

各縣市交通量跟交通事故之關係

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研究動機

- 有鑑於台南交通十分混亂，例如：大學路時常發生車禍，所以我們想要了解車流量的多寡是否會影響車禍發生的數量。



研究簡述

- 每年每個縣市的車流量及車禍量直方圖。
- 比較車流量，在108~111年間每個縣市的車流量是否有差異。
- 比較車禍量，在108~111年間每個縣市的車禍量是否有差異。
- 分別分析108~111年的車流量與車禍量是否有差異。
- 結論

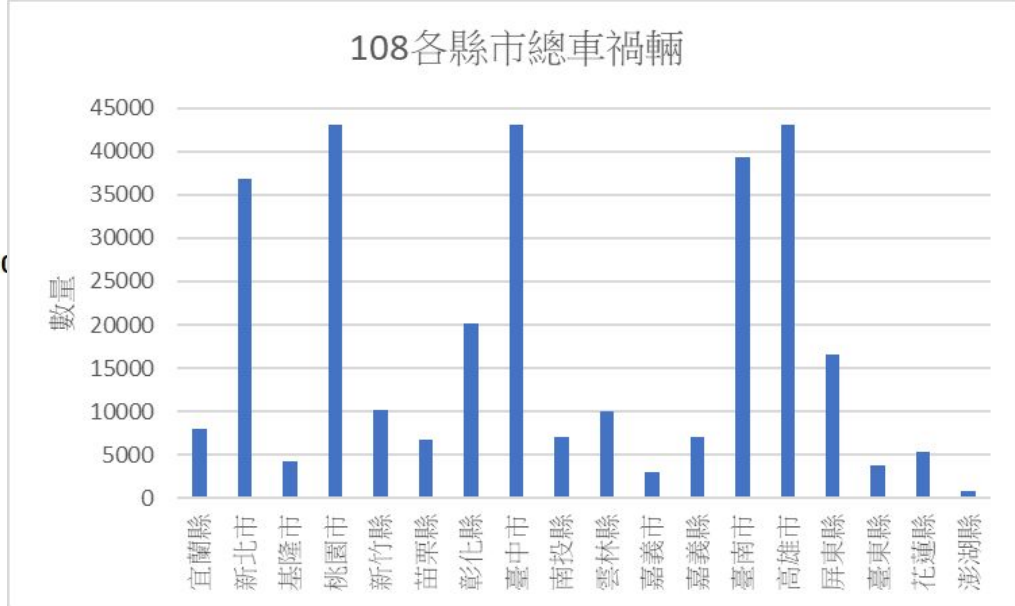
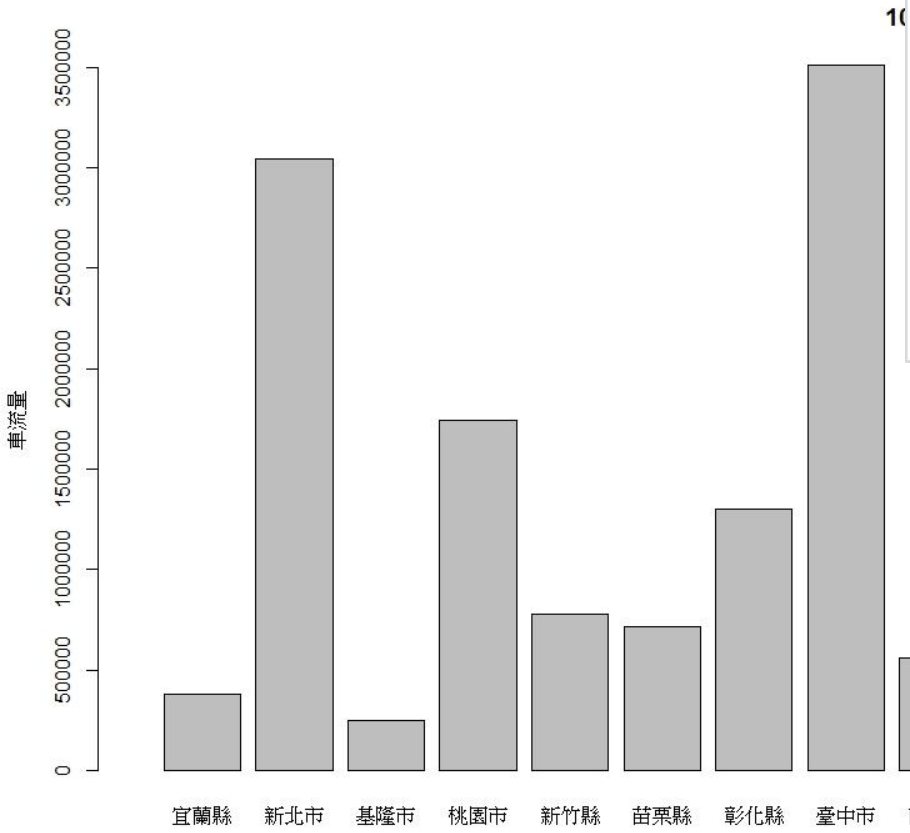
研究資料



