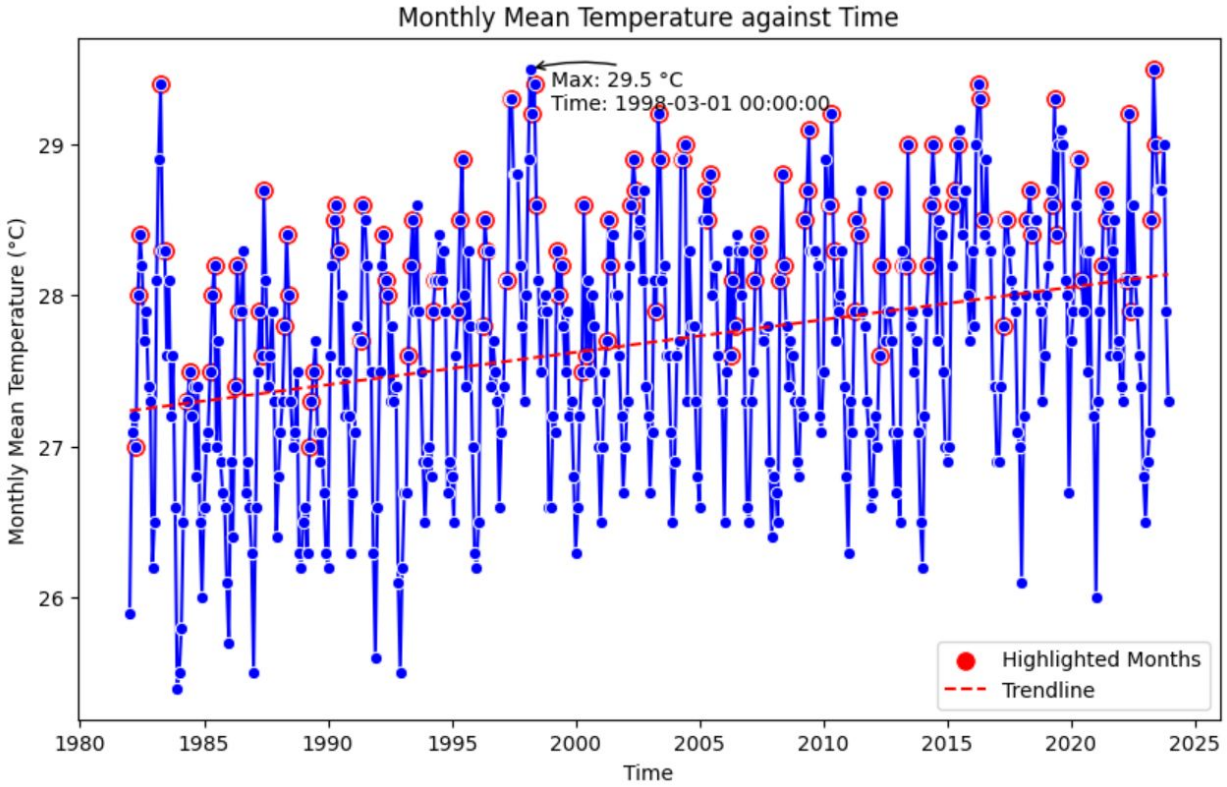
- According to the latest National Climate Change Study, Singapore will experience progressively hotter days and more extreme rainfall. Industry experts warned that this could dampen the appeal of Singapore as a tourist destination.
- As a Data Analyst working with NEA and STB, the task is to **analyse the impact of high temperature and rainfall on Singapore's tourism industry.**

November, December and January have the highest average total rainfall across all years.



- It seems that there are regular fluctuations/peaks in the data that occur at **specific year months**. This is because monthly rainfall is often subject to seasonality and varies based on geographical location and climate patterns.
- Data points in Nov, Dec and Jan are highlighted and generally corresponds to the peaks in the plot.

