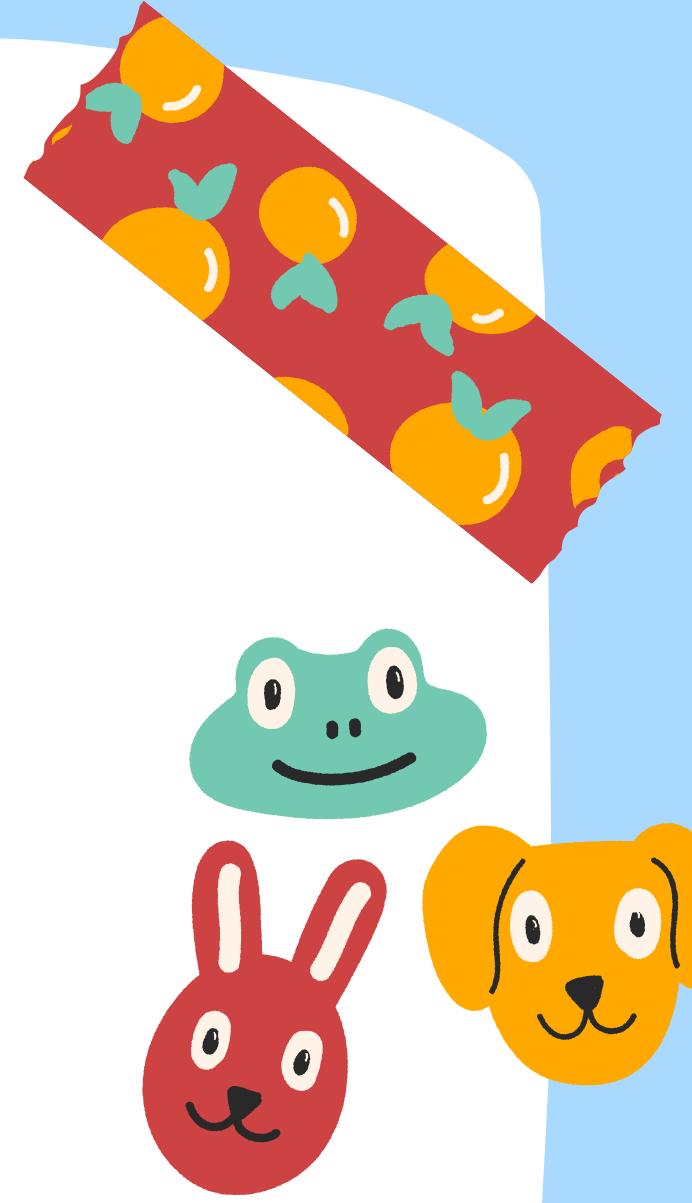
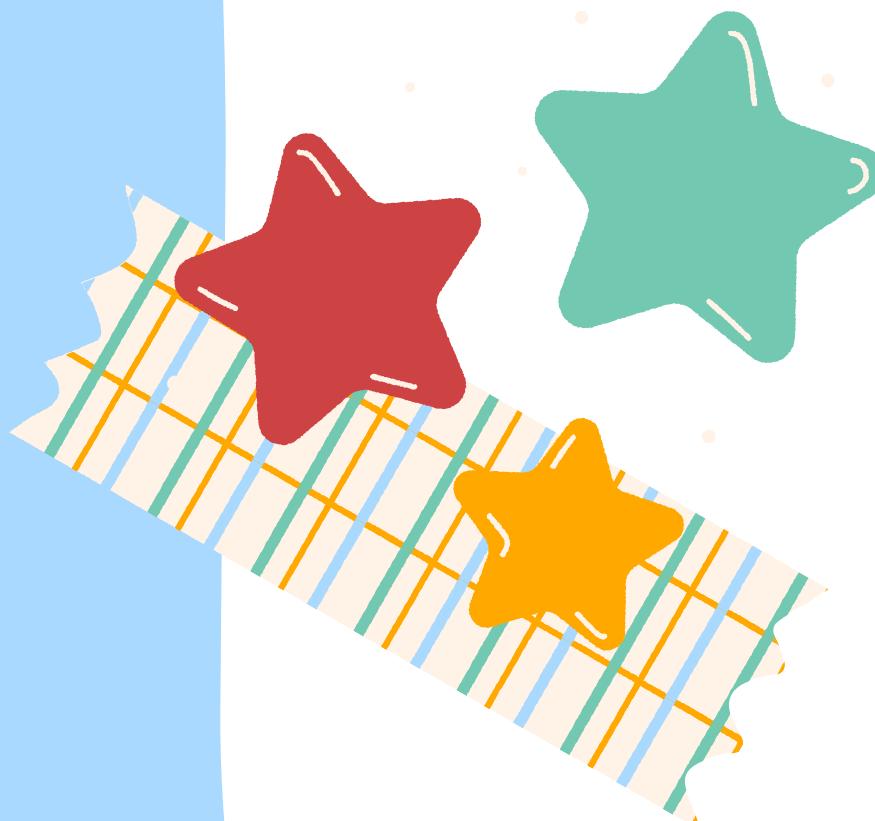
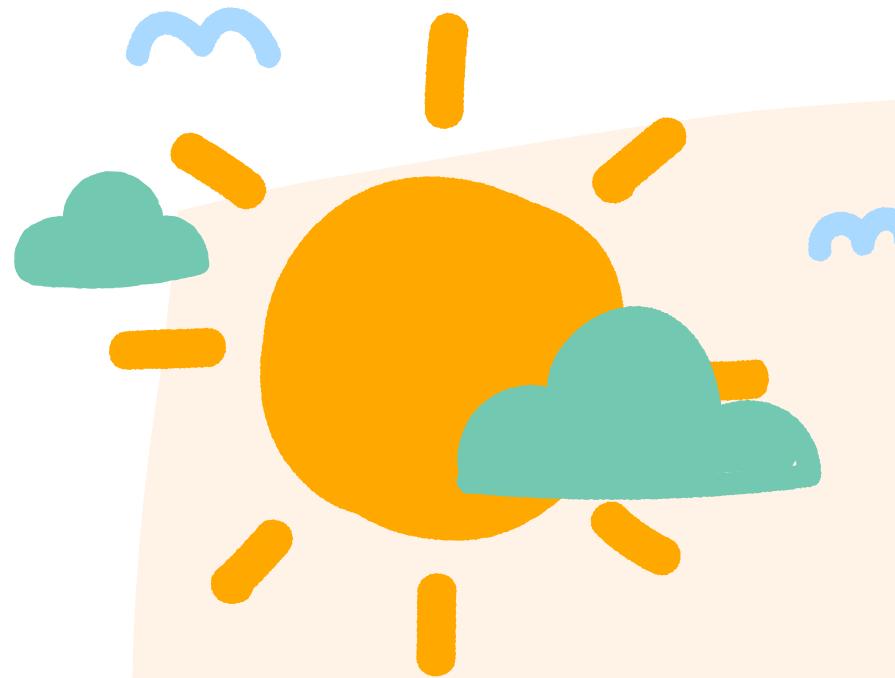


資料一

期末專題

酒店價格趨勢與機票價格趨勢的關聯性
(桃園-東京國際機場)