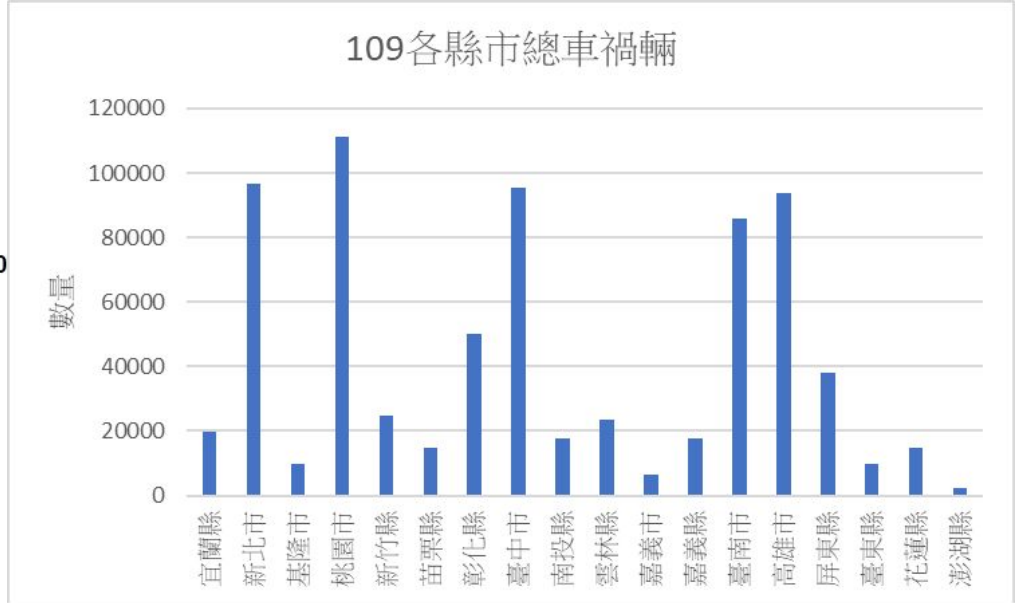
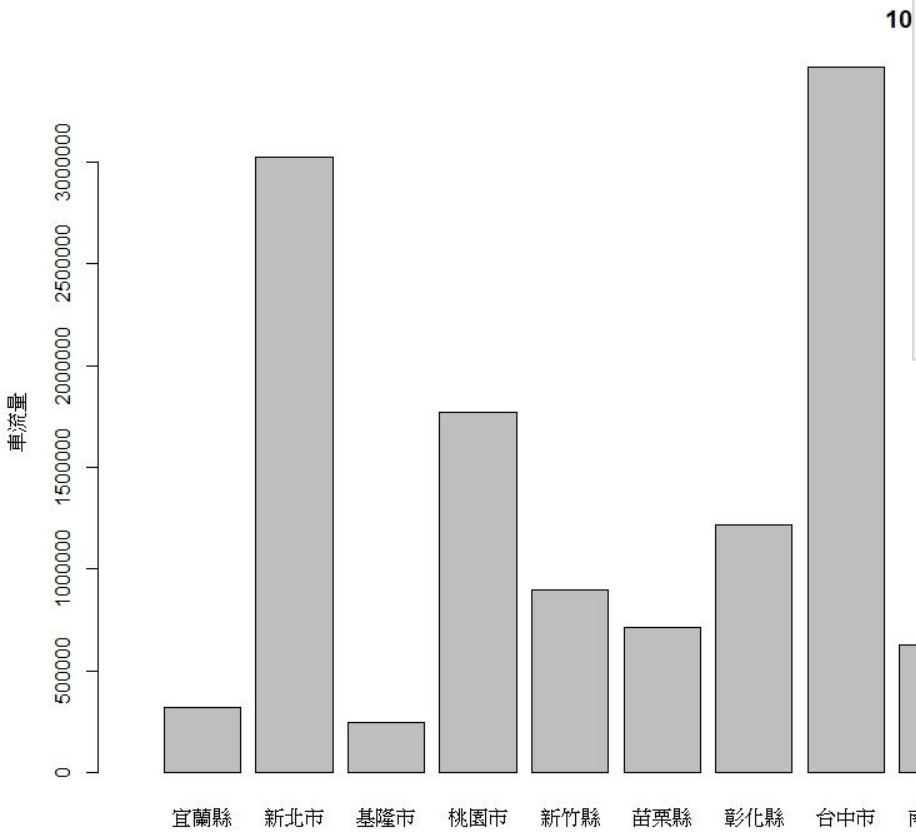
縣市	country_ID	year	交通量
宜蘭縣	1	108	381939
新北市	2	108	3047320
基隆市	3	108	247553
桃園市	4	108	1740507
新竹縣	5	108	779712
苗栗縣	6	108	715768
彰化縣	7	108	1302240
臺中市	8	108	3510359
南投縣	9	108	561806
雲林縣	10	108	423764
嘉義市	11	108	77533
嘉義縣	12	108	501878
臺南市	13	108	1817804
高雄市	14	108	1319424
屏東縣	15	108	977849
臺東縣	16	108	196279
花蓮縣	17	108	284834
澎湖縣	18	108	124784
宜蘭縣	1	109	320999
新北市	2	109	3025641
基隆市	3	109	246286
桃園市	4	109	1767931
新竹縣	5	109	895919
苗栗縣	6	109	711757
彰化縣	7	109	1217891
臺中市	8	109	3465823
南投縣	9	109	623910