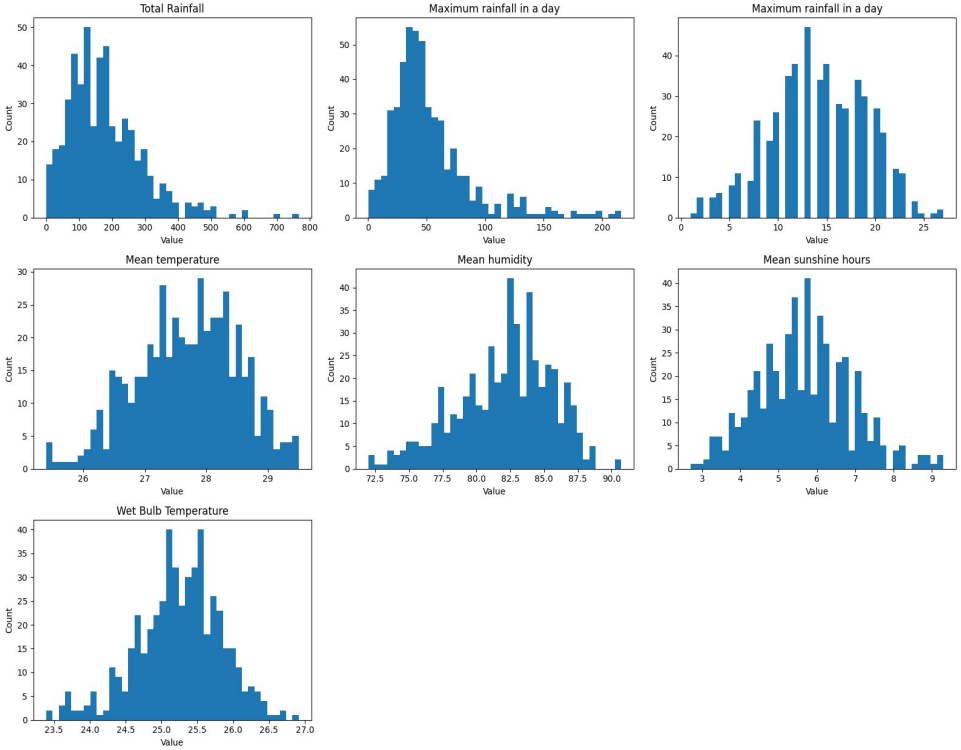
Hottest months in Singapore are April, May and June



month_only	mean_temp
May	28.51
June	28.42
April	28.13

Hottest months generally corresponds to the peaks in the plot. There are also a few points that lie below the trendline.