why 帶入使用者角度



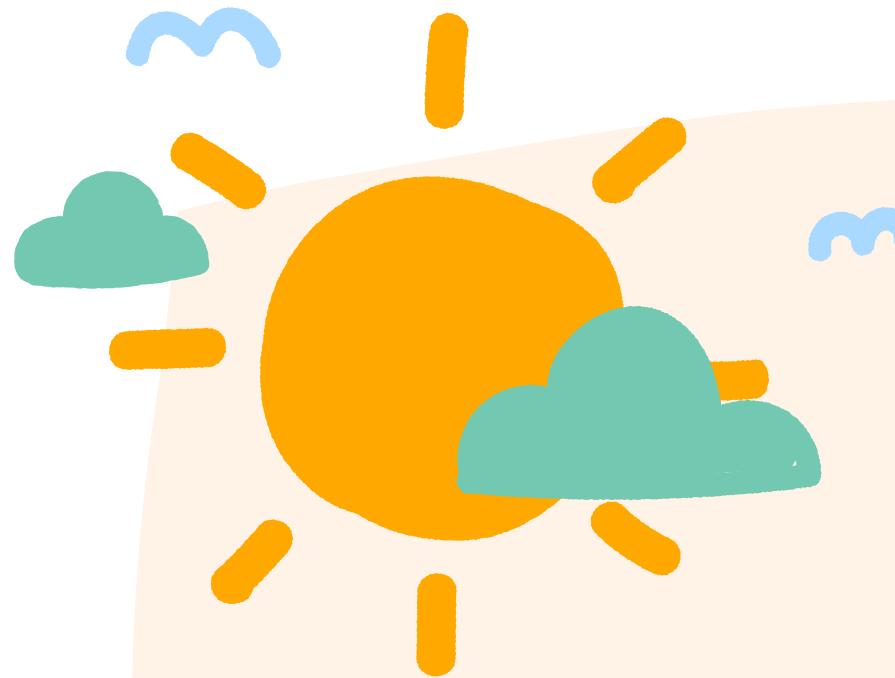


agoda



Skyscanner





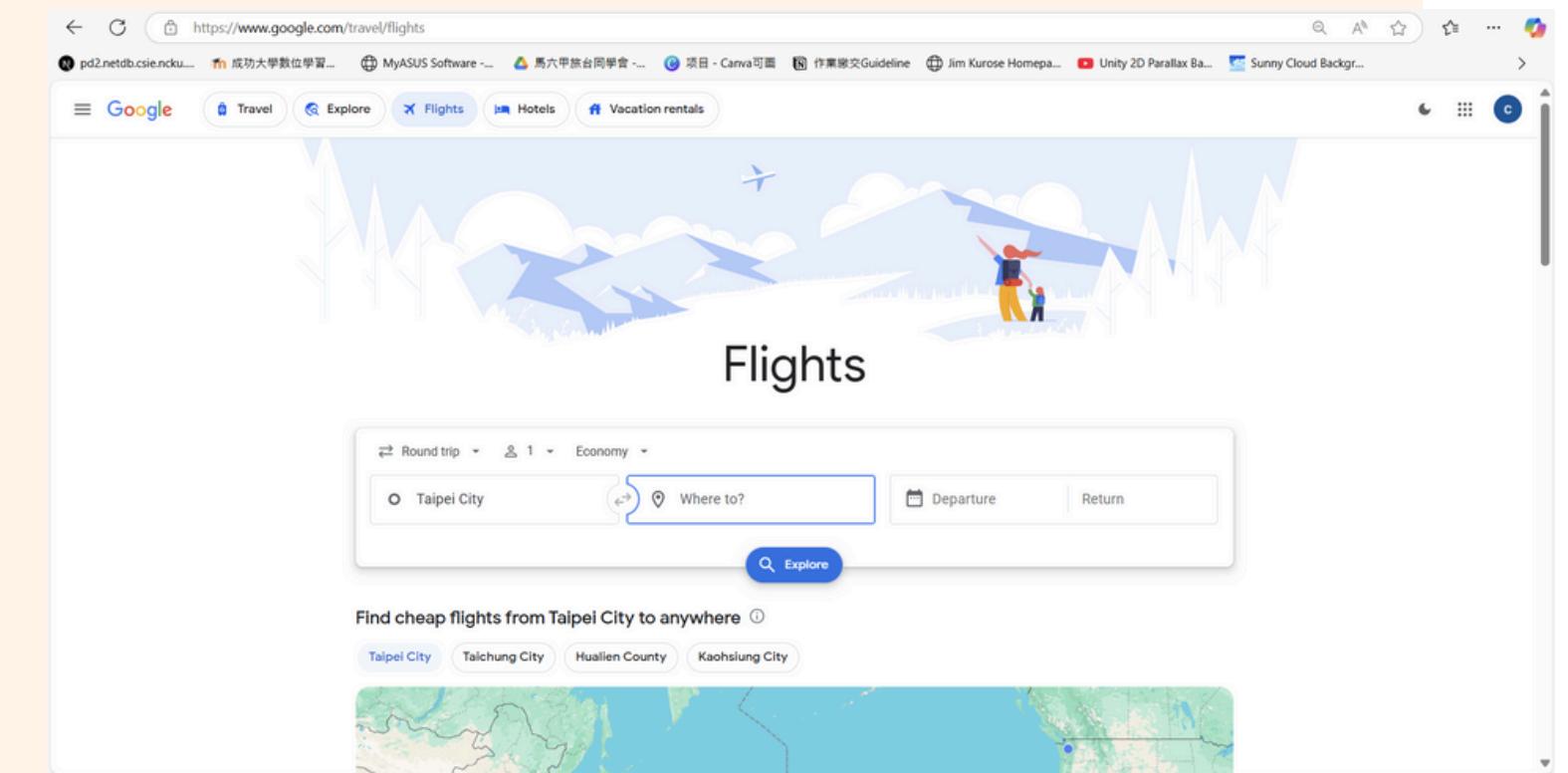
爬取的資料



爬取方法

網站：Google travel

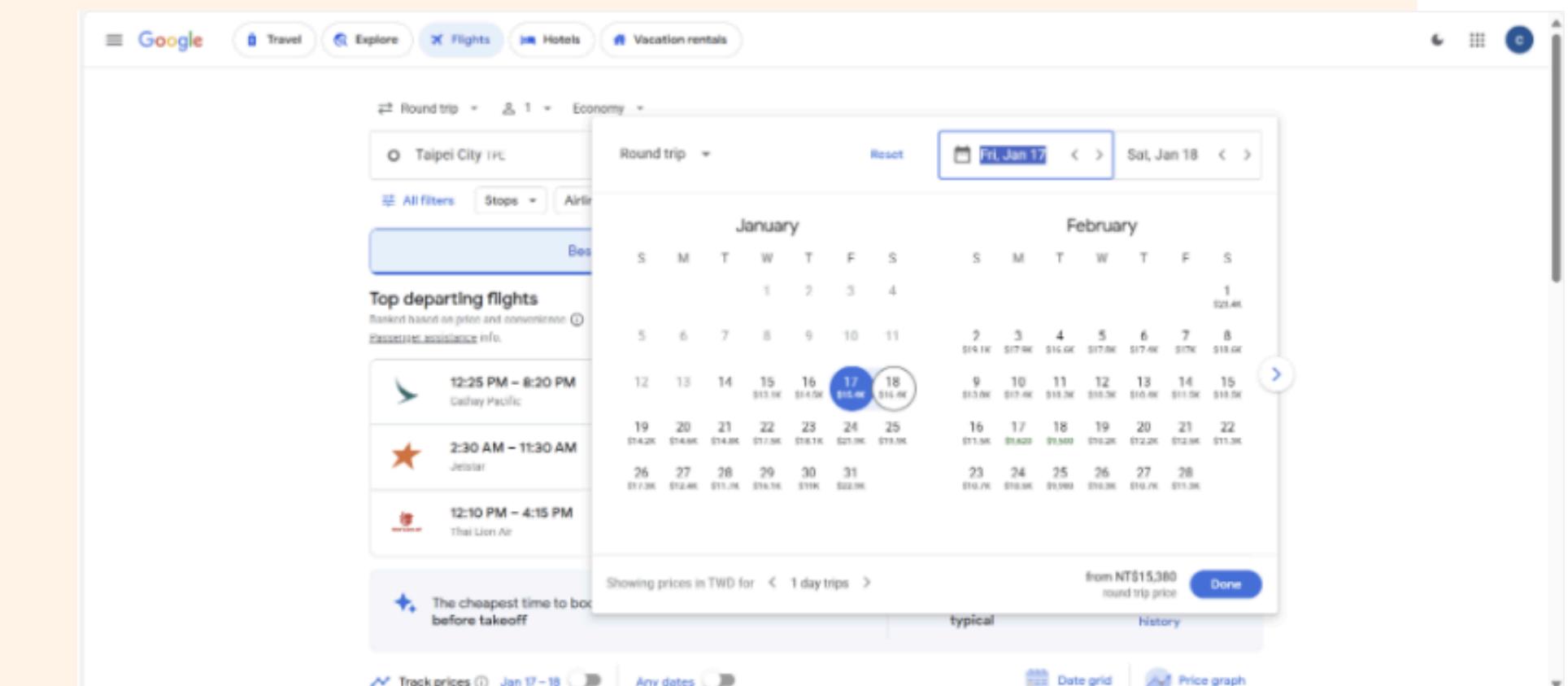
使用方法：selenium, beautifulsoup



爬取方法-機票

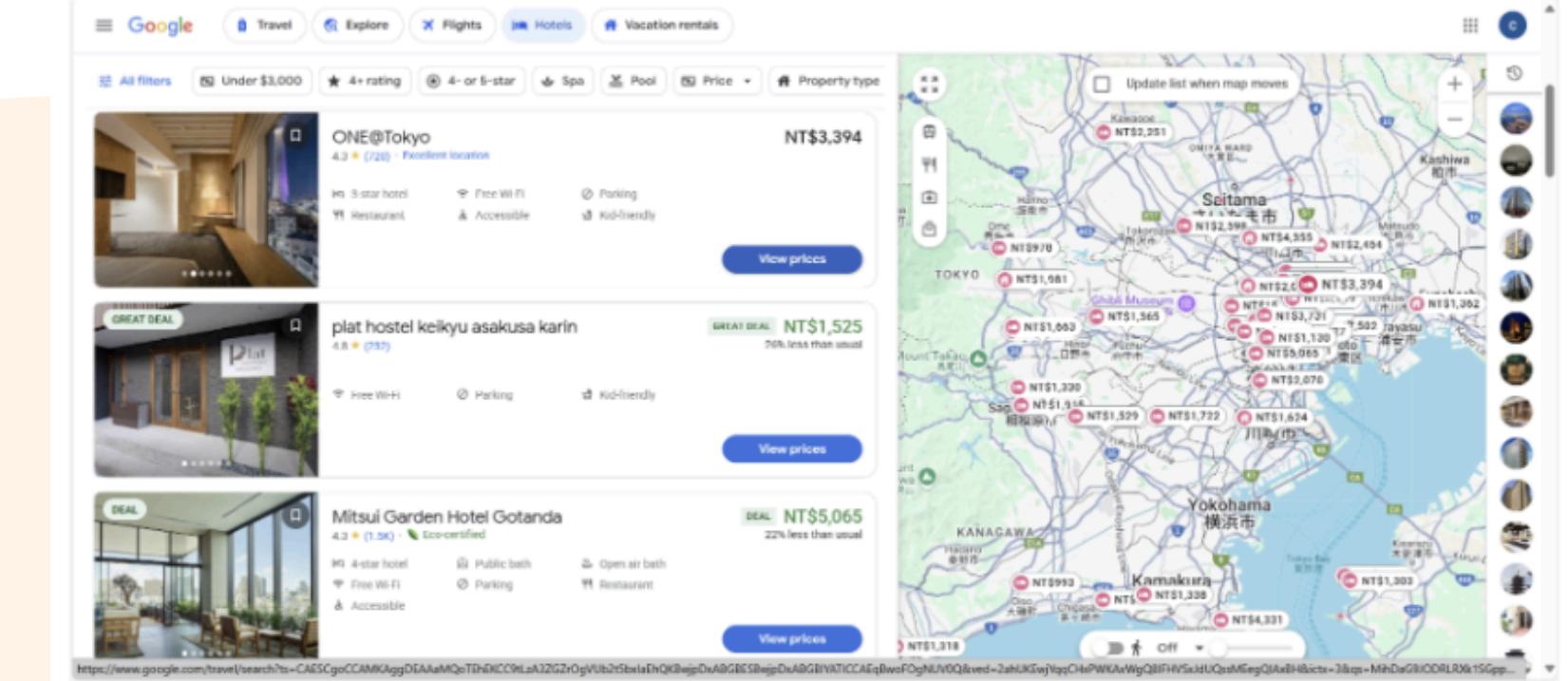
- 價格統一爬取資訊頁面的宣傳價格，下圖顯示每天去程的機票價格
- 條件：直達、最經濟的機票價格（不考慮飛航公司，只比價格）
- 爬取未來近一年的機票價格

25	23	Tuesday, Dec	\$12.2K
26	24	Wednesday, Dec	\$8,670
27	25	Thursday, Dec	\$7,250
28	26	Friday, Dec	\$7,050
29	27	Saturday, Dec	\$8,800
30	28	Sunday, Dec	\$6,460
31	29	Monday, Dec	\$6,120
32	30	Tuesday, Dec	\$6,550
33	31	Wednesday, Dec	\$7,670
34	32	Thursday, Dec	\$8,980
35	33	Friday, Jan	\$10.9K
36	34	Saturday, Jan	\$17K
37	35	Sunday, Jan	\$15K
38	36	Monday, Jan	\$14.9K
39	37	Tuesday, Jan	\$11.5K
40	38	Wednesday, Jan	\$14.9K
41	39	Thursday, Jan	\$11.5K
42	40	Friday, Jan	\$14.9K
43	41	Saturday, Jan	\$17K
44	42	Sunday, Jan	\$15K
45	43	Monday, Jan	\$14.9K
46	44	Tuesday, Jan	\$11.5K
47	45	Wednesday, Jan	\$14.9K
48	46	Thursday, Jan	\$11.5K
49	47	Friday, Jan	\$14.9K
50	48	Saturday, Jan	\$17K
51	49	Sunday, Jan	\$15K
52	50	Monday, Jan	\$14.9K
53	51	Tuesday, Jan	\$11.5K
54	52	Wednesday, Jan	\$14.9K
55	53	Thursday, Jan	\$11.5K