地區	country_ID	year	A1車禍量	A2車禍量	總車禍量
宜蘭縣	1	108	54	7918	7972
新北市	2	108	165	36617	36782
基隆市	3	108	17	4177	4194
桃園市	4	108	157	42937	43094
新竹縣	5	108	57	10109	10166
苗栗縣	6	108	74	6609	6683
彰化縣	7	108	137	20031	20168
臺中市	8	108	197	42935	43132
南投縣	9	108	64	7074	7138
雲林縣	10	108	90	9968	10058
嘉義市	11	108	12	3000	3012
嘉義縣	12	108	86	7033	7119
臺南市	13	108	184	39128	39312
高雄市	14	108	205	42856	43061
屏東縣	15	108	113	16478	16591
臺東縣	16	108	41	3772	3813
花蓮縣	17	108	38	5300	5338
澎湖縣	18	108	6	860	866
宜蘭縣	1	109	102	19851	19953
新北市	2	109	400	96258	96658
基隆市	3	109	28	9874	9902
桃園市	4	109	435	110842	111277
新竹縣	5	109	154	24590	24744
苗栗縣	6	109	168	14651	14819
彰化縣	7	109	303	49824	50127
臺中市	8	109	534	95010	95544
南投縣	9	109	176	17693	17869

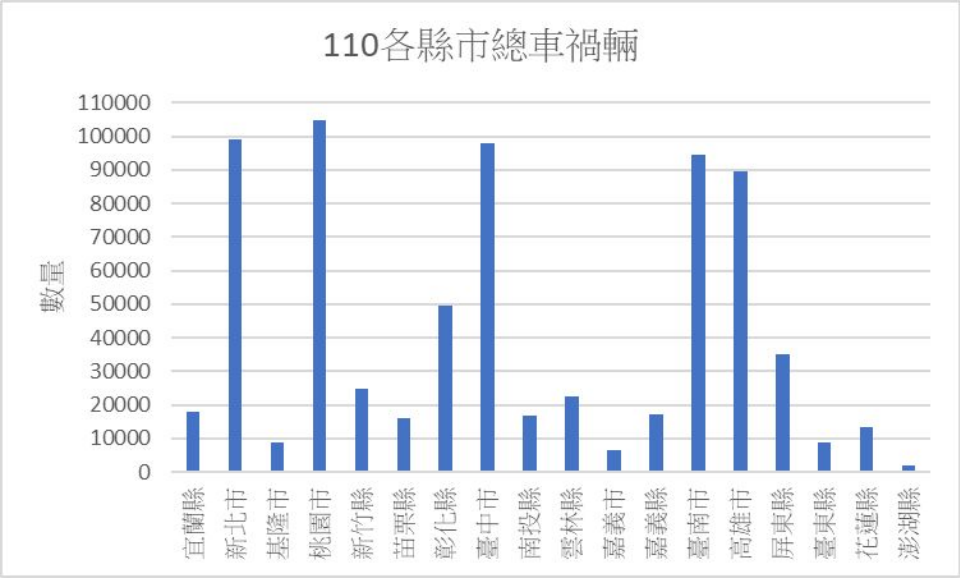
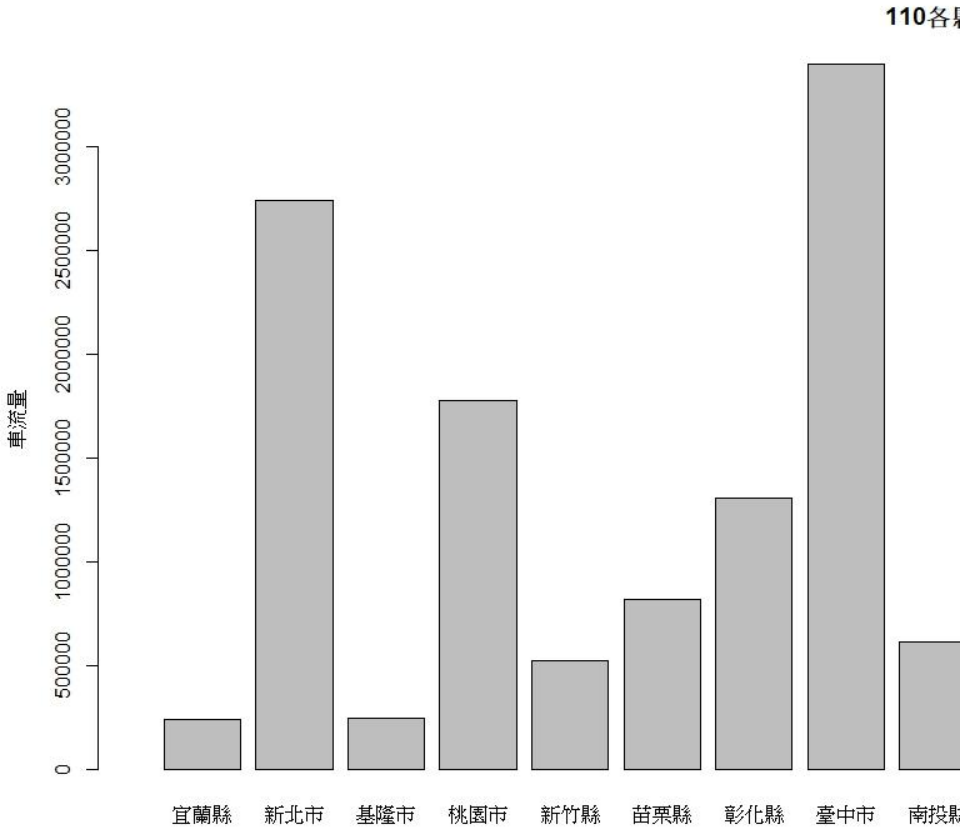
108縣市車流量和車禍量