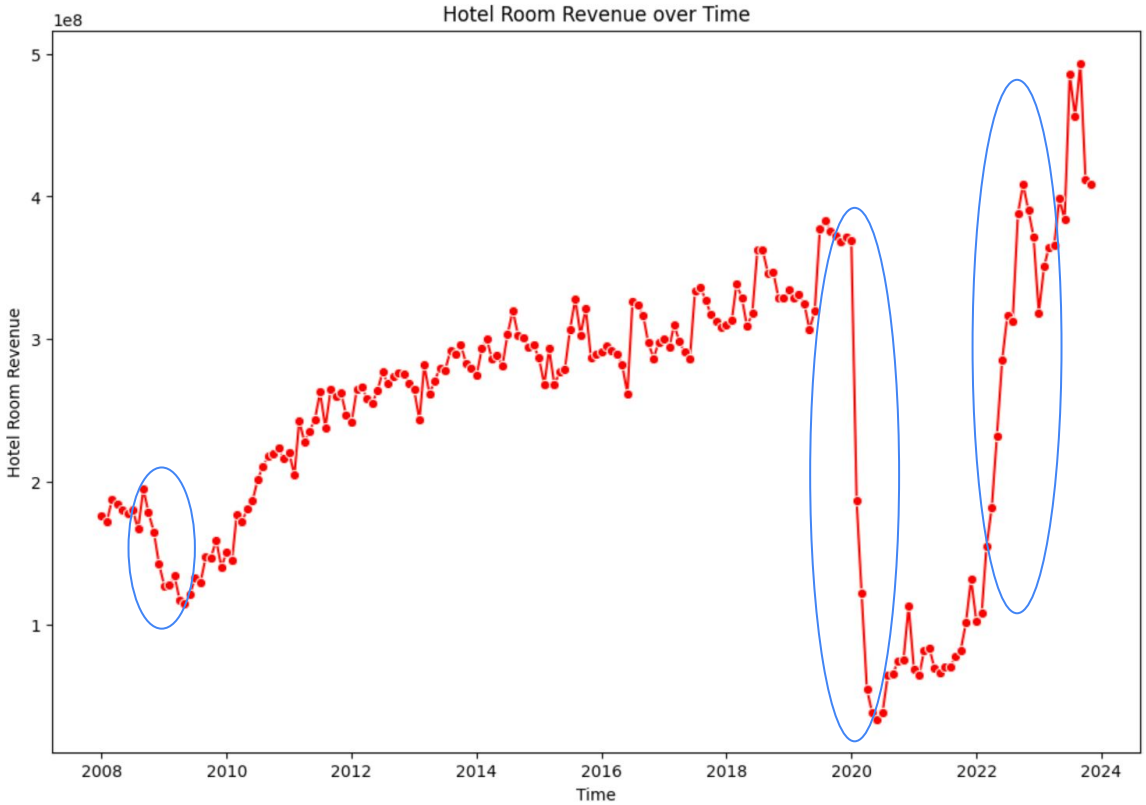
Distribution of weather datasets



Normally distributed

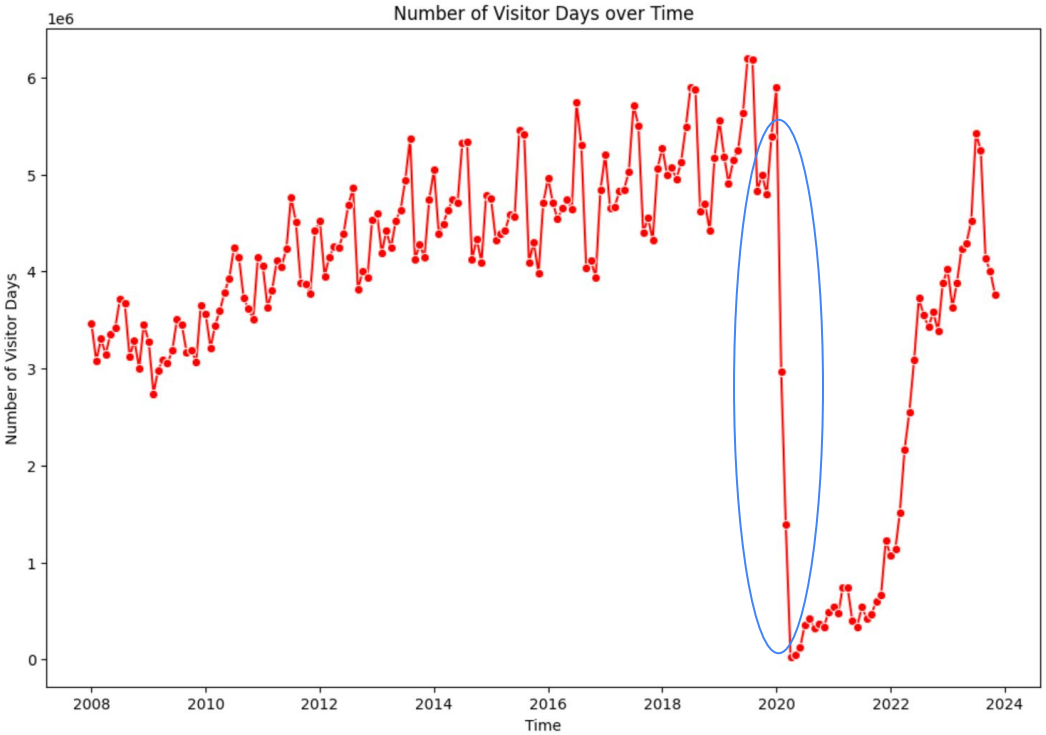
- Total rainfall and maximum rainfall in a day is **left skewed**, this may be due to monsoon season in certain months of the year
- Mean humidity is **right skewed**

Hotel room revenue is generally increasing over time



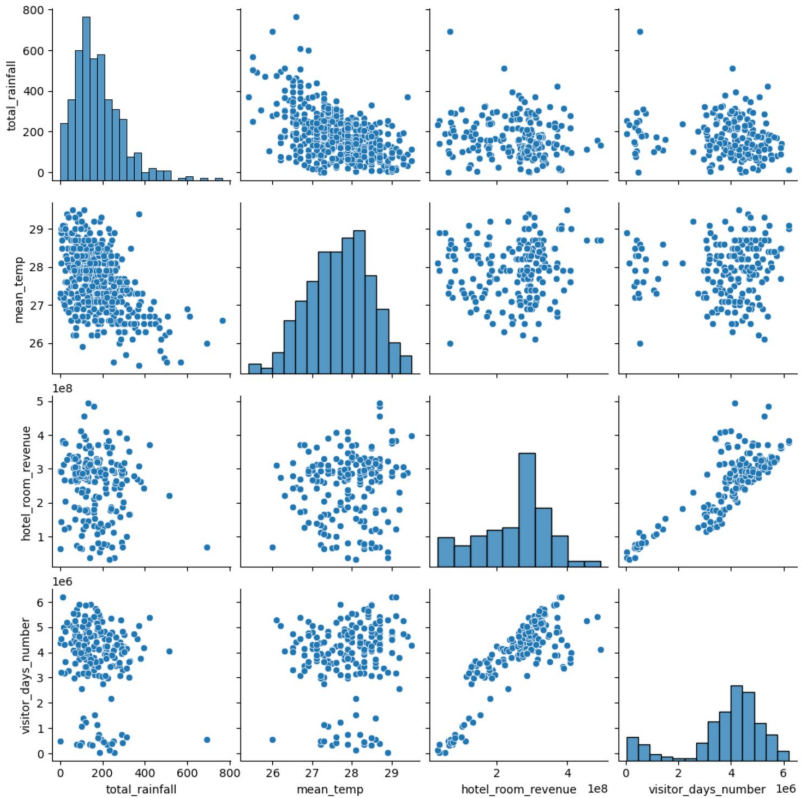
- Decrease in hotel room revenue from 2008 - 2009 due to the global financial crisis in 2008
- Significant decline was observed towards the start of 2020 as a result of worldwide travel restrictions imposed due to the COVID-19 pandemic
- After restrictions were lifted in 2022, there was a substantial surge in hotel room revenue, surpassing even pre-COVID figures. This could be attributed to a phenomenon called ‘revenge spending’, where people spend more than they would otherwise after a shock like the pandemic lockdown.