56	54	Friday, Jan	\$14.9K
57	55	Saturday, Jan	\$17K
58	56	Sunday, Jan	\$15K
59	57	Monday, Jan	\$14.9K
60	58	Tuesday, Jan	\$11.5K
61	59	Wednesday, Jan	\$14.9K
62	60	Thursday, Jan	\$11.5K
63	61	Friday, Jan	\$14.9K
64	62	Saturday, Jan	\$17K
65	63	Sunday, Jan	\$15K
66	64	Monday, Jan	\$14.9K
67	65	Tuesday, Jan	\$11.5K
68	66	Wednesday, Jan	\$14.9K
69	67	Thursday, Jan	\$11.5K
70	68	Friday, Jan	\$14.9K
71	69	Saturday, Jan	\$17K
72	70	Sunday, Jan	\$15K
73	71	Monday, Jan	\$14.9K
74	72	Tuesday, Jan	\$11.5K
75	73	Wednesday, Jan	\$14.9K
76	74	Thursday, Jan	\$11.5K
77	75	Friday, Jan	\$14.9K
78	76	Saturday, Jan	\$17K
79	77	Sunday, Jan	\$15K
80	78	Monday, Jan	\$14.9K
81	79	Tuesday, Jan	\$11.5K
82	80	Wednesday, Jan	\$14.9K
83	81	Thursday, Jan	\$11.5K
84	82	Friday, Jan	\$14.9K
85	83	Saturday, Jan	\$17K
86	84	Sunday, Jan	\$15K
87	85	Monday, Jan	\$14.9K
88	86	Tuesday, Jan	\$11.5K
89	87	Wednesday, Jan	\$14.9K
90	88	Thursday, Jan	\$11.5K
91	89	Friday, Jan	\$14.9K
92	90	Saturday, Jan	\$17K
93	91	Sunday, Jan	\$15K
94	92	Monday, Jan	\$14.9K
95	93	Tuesday, Jan	\$11.5K
96	94	Wednesday, Jan	\$14.9K
97	95	Thursday, Jan	\$11.5K
98	96	Friday, Jan	\$14.9K
99	97	Saturday, Jan	\$17K
100	98	Sunday, Jan	\$15K