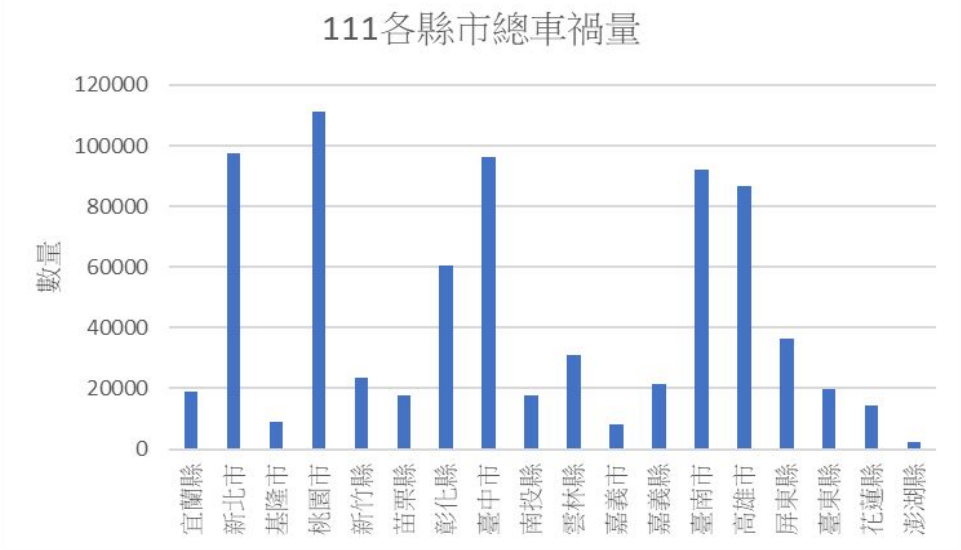
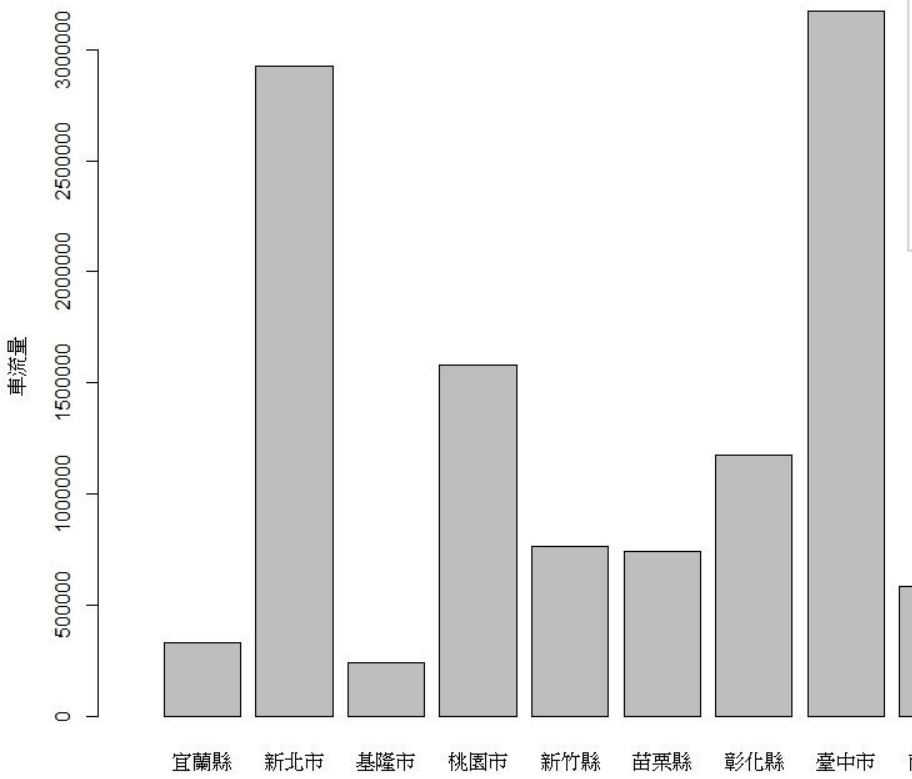
109縣市車流量和車禍量



110縣市車流量和車禍量



111縣市車流量和車禍量



比較四年每個縣市的車流量有沒有差異

```
> anova(lm(交通量~factor(country_ID), data=data))
```

```
Analysis of Variance Table
```

```
Response: 交通量
```

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
factor(country_ID)	17	6.2114e+13	3.6538e+12	469.65	< 2.2e-16 ***
Residuals	54	4.2011e+11	7.7797e+09		

```
---
```

```
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
> leveneTest(data$交通量, data$country_ID, center=mean)
```

```
Levene's Test for Homogeneity of Variance (center = mean)
```