Similar trends were also observed in the number of visitor days



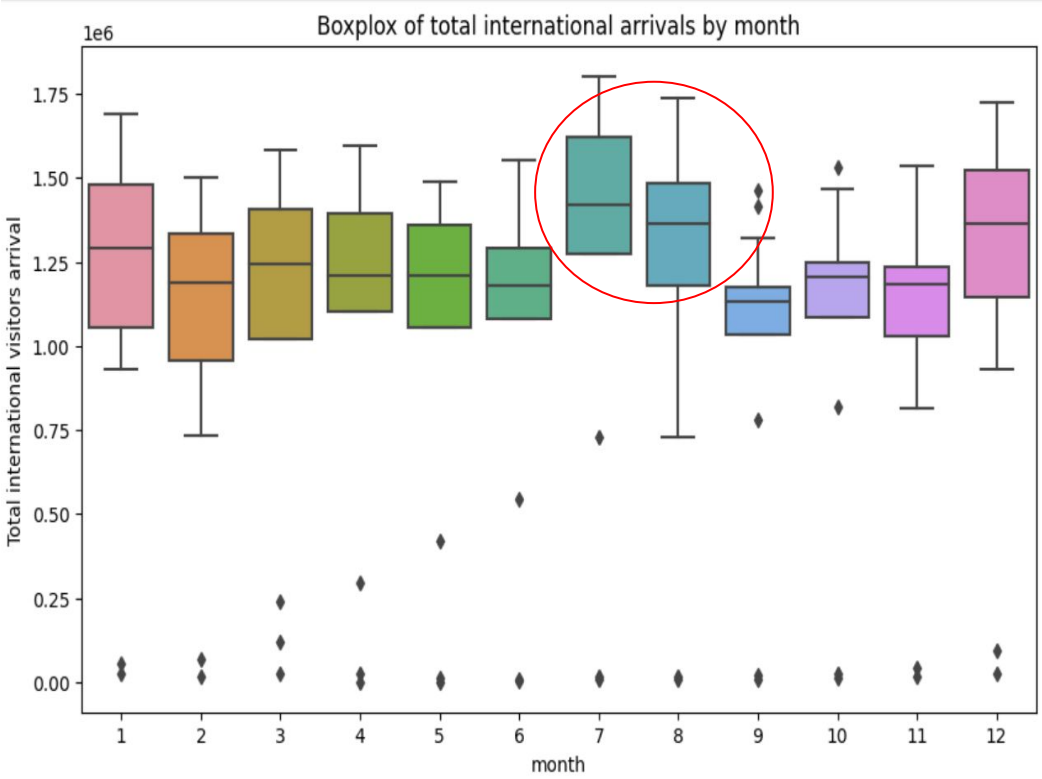
- Mainly because number of visitor days is directly proportional to hotel room revenue (i.e. as visitors stay longer in Singapore, they pay more for accommodations)
- Number of visitor days post-COVID did not recover to pre-COVID figures. This might be attributed to travel anxiety, as a considerable number of individuals continue to be apprehensive about contracting infections, leading them to delay travel or opt for shorter durations than originally planned.
- This could that visitors are staying for a shorter number of days in Singapore but are very willing to splurge on luxury accommodations.