爬取方法-酒店_1

- 按照星級分類 (3, 4, 5)
- 爬取酒店的資訊和網址
- 依照網址逐一訪問
 - 易管理

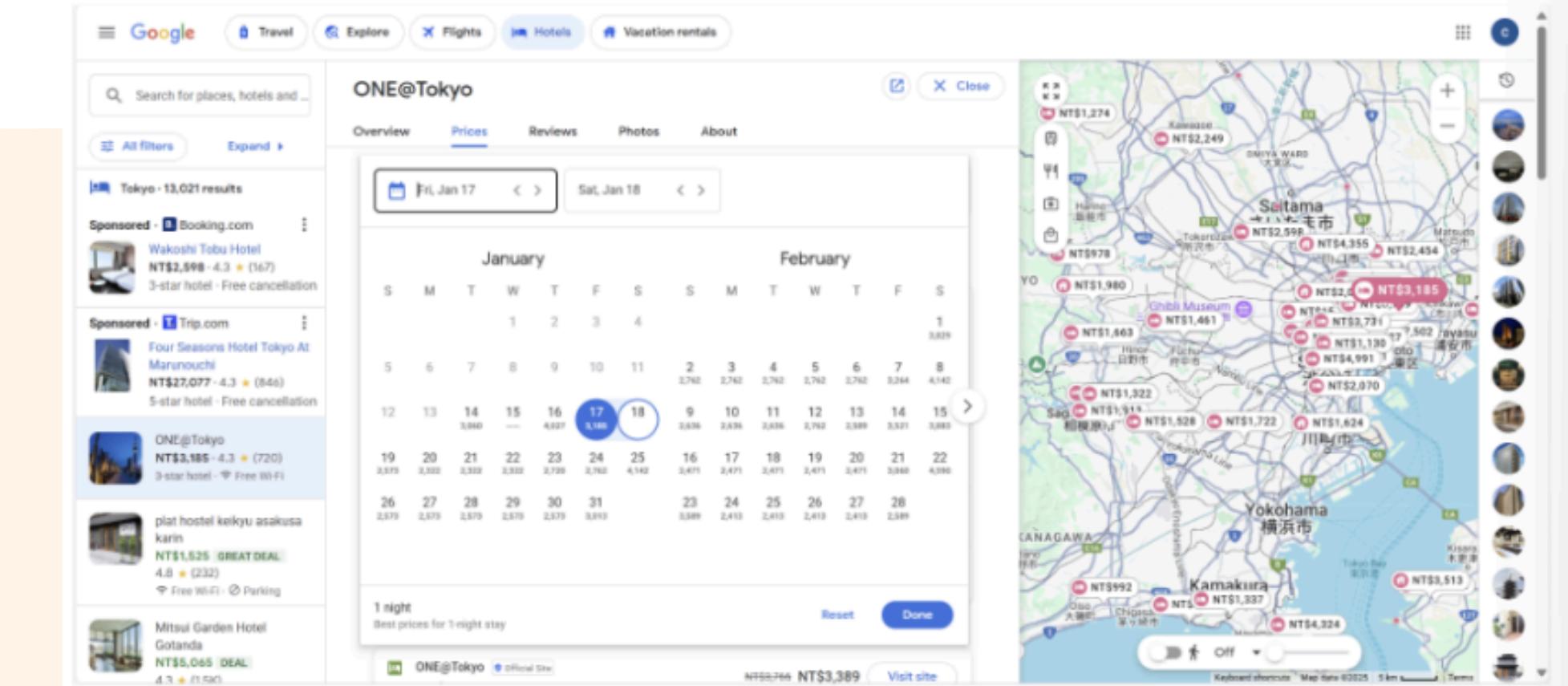


	Hotel Name	Stars	url	Accessible	Bar	Fitness center	Free Wi-Fi	Kid-friendly	Kitchen in	Kitchen in	Onsen	Open air bath	Outdoor pool	Parking	Parking (\$)	Public bath	Restaurant	Sauna	Transfer
0	The Knot Tokyo	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	FALSE	TRUE	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	FALSE
1	APA Hotel	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE
2	APA Hotel	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE
3	ONE@Tokyo	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE
4	Hotel Keihin	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	FALSE	TRUE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE
5	TSUKI TOKYO	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	FALSE	TRUE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE
6	Hotel Orie	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE
7	Hotel Wing International	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE
8	HOTEL GRANDE	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	FALSE	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	FALSE
9	KEIO Plaza	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE
10	Sakura Crc	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE
11	Via Inn Premium	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE
12	The Royal Hotel	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE
13	THE KANZU HOTEL	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	TRUE	FALSE	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE
14	Sotetsu Freeway Hotel	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	FALSE
15	hotel MONTE CARLO	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE
16	Hotel Musashino	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE
17	APA HOTEL	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE
18	APA Hotel	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	TRUE	FALSE	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE
19	Hotel Grace	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE
20	remm Roppongi	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	TRUE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	FALSE
21	Shiba Park Hotel	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	FALSE	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	TRUE
22	Tosei Hotel	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	TRUE	FALSE	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE
23	ASAKUSA KOMON	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	FALSE	FALSE	FALSE	TRUE	TRUE	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE
24	Lotte City Hotel	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE
25	Henn na Hotel	3	https://www.google.com/travel/search?hl=zh-TW&q=hotels+in+tokyo+japan&sa=X&ved=0ahUKEwzvqOOGjIyQAHQhQ&rlz=1C1GCEB	TRUE	TRUE	FALSE	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	TRUE	TRUE	FALSE



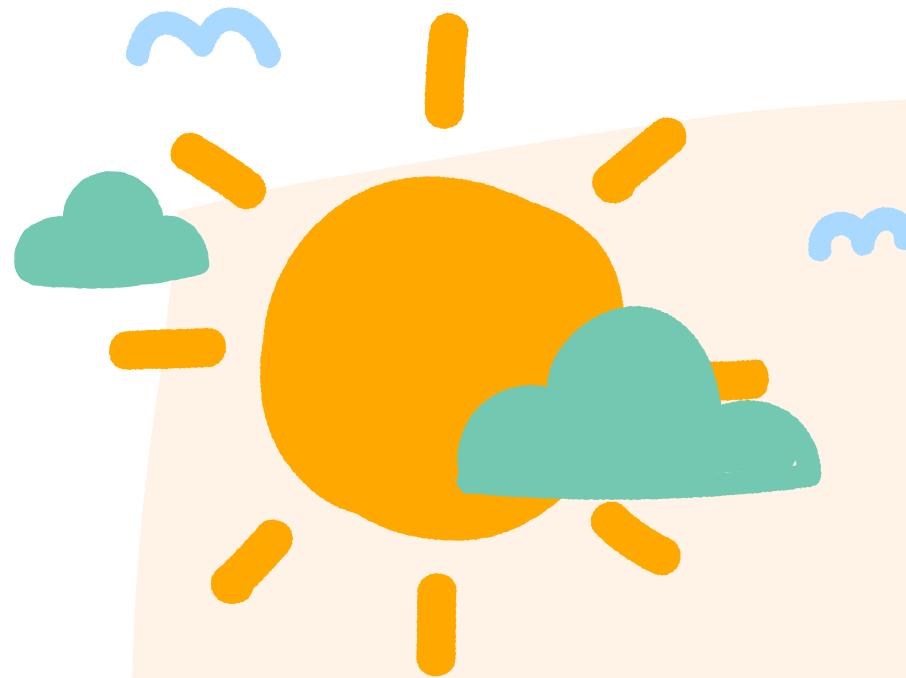
爬取方法-酒店_2

- 繼上文含網址的資料集，逐一訪問酒店頁面並爬取最經濟房型價格和其他基本資訊如:日期、評分等。



	A	B	C	D
2	APA Hotel	4.8	Saturday, I	4,749
3	APA Hotel	4.8	Sunday, De	2,194
4	APA Hotel	4.8	Monday, D	2,070
5	APA Hotel	4.8	Tuesday, D	2,550
6	APA Hotel	4.8	Wednesday	2,674
7	APA Hotel	4.8	Thursday, I	2,162
8	APA Hotel	4.8	Friday, Dec	2,162
9	APA Hotel	4.8	Saturday, I	4,388
0	APA Hotel	4.8	Sunday, De	4,388
1	APA Hotel	4.8	Monday, D	4,236
2	APA Hotel	4.8	Tuesday, D	6,066
3	APA Hotel	4.8	Wednesday	3,557
4	APA Hotel	4.8	Thursday, .	2,707
5	APA Hotel	4.8	Friday, Jan	4,439
6	APA Hotel	4.8	Saturday, J	2,194





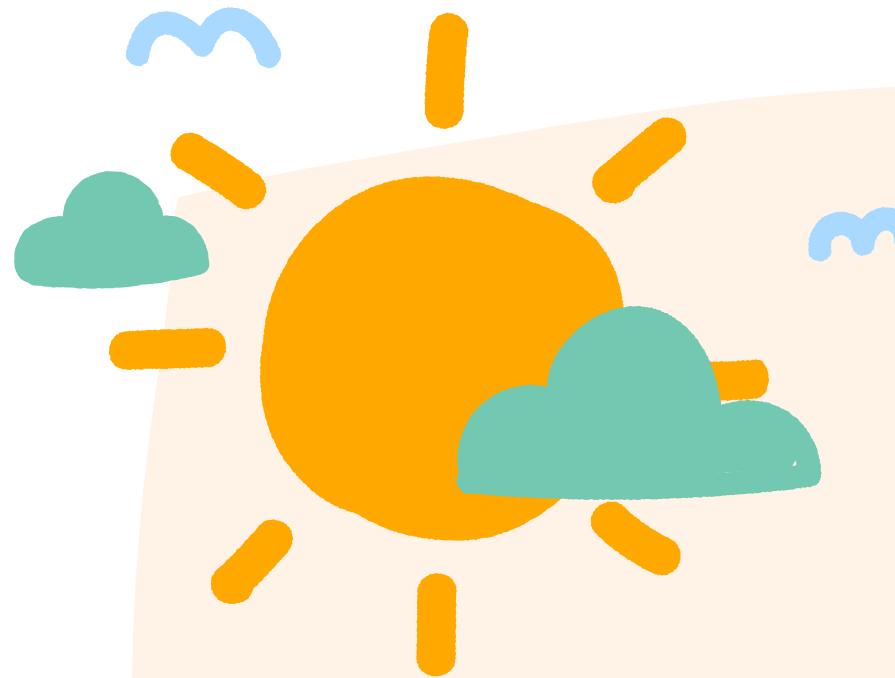
資料集



資料集

- 主要考慮機票價格趨勢會不會和酒店價格趨勢同步（正相關或負相關）
- 不同間業者的優惠策略不同
- 使用多筆酒店價格作為參考，每個星級有36間
- 確保數據的代表性和可靠性
- 可以更準確反映該星級酒店在市場上的平均價格。