	Df	F value	Pr(>F)
group	17	2.7314	0.002617 **
	54		

```
---
```

```
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
警告訊息：
```

```
於 leveneTest.default(data$交通量, data$country_ID, center = mean) :  
  data$country_ID coerced to factor.
```

```

q value Pr(>|q|)
2 - 1 == 0 48.801 0.00013905 ***
3 - 1 == 0 -3.528 0.61647046
4 - 1 == 0 36.253 3.1191e-05 ***
5 - 1 == 0 7.135 0.11510188
6 - 1 == 0 15.774 0.00117285 **
7 - 1 == 0 29.917 2.0248e-05 ***
8 - 1 == 0 53.704 0.00011617 ***
9 - 1 == 0 12.043 0.01411459 *
10 - 1 == 0 4.919 0.27818406
11 - 1 == 0 -10.316 0.03173580 *
12 - 1 == 0 9.236 0.01804421 *
13 - 1 == 0 36.998 8.0585e-05 ***
14 - 1 == 0 16.877 0.00503900 **
15 - 1 == 0 11.343 0.01871617 *
16 - 1 == 0 -6.233 0.17131973
17 - 1 == 0 -0.702 0.99999858
18 - 1 == 0 -8.582 0.07422102 .
3 - 2 == 0 -54.438 0.00058254 ***
4 - 2 == 0 -20.595 0.00058153 ***
5 - 2 == 0 -29.554 2.2739e-05 ***
6 - 2 == 0 -41.778 0.00037723 ***
7 - 2 == 0 -30.865 0.00024232 ***
8 - 2 == 0 6.219 0.10779476
9 - 2 == 0 -46.377 0.00075232 ***
10 - 2 == 0 -48.935 0.00046983 ***
11 - 2 == 0 -56.816 0.00031335 ***
12 - 2 == 0 -44.527 0.00025545 ***
13 - 2 == 0 -15.847 0.00130724 **
14 - 2 == 0 -24.022 9.6497e-05 ***
15 - 2 == 0 -30.965 1.5208e-05 ***
16 - 2 == 0 -55.083 0.00040986 ***
17 - 2 == 0 -52.877 0.00058637 ***
18 - 2 == 0 -56.289 0.00039139 ***
4 - 3 == 0 45.309 0.00128150 **
5 - 3 == 0 8.947 0.08680331 .
6 - 3 == 0 28.785 0.00260343 **
7 - 3 == 0 43.359 0.00141627 **
8 - 3 == 0 59.046 0.00031985 ***
9 - 3 == 0 34.922 0.00175743 **
10 - 3 == 0 15.186 0.01940109 *
11 - 3 == 0 -18.495 0.01063199 *
12 - 3 == 0 17.576 0.01303845 *
13 - 3 == 0 43.930 0.00139012 **

14 - 3 == 0 19.714 0.00961774 ***
15 - 3 == 0 14.172 0.02434370 *
16 - 3 == 0 -8.297 0.10174222 .
17 - 3 == 0 9.597 0.06650221 .
18 - 3 == 0 -17.962 0.01077933 *
5 - 4 == 0 -15.201 0.00340524 ***
6 - 4 == 0 -26.342 0.00034155 ***
7 - 4 == 0 -11.696 0.00750321 **
8 - 4 == 0 26.780 0.00018326 ***
9 - 4 == 0 -32.956 0.00070926 ***
10 - 4 == 0 -36.660 0.00032676 ***
11 - 4 == 0 -48.563 0.00046914 ***
12 - 4 == 0 -30.274 0.00010150 ***
13 - 4 == 0 4.442 0.34613725
14 - 4 == 0 -7.971 0.04919057 *
15 - 4 == 0 -15.270 0.00186916 **
16 - 4 == 0 -46.025 0.00063954 ***
17 - 4 == 0 -42.805 0.00099879 ***
18 - 4 == 0 -47.933 0.00070999 ***
6 - 5 == 0 0.099 1.00000000
7 - 5 == 0 8.486 0.06120394 .
8 - 5 == 0 34.441 6.8484e-06 ***
9 - 5 == 0 -2.556 0.85228221
10 - 5 == 0 -5.318 0.28563567
11 - 5 == 0 -11.673 0.03784402 *
12 - 5 == 0 -2.770 0.80594603
13 - 5 == 0 17.776 0.00096769 ***
14 - 5 == 0 6.651 0.08206193 .
15 - 5 == 0 1.900 0.97952869
16 - 5 == 0 -10.024 0.05944265 .
17 - 5 == 0 -7.850 0.11812744
18 - 5 == 0 -10.919 0.04810543 *
7 - 6 == 0 17.391 0.00087412 ***
8 - 6 == 0 47.165 0.00033861 ***
9 - 6 == 0 -7.452 0.07187335 .
10 - 6 == 0 -14.294 0.00262492 **
11 - 6 == 0 -34.066 0.00014957 ***
12 - 6 == 0 -6.526 0.08870185 .
13 - 6 == 0 28.215 0.00042680 ***
14 - 6 == 0 9.235 0.05403129 .
15 - 6 == 0 2.705 0.82370823
16 - 6 == 0 -29.721 0.00033927 ***
17 - 6 == 0 -24.078 0.00186580 **
18 - 6 == 0 -33.252 0.00049133 ***

9 - 7 == 0 -25.884 0.00076725 ***
10 - 7 == 0 -30.722 0.00012570 ***
11 - 7 == 0 -47.145 0.00024757 ***
12 - 7 == 0 -22.441 0.00018766 ***
13 - 7 == 0 15.341 0.00306190 **
14 - 7 == 0 -0.206 1.00000000
15 - 7 == 0 -7.467 0.07843846 .
16 - 7 == 0 -43.792 0.00038864 ***
17 - 7 == 0 -39.568 0.00077953 ***
18 - 7 == 0 -46.615 0.00052056 ***
9 - 8 == 0 -51.530 0.00052966 ***
10 - 8 == 0 -53.898 0.00032634 ***
11 - 8 == 0 -61.254 0.00017210 ***
12 - 8 == 0 -49.718 0.00022336 ***
13 - 8 == 0 -21.986 0.00030065 ***
14 - 8 == 0 -29.296 2.2466e-05 ***
15 - 8 == 0 -36.196 7.8129e-06 ***
16 - 8 == 0 -59.642 0.00023201 ***
17 - 8 == 0 -57.592 0.00034188 ***
18 - 8 == 0 -60.764 0.00021195 ***
10 - 9 == 0 -9.777 0.01539852 *
11 - 9 == 0 -38.761 6.3019e-06 ***
12 - 9 == 0 -0.851 0.99999237
13 - 9 == 0 33.706 0.00093254 ***
14 - 9 == 0 12.493 0.02869228 *
15 - 9 == 0 6.115 0.20567153
16 - 9 == 0 -32.821 1.6154e-05 ***
17 - 9 == 0 -25.098 0.00029880 ***
18 - 9 == 0 -39.361 3.3194e-05 ***
11 - 10 == 0 -23.003 0.00031580 ***
12 - 10 == 0 6.137 0.13080834
13 - 10 == 0 36.975 0.00052981 ***
14 - 10 == 0 15.397 0.01306669 *
15 - 10 == 0 9.448 0.05670556 .
16 - 10 == 0 -17.345 0.00161944 **
17 - 10 == 0 -9.617 0.03448846 *
18 - 10 == 0 -21.654 0.00126702 **
12 - 11 == 0 23.675 0.00108712 **
13 - 11 == 0 46.919 0.00066546 ***
14 - 11 == 0 22.543 0.00503412 **
15 - 11 == 0 17.421 0.01056044 *
16 - 11 == 0 8.100 0.03399998 *
17 - 11 == 0 20.791 0.00043687 ***
18 - 11 == 0 4.318 0.38029862

res<-gamesHowellTest(aov)
summary(res)
13 - 12 == 0 31.684 0.00018139 ***
14 - 12 == 0 12.262 0.01903472 *
15 - 12 == 0 6.144 0.16882124
16 - 12 == 0 -19.450 0.00303846 **
17 - 12 == 0 -13.842 0.01518175 *
18 - 12 == 0 -22.379 0.00277806 ***
14 - 13 == 0 -11.057 0.00876671 **
15 - 13 == 0 -18.084 0.00051349 ***
16 - 13 == 0 -44.726 0.00083846 ***
17 - 13 == 0 -41.927 0.00116622 **
18 - 13 == 0 -46.271 0.00090228 ***
15 - 14 == 0 -5.402 0.18528583
16 - 14 == 0 -20.761 0.00689105 **
17 - 14 == 0 -18.431 0.01049949 *
18 - 14 == 0 -21.793 0.00630078 **
16 - 15 == 0 -15.402 0.01591591 *
17 - 15 == 0 -12.749 0.03005699 *
18 - 15 == 0 -16.552 0.01376040 *
17 - 16 == 0 12.540 0.00458980 **
18 - 16 == 0 -4.809 0.27689072
18 - 17 == 0 -19.797 0.00027936 ***