No correlation found between weather (rainfall + temp) and tourism fields (hotel room revenue + num visitor days)



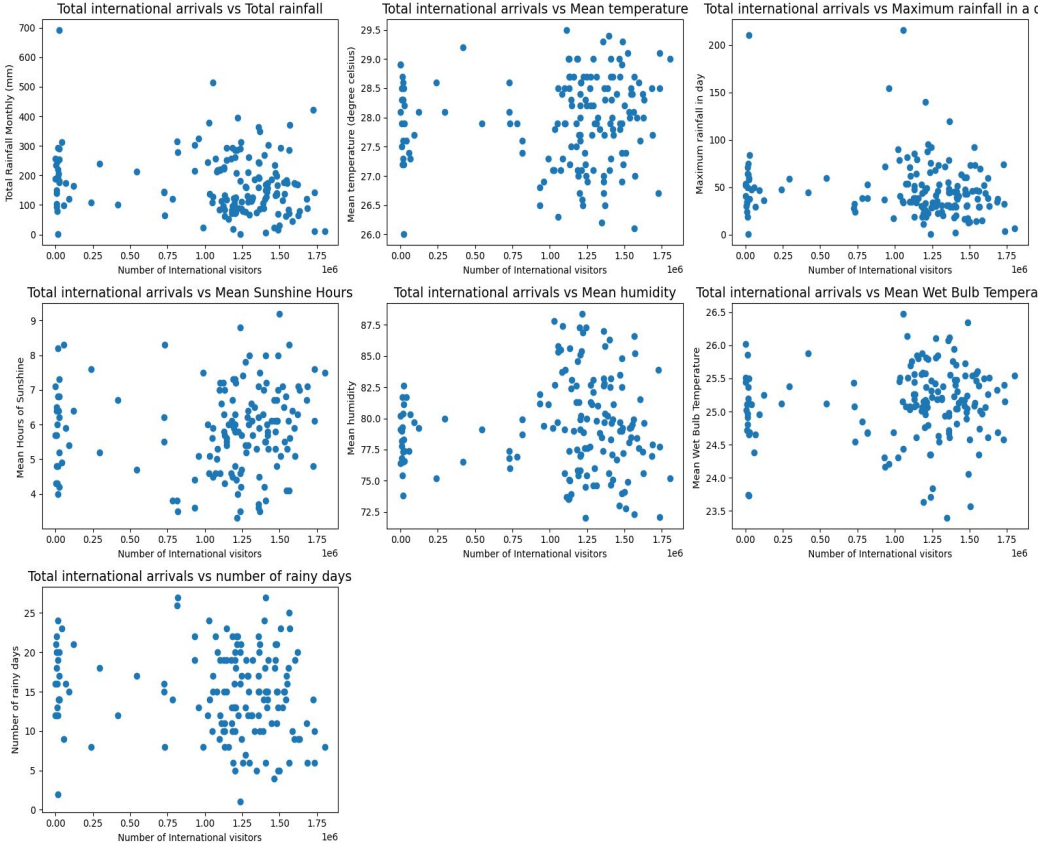
- Rainfall and temperature are **<u>negatively correlated</u>** while hotel room revenue and number of visitor days are **<u>positively correlated</u>**.
- Data points for scatter-plots of rainfall/temperature against hotel room revenue/visitor days are randomly distributed, which indicates **<u>weak correlation</u>** and a **<u>lack of discernible relationship</u>** between variables.

International visitors arrival by month



- **July** and **August** has a higher number of international visitors arrival, this may be due to holiday season for visitors in the regions, resulting higher visitors travelling for leisure
- **September** and **October** has a narrower range in visitors arrivals, although outliers can be observed.

Trend of international visitors arrivals vs weather



- **No clear trend** between data points to show linear correlation between number of international visitor arrival
- Large number of outliers with low number of international visitors due to covid-19 lockdown which hinders travelling

Conclusion

- **No clear correlations** between weather and tourism data fields
- Tourism metrics used are more indicative of Singapore's economic health, rather than being representative of specific dynamics within the tourism industry.
- For example, number of international visitor arrivals may primarily be driven by business-related travels, rather than tourist activities.

Limitations & Recommendations

- Data for metrics more relevant to tourist activities, such as revenue generated by outdoor attractions (USS, Zoo, etc.), or visitor counts for cultural destinations like the Botanic Gardens are not publicly available.
- Incorporating these data could offer a more holistic comprehension of Singapore’s tourism industry, and also allow us to implement proactive and targeted measures during months of high rainfall/temperature to enhance the resilience of these facilities to withstand adverse climatic conditions in the future.