資料處理及分析



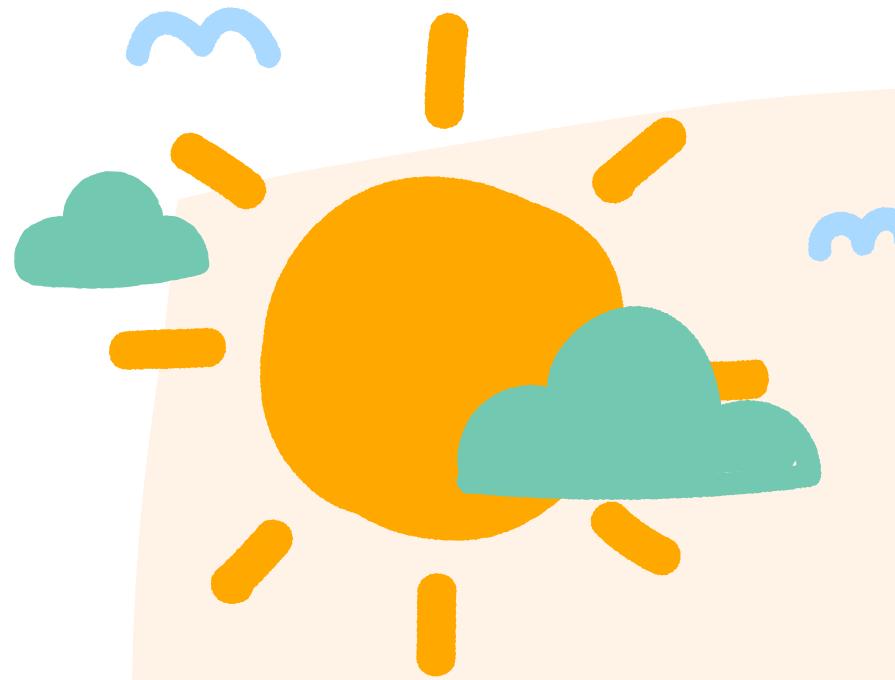
資料處理

- 不同星級獨自處理
- 繪製觀察所有酒店價格趨勢折線圖，剔除異常走勢的酒店
- 標準化、平均
- 三筆平均資料集（3，4，5星級酒店）

資料分析

- 使用Correlation和Granger因果檢驗
- 推斷影響酒店價格趨勢的因素

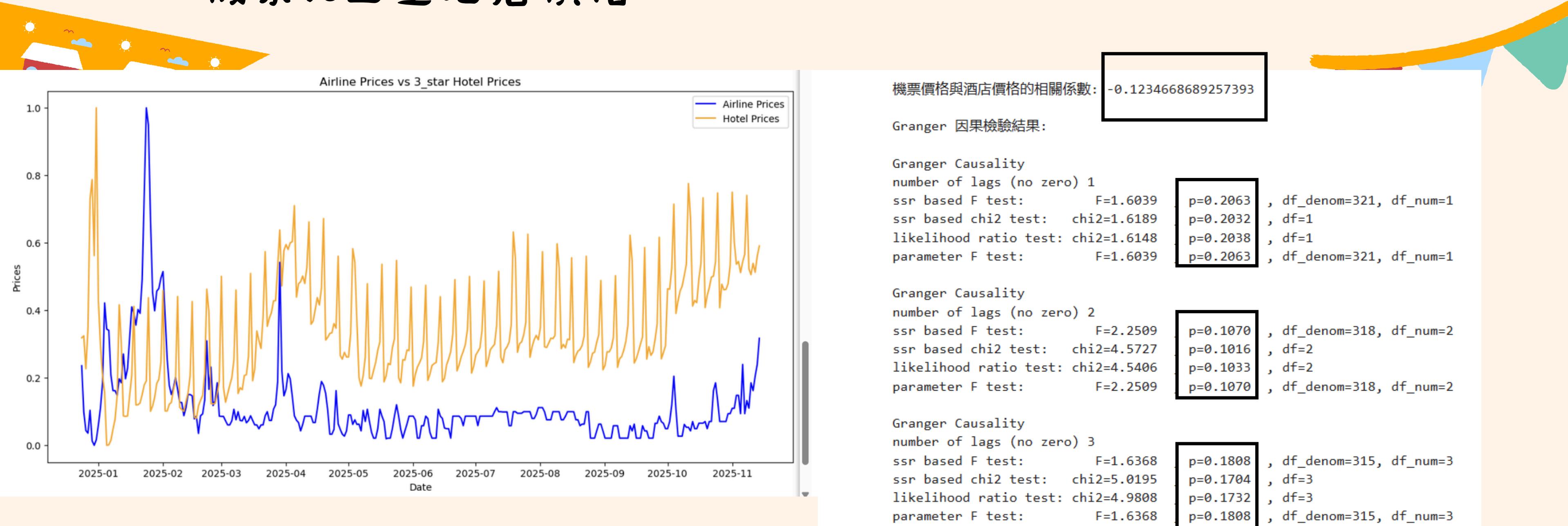




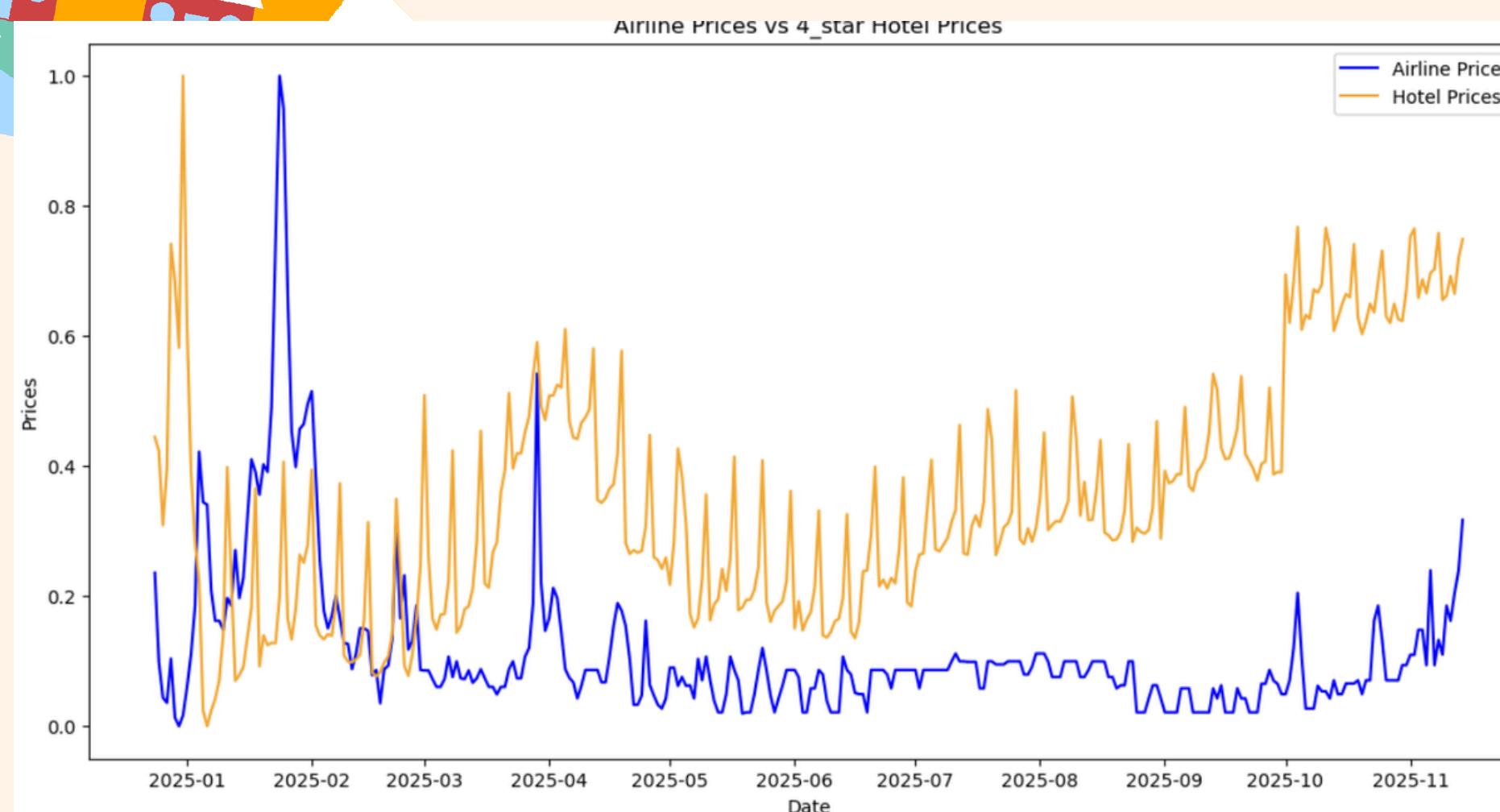
機票價格vs酒店星級



機票vs三星酒店價格



機票vs四星酒店價格



機票價格與酒店價格的相關係數: -0.12947557864914888

Granger 因果檢驗結果:

Granger Causality

number of lags (no zero) 1

ssr based F test: F=0.9053

ssr based chi2 test: chi2=0.9137

likelihood ratio test: chi2=0.9124

parameter F test: F=0.9053

p=0.3421 , df_denom=321, df_num=1

p=0.3391 , df=1

p=0.3395 , df=1

p=0.3421 , df_denom=321, df_num=1

Granger Causality

number of lags (no zero) 2

ssr based F test: F=0.6474

ssr based chi2 test: chi2=1.3152

likelihood ratio test: chi2=1.3125

parameter F test: F=0.6474

p=0.5241 , df_denom=318, df_num=2

p=0.5181 , df=2

p=0.5188 , df=2

p=0.5241 , df_denom=318, df_num=2

Granger Causality

number of lags (no zero) 3

ssr based F test: F=0.4263

ssr based chi2 test: chi2=1.3074

likelihood ratio test: chi2=1.3047

parameter F test: F=0.4263

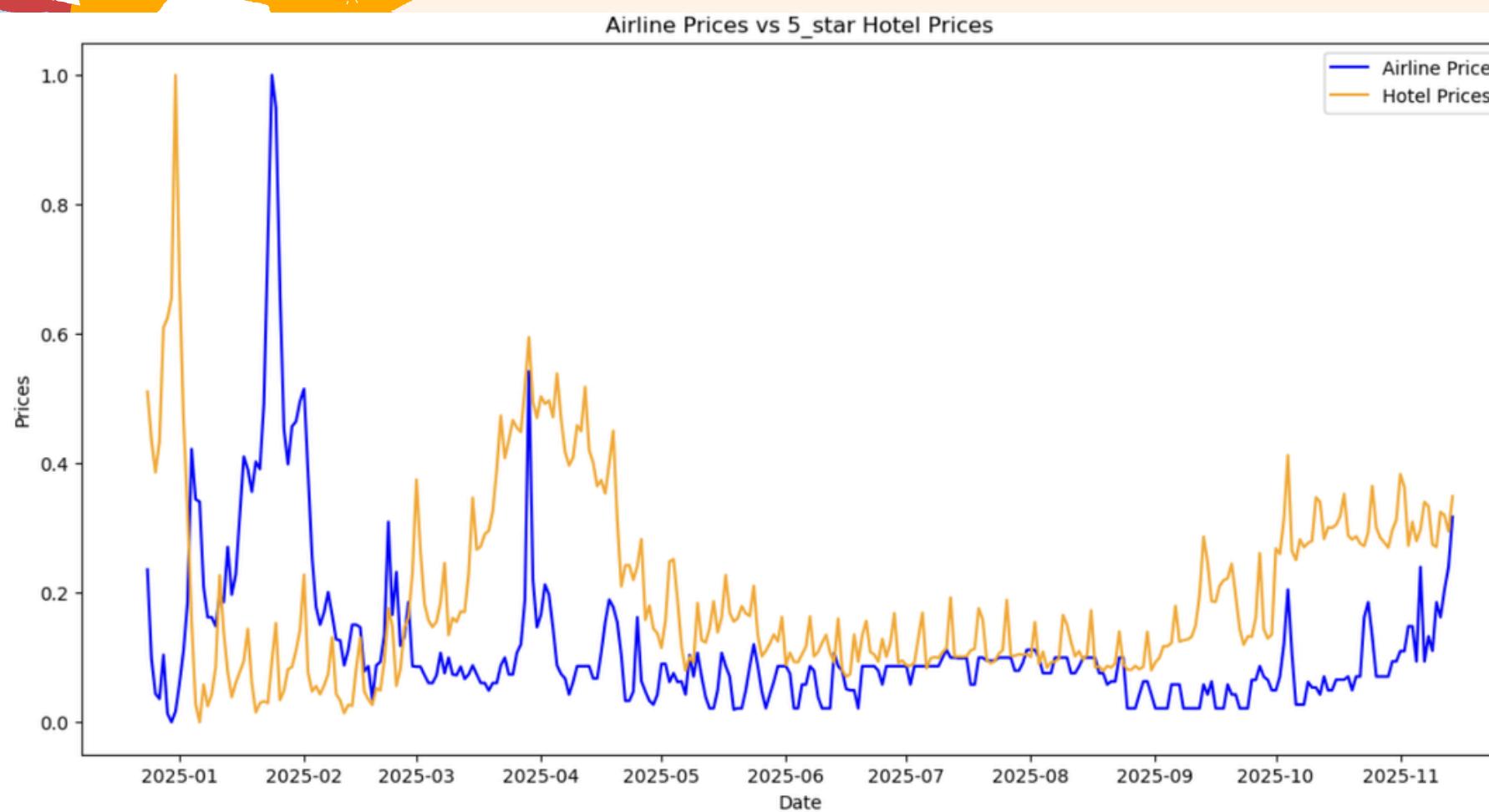
p=0.7343 , df_denom=315, df_num=3

p=0.7274 , df=3

p=0.7280 , df=3

p=0.7343 , df_denom=315, df_num=3

機票vs五星酒店價格



機票價格與酒店價格的相關係數: -0.0985535869877709

Granger 因果檢驗結果:

Granger Causality

number of lags (no zero) 1

ssr based F test: F=0.3393

ssr based chi2 test: chi2=0.3425

likelihood ratio test: chi2=0.3423

parameter F test: F=0.3393

, p=0.5606

, df_denom=321, df_num=1

, df=1

, df=1

, df_denom=321, df_num=1

Granger Causality

number of lags (no zero) 2

ssr based F test: F=0.1181

ssr based chi2 test: chi2=0.2399

likelihood ratio test: chi2=0.2398

parameter F test: F=0.1181

, p=0.8887

, df_denom=318, df_num=2

, df=2

, df=2

, df_denom=318, df_num=2

Granger Causality

number of lags (no zero) 3

ssr based F test: F=0.6218

ssr based chi2 test: chi2=1.9067

likelihood ratio test: chi2=1.9011

parameter F test: F=0.6218

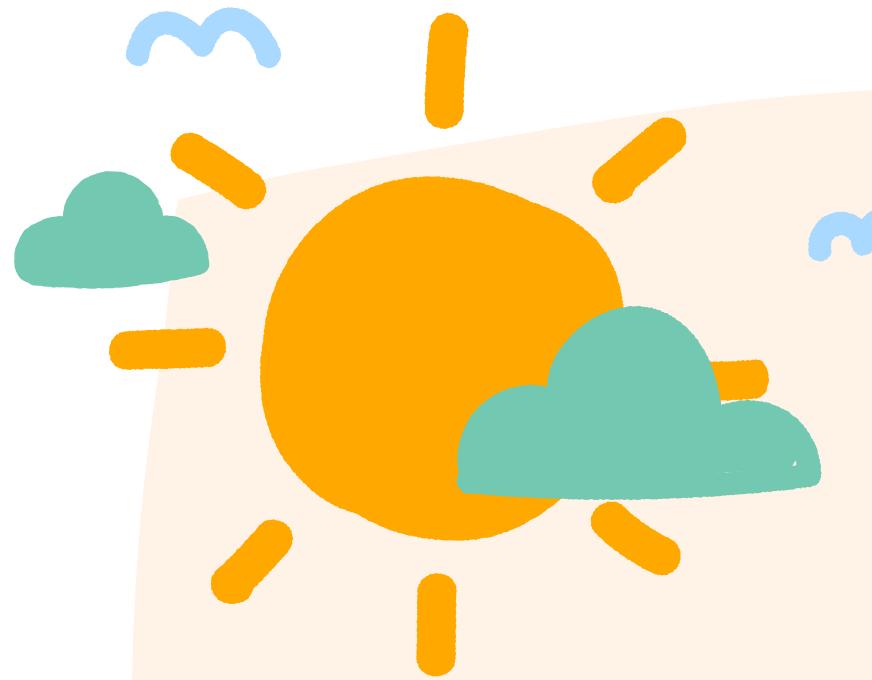
, p=0.6014

, df_denom=315, df_num=3

, df=3

, df=3

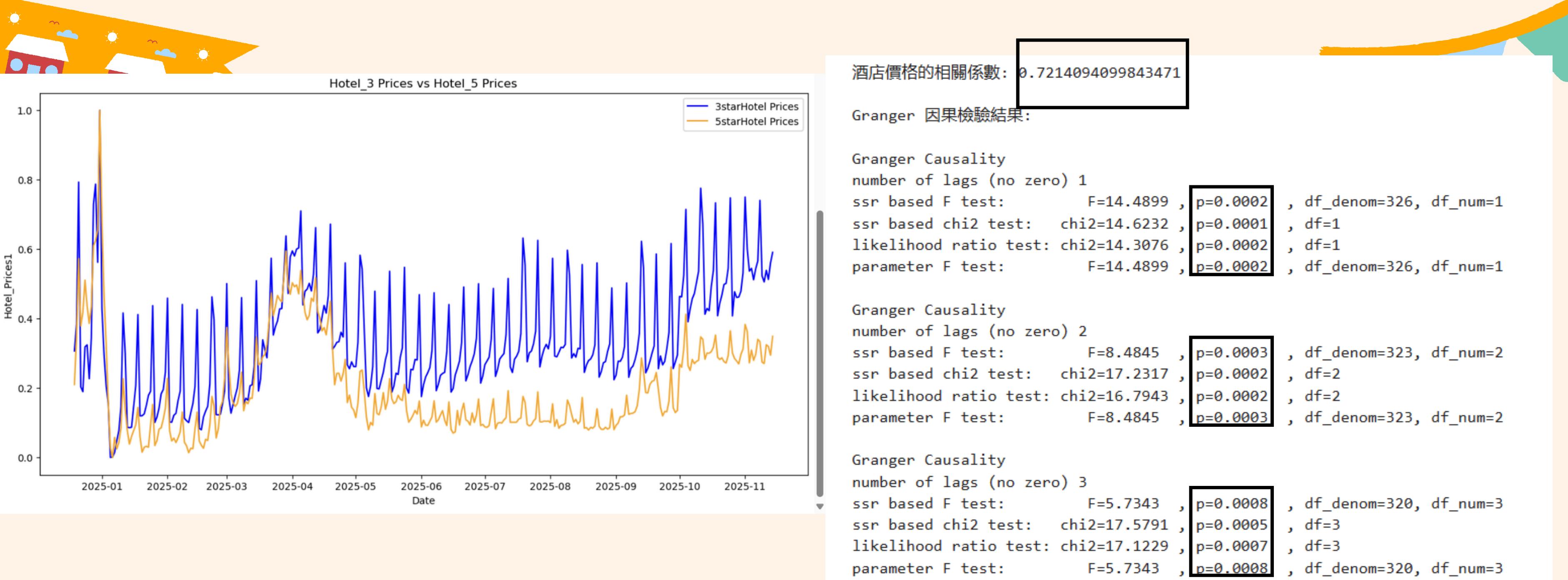
, df_denom=315, df_num=3



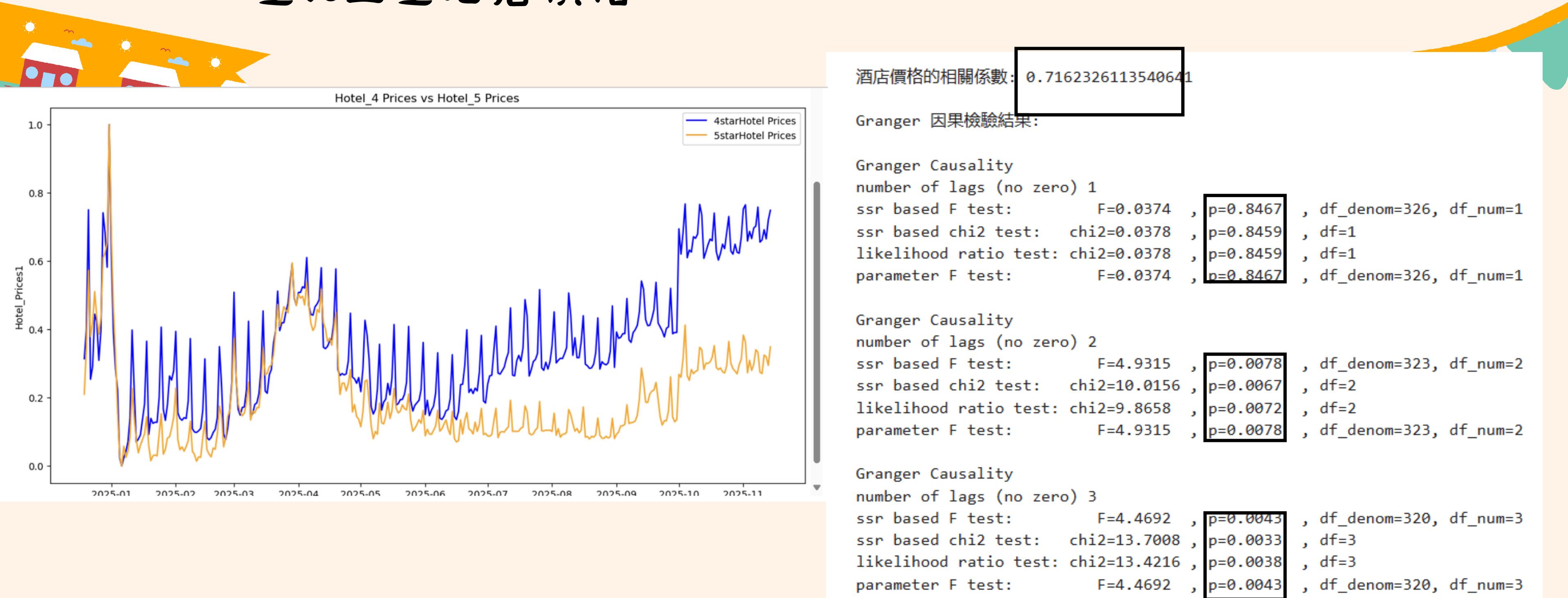
酒店星級vs酒店星級



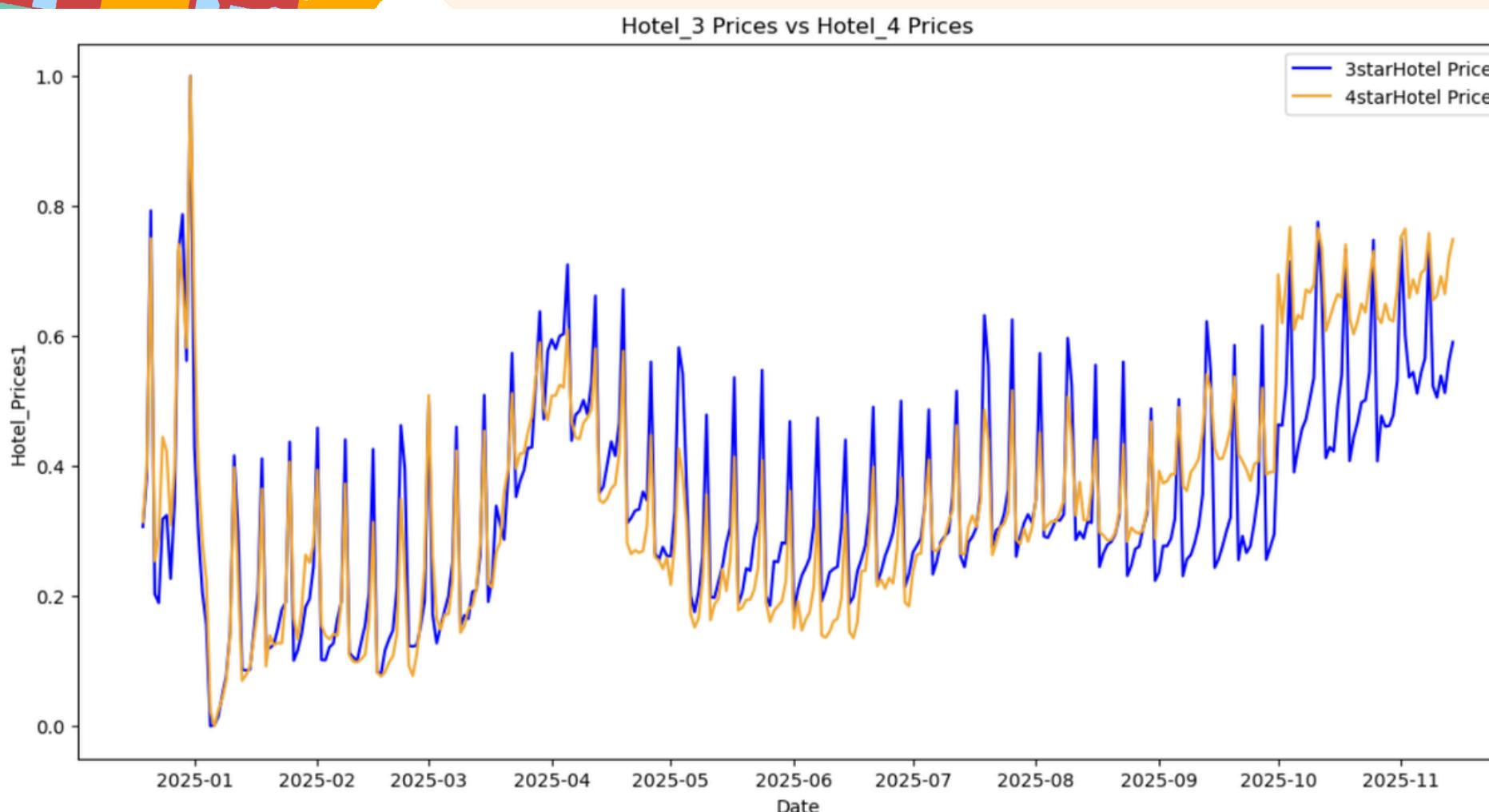
三星vs五星酒店價格



四星vs五星酒店價格



三星vs四星酒店價格



酒店價格的相關係數: 0.8902167401584883

Granger 因果檢驗結果:

Granger Causality

number of lags (no zero) 1

ssr based F test: F=41.9853 , p=0.0000

ssr based chi2 test: chi2=42.3717 , p=0.0000

likelihood ratio test: chi2=39.8569 , p=0.0000

parameter F test: F=41.9853 , p=0.0000

, df_denom=326, df_num=1

, df=1

, df=1

, df_denom=326, df_num=1

Granger Causality

number of lags (no zero) 2

ssr based F test: F=18.2253 , p=0.0000

ssr based chi2 test: chi2=37.0149 , p=0.0000

likelihood ratio test: chi2=35.0713 , p=0.0000

parameter F test: F=18.2253 , p=0.0000

, df_denom=323, df_num=2

, df=2

, df=2

, df_denom=323, df_num=2

Granger Causality

number of lags (no zero) 3

ssr based F test: F=12.0798 , p=0.0000

ssr based chi2 test: chi2=37.0322 , p=0.0000

likelihood ratio test: chi2=35.0813 , p=0.0000

parameter F test: F=12.0798 , p=0.0000

, df_denom=320, df_num=3

, df=3

, df=3

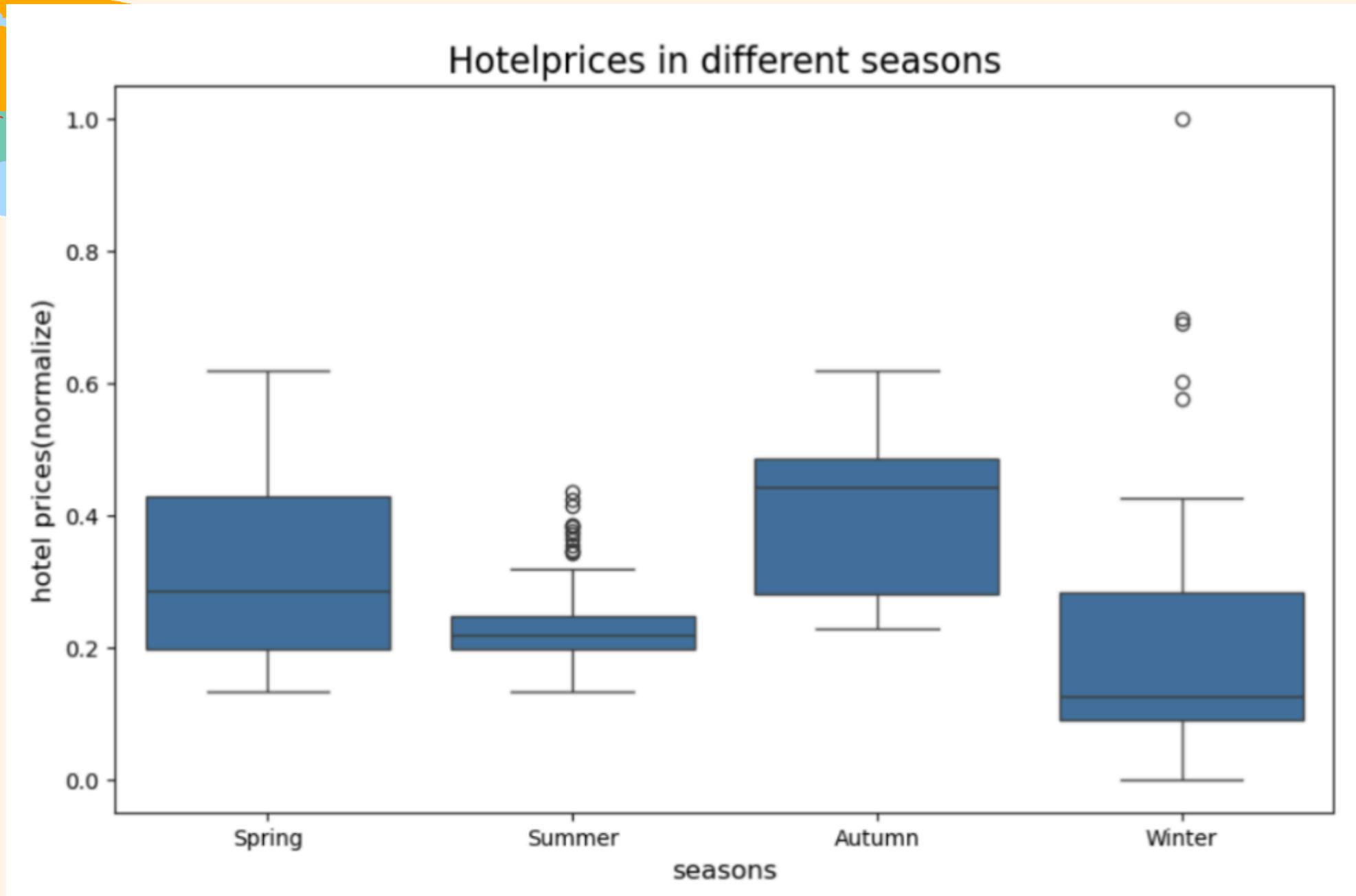
, df_denom=320, df_num=3

小結

- 如上表所示，各星級的平均價格趨勢呈近同步（正相關）的狀況，由此可見這樣的價格趨勢可以認為是合理的。機票價格趨勢多少會影響酒店價格趨勢，但這其中的規律和相關特徵可能更加複雜（天氣因素、業者策略、股市等），這是我們能在開始這個課題前沒有考慮到的問題。

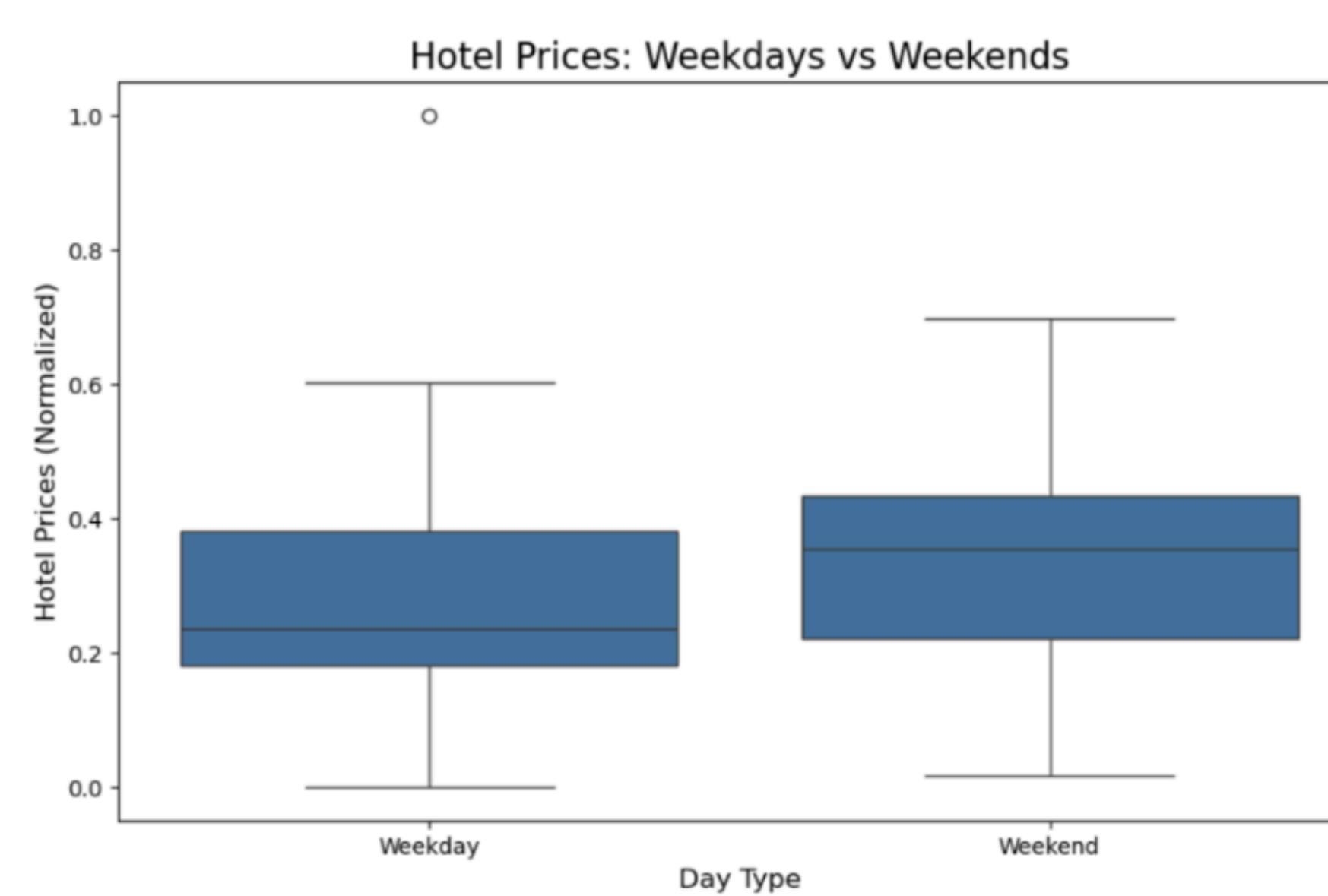


季節與酒店價格的關係



如圖所示春和秋天的平均趨勢比較高，而夏和冬則相反，可推斷出春和秋為當地的旅游旺季，夏和冬則為旅游淡季。異常值代表酒店價格大幅漲調，也可能代表假期或旅游旺季。

平日/假日與酒店價格的關係



平日平均價格比假日平均價格來得低，可解釋為什麼折線圖每個月會有約四次的峰值。



結論



感謝您
聽我講！