```

比較四年每個縣市的車禍量有沒有差異

```
> anova(lm(總車禍量~factor(country_ID), data=data))
```

Analysis of Variance Table

Response: 總車禍量

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
factor(country_ID)	17	6.9947e+10	4114526839	15.735	3.651e-15 ***
Residuals	54	1.4120e+10	261488815		

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

```
> leveneTest(data$總車禍量, data$country_ID, center=mean)
```

Levene's Test for Homogeneity of Variance (center = mean)

	Df	F value	Pr(>F)
group	17	3.7931	9.245e-05 ***
	54		

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

警告訊息：

於 leveneTest.default(data\$總車禍量, data\$country_ID, center = mean) :
data\$country_ID coerced to factor.


```

q value Pr(>|q|) 14 - 3 == 0 8.346 0.100580 8 - 7 == 0 3.382 0.636199
2 - 1 == 0 6.051 0.216867 15 - 3 == 0 6.424 0.176783 9 - 7 == 0 -4.729 0.358783
3 - 1 == 0 -3.768 0.537347 16 - 3 == 0 0.974 0.999935 10 - 7 == 0 -3.392 0.636888
4 - 1 == 0 6.435 0.188421 17 - 3 == 0 2.130 0.949791 11 - 7 == 0 -6.313 0.201814
5 - 1 == 0 1.457 0.997819 18 - 3 == 0 -6.567 0.167118 12 - 7 == 0 -4.485 0.392493
6 - 1 == 0 -0.888 0.999994 5 - 4 == 0 -5.989 0.217858 13 - 7 == 0 2.972 0.758863
7 - 1 == 0 4.492 0.396362 6 - 4 == 0 -6.650 0.175647 14 - 7 == 0 3.199 0.691001
8 - 1 == 0 6.940 0.151321 7 - 4 == 0 -3.588 0.581264 15 - 7 == 0 -1.924 0.973650
9 - 1 == 0 -0.500 1.000000 8 - 4 == 0 -0.615 1.000000 16 - 7 == 0 -5.259 0.267139
10 - 1 == 0 1.553 0.995391 9 - 4 == 0 -6.559 0.180987 17 - 7 == 0 -5.248 0.290679
11 - 1 == 0 -4.810 0.331793 10 - 4 == 0 -5.843 0.224240 18 - 7 == 0 -7.050 0.158787
12 - 1 == 0 -0.095 1.000000 11 - 4 == 0 -7.371 0.141341 9 - 8 == 0 -7.098 0.144461
13 - 1 == 0 6.570 0.173410 12 - 4 == 0 -6.437 0.185992 10 - 8 == 0 -6.173 0.185013
14 - 1 == 0 7.227 0.132481 13 - 4 == 0 -0.977 0.999976 11 - 8 == 0 -8.127 0.109573
15 - 1 == 0 3.789 0.525240 14 - 4 == 0 -0.988 0.999969 12 - 8 == 0 -6.934 0.148450
16 - 1 == 0 -1.841 0.983965 15 - 4 == 0 -4.993 0.317695 13 - 8 == 0 -0.400 1.000000
17 - 1 == 0 -1.717 0.990701 16 - 4 == 0 -6.868 0.155956 14 - 8 == 0 -0.392 1.000000
18 - 1 == 0 -7.281 0.142259 17 - 4 == 0 -6.831 0.165819 15 - 8 == 0 -5.124 0.287422
3 - 2 == 0 -6.880 0.166490 18 - 4 == 0 -7.749 0.125815 16 - 8 == 0 -7.454 0.119539
4 - 2 == 0 0.627 1.000000 6 - 5 == 0 -2.277 0.929816 17 - 8 == 0 -7.440 0.130667
5 - 2 == 0 -5.569 0.256315 7 - 5 == 0 3.660 0.569077 18 - 8 == 0 -8.601 0.096174 .
6 - 2 == 0 -6.284 0.200217 8 - 5 == 0 6.373 0.179342 10 - 9 == 0 1.959 0.970602
7 - 2 == 0 -3.015 0.744870 9 - 5 == 0 -1.926 0.976363 11 - 9 == 0 -4.443 0.391945
8 - 2 == 0 0.051 1.000000 10 - 5 == 0 0.253 1.000000 12 - 9 == 0 0.372 1.000000
9 - 2 == 0 -6.186 0.207132 11 - 5 == 0 -5.602 0.242317 13 - 9 == 0 6.731 0.164872
10 - 2 == 0 -5.411 0.266218 12 - 5 == 0 -1.479 0.997646 14 - 9 == 0 7.409 0.125999
11 - 2 == 0 -7.068 0.156597 13 - 5 == 0 5.990 0.208912 15 - 9 == 0 4.187 0.431830
12 - 2 == 0 -6.053 0.214047 14 - 5 == 0 6.575 0.159609 16 - 9 == 0 -1.447 0.997946
13 - 2 == 0 -0.321 1.000000 15 - 5 == 0 2.455 0.895627 17 - 9 == 0 -1.235 0.999635
14 - 2 == 0 -0.309 1.000000 16 - 5 == 0 -2.980 0.759220 18 - 9 == 0 -7.093 0.151213
15 - 2 == 0 -4.496 0.394482 17 - 5 == 0 -3.019 0.744540 11 - 10 == 0 -4.982 0.327504
16 - 2 == 0 -6.519 0.175857 18 - 5 == 0 -7.506 0.133525 12 - 10 == 0 -1.576 0.995216
17 - 2 == 0 -6.481 0.187555 7 - 6 == 0 4.900 0.333926 13 - 10 == 0 5.788 0.217419
18 - 2 == 0 -7.479 0.137543 8 - 6 == 0 7.211 0.139532 14 - 10 == 0 6.334 0.164998
4 - 3 == 0 7.198 0.149295 9 - 6 == 0 0.394 1.000000 15 - 10 == 0 2.062 0.964289
5 - 3 == 0 4.770 0.342008 10 - 6 == 0 2.261 0.928217 16 - 10 == 0 -2.918 0.776517
6 - 3 == 0 2.950 0.762654 11 - 6 == 0 -4.083 0.464780 17 - 10 == 0 -2.891 0.778758
7 - 3 == 0 5.976 0.226984 12 - 6 == 0 0.733 1.000000 18 - 10 == 0 -6.500 0.191391
8 - 3 == 0 7.910 0.116572 13 - 6 == 0 6.848 0.158803 12 - 11 == 0 4.247 0.440029
9 - 3 == 0 3.340 0.651572 14 - 6 == 0 7.539 0.121337 13 - 11 == 0 7.787 0.122202
10 - 3 == 0 4.307 0.433699 15 - 6 == 0 4.475 0.374294 14 - 11 == 0 8.594 0.094165 .
11 - 3 == 0 -1.642 0.993730 16 - 6 == 0 -1.132 0.999843 15 - 11 == 0 7.029 0.145456
12 - 3 == 0 3.320 0.658956 17 - 6 == 0 -0.840 0.999997 16 - 11 == 0 1.778 0.979646
13 - 3 == 0 7.564 0.130564 18 - 6 == 0 -6.831 0.165631 17 - 11 == 0 3.349 0.649412

```

```

res<-gamesHowellTest(aov)
summary(res)

```

```

18 - 11 == 0 -5.383 0.264942
13 - 12 == 0 6.565 0.170294
14 - 12 == 0 7.214 0.129319
15 - 12 == 0 3.752 0.530864
16 - 12 == 0 -1.670 0.993005
17 - 12 == 0 -1.497 0.997010
18 - 12 == 0 -6.409 0.195863
14 - 13 == 0 0.027 1.000000
15 - 13 == 0 -4.717 0.347424
16 - 13 == 0 -7.100 0.135556
17 - 13 == 0 -7.083 0.147900
18 - 13 == 0 -8.274 0.106332
15 - 14 == 0 -5.153 0.274722
16 - 14 == 0 -7.792 0.101153
17 - 14 == 0 -7.802 0.113099
18 - 14 == 0 -9.134 0.082033 .
16 - 15 == 0 -4.927 0.269023
17 - 15 == 0 -5.076 0.282201
18 - 15 == 0 -8.376 0.101882
17 - 16 == 0 0.483 1.000000
18 - 16 == 0 -3.645 0.588397
18 - 17 == 0 -6.387 0.193607

```

結論一

- 從長條圖中可以看出車禍的多寡與車流量大小並沒有符合。
- 預期結果為各縣市間的车流量和車禍量分別都有差異。
- 檢定過後，發現兩者有明顯差異。
- 但是在縣市間的车禍量的事後檢定卻只有三組有比較明顯差異。

108年車禍量與車流量是否有差異

```
> shapiro.test(data108$count[data108$kind=='車禍量'])
```

```
Shapiro-Wilk normality test
```

```
data: data108$count[data108$kind == "車禍量"]
```

```
W = 0.82091, p-value = 0.003046
```

```
> shapiro.test(data108$count[data108$kind=='車流量'])
```

```
Shapiro-Wilk normality test
```

```
data: data108$count[data108$kind == "車流量"]
```

```
W = 0.82017, p-value = 0.002969
```

```
> leveneTest(data108$count, data108$kind, center=mean)
```

```
Levene's Test for Homogeneity of Variance (center = mean)
```

	Df	F value	Pr(>F)
group	1	25.486	1.487e-05 ***
	34		

```
---  
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

警告訊息：

於 leveneTest.default(data108\$count, data108\$kind, center = mean) :

data108\$kind coerced to factor.

```
> t.test(data108$count[data108$kind=='車禍量'], data108$count[data108$kind=='車流量'], var.equal=FALSE)
```

```
Welch Two Sample t-test
```

```
data: data108$count[data108$kind == "車禍量"] and data108$count[data108$kind == "車流量"]
```

```
t = -4.2232, df = 17.012, p-value = 0.0005715
```

```
alternative hypothesis: true difference in means is not equal to 0
```

```
95 percent confidence interval:
```

```
-1472087.2 -491282.9
```

```
sample estimates:
```

```
mean of x mean of y
```

```
18945.67 1000630.72
```

109年車禍量與車流量是否有差異

```
> data109<-read.csv("109-vs.csv")
> shapiro.test(data109$count[data109$kind=='車禍量'])
```

Shapiro-Wilk normality test

```
data: data109$count[data109$kind == "車禍量"]
W = 0.83151, p-value = 0.004388
```

```
> shapiro.test(data109$count[data109$kind=='車流量'])
```

Shapiro-Wilk normality test

```
data: data109$count[data109$kind == "車流量"]
W = 0.82511, p-value = 0.003515
```

```
> leveneTest(data109$count, data109$kind, center=mean)
Levene's Test for Homogeneity of Variance (center = mean)
```

	Df	F value	Pr(>F)
group	1	23.295	2.88e-05 ***
	34		

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

警告訊息：

於 leveneTest.default(data109\$count, data109\$kind, center = mean) :
data109\$kind coerced to factor.

```
> t.test(data109$count[data109$kind=='車禍量'], data109$count[data109$kind=='車流量'], var.equal=FALSE)
```

Welch Two Sample t-test

```
data: data109$count[data109$kind == "車禍量"] and data109$count[data109$kind == "車流量"]
t = -4.1567, df = 17.07, p-value = 0.0006554
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -1443489.6 -471696.2
sample estimates:
mean of x mean of y
 45291.83 1002884.72
```


110年車禍量與車流量是否有差異

```
> data110<-read.csv("110-vs.csv")
> shapiro.test(data110$count[data110$kind=='車禍量'])

      Shapiro-Wilk normality test

data:  data110$count[data110$kind == "車禍量"]
W = 0.82284, p-value = 0.003253

> shapiro.test(data110$count[data110$kind=='車流量'])

      Shapiro-Wilk normality test

data:  data110$count[data110$kind == "車流量"]
W = 0.82204, p-value = 0.003165

> leveneTest(data110$count, data110$kind, center=mean)
Levene's Test for Homogeneity of Variance (center = mean)
      Df F value    Pr(>F)
group 1  25.297 1.573e-05 ***
      34
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
警告訊息:
於 leveneTest.default(data110$count, data110$kind, center = mean):
  data110$kind coerced to factor.
> t.test(data110$count[data110$kind=='車禍量'], data110$count[data110$kind=='車流量'], var.equal=FALSE)

      Welch Two Sample t-test

data:  data110$count[data110$kind == "車禍量"] and data110$count[data110$kind == "車流量"]
t = -4.0304, df = 17.072, p-value = 0.0008617
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -1380960.5 -432141.3
sample estimates:
mean of x mean of y
 43828.72 950379.61
```


111年車禍量與車流量是否有差異

```
> data111<-read.csv("111-vs.csv")
> shapiro.test(data111$count[data111$kind=='車禍量'])

      Shapiro-Wilk normality test

data:  data111$count[data111$kind == "車禍量"]
W = 0.85151, p-value = 0.008947

> shapiro.test(data111$count[data111$kind=='車流量'])

      Shapiro-Wilk normality test

data:  data111$count[data111$kind == "車流量"]
W = 0.82964, p-value = 0.004111

> leveneTest(data111$count,data111$kind,center=mean)
Levene's Test for Homogeneity of Variance (center = mean)
  Df F value    Pr(>F)
group 1  24.862 1.79e-05 ***
    34
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
警告訊息:
於 leveneTest.default(data111$count, data111$kind, center = mean) :
  data111$kind coerced to factor.
> t.test(data111$count[data111$kind=='車禍量'],data111$count[data111$kind=='車流量'],var.equal=FALSE)

      Welch Two Sample t-test

data:  data111$count[data111$kind == "車禍量"] and data111$count[data111$kind == "車流量"]
t = -4.3262, df = 17.075, p-value = 0.0004542
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -1393583.4 -480120.2
sample estimates:
mean of x mean of y
 46703.89 983555.67
```

結論二

- 預期結果為車禍量跟車流量沒有太大差異。
- 檢定過後，發現兩者有明顯差異。
- 造成車禍的主因？



分工表

羅尹彤	報告、數據分析
盧妍妤	報告、數據分析
黃薇庭	整理數據、PPT
陳品媛	整理數據、PPT
蔡侑婷	整理數據、PPT

參考資料

- [政府資料開放平台](#)
- [中華民國交通部公路總局](#)
- 科學計算軟體講義