

# 數據的統計資料

```
> summary(test_data)
```

二氧化硫	一氧化碳	懸浮微粒	細懸浮微粒	氮氧化物	一氧化氮	二氧化氮
Min. :1.400	Min. :0.0900	Min. : 9.0	Min. : 5.00	Min. : 1.72	Min. : 0.220	Min. : 1.39
1st Qu.:1.975	1st Qu.:0.3375	1st Qu.:25.0	1st Qu.:12.00	1st Qu.:15.23	1st Qu.: 3.357	1st Qu.:12.24
Median :2.300	Median :0.4300	Median :28.5	Median :14.00	Median :23.26	Median : 5.100	Median :17.91
Mean :2.396	Mean :0.4954	Mean :32.2	Mean :14.55	Mean :25.92	Mean : 8.715	Mean :17.20
3rd Qu.:2.700	3rd Qu.:0.5600	3rd Qu.:41.0	3rd Qu.:17.25	3rd Qu.:30.19	3rd Qu.: 7.883	3rd Qu.:22.80
Max. :5.200	Max. :1.2800	Max. :68.0	Max. :23.00	Max. :74.68	Max. :40.970	Max. :33.71

風速	溫度	相對濕度
Min. :1.460	Min. :10.05	Min. :62.55
1st Qu.:1.850	1st Qu.:19.66	1st Qu.:70.48
Median :2.015	Median :23.12	Median :74.38
Mean :2.097	Mean :23.19	Mean :75.96
3rd Qu.:2.223	3rd Qu.:28.52	3rd Qu.:79.20
Max. :3.500	Max. :30.96	Max. :96.92

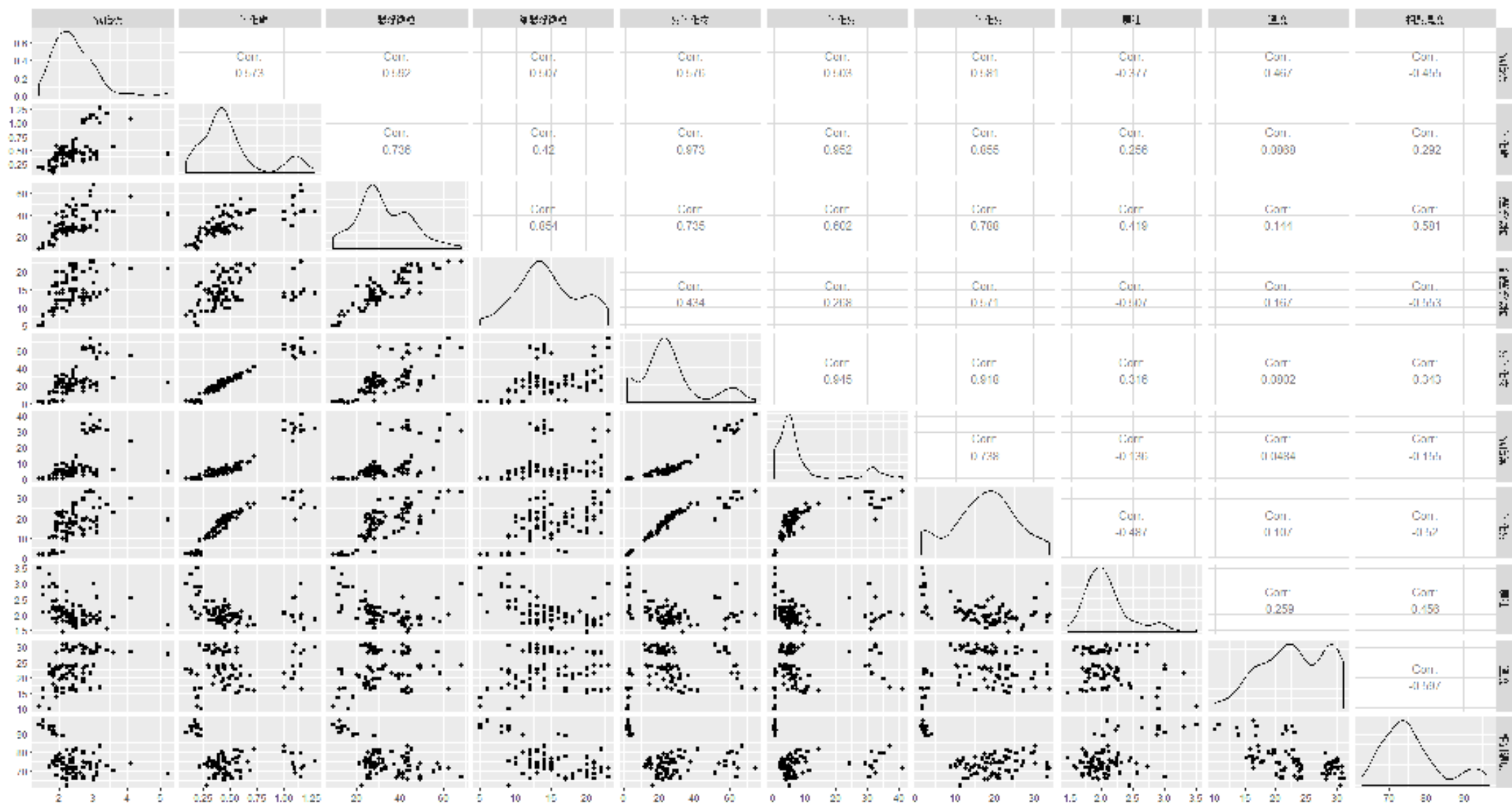
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```

### 各相關係數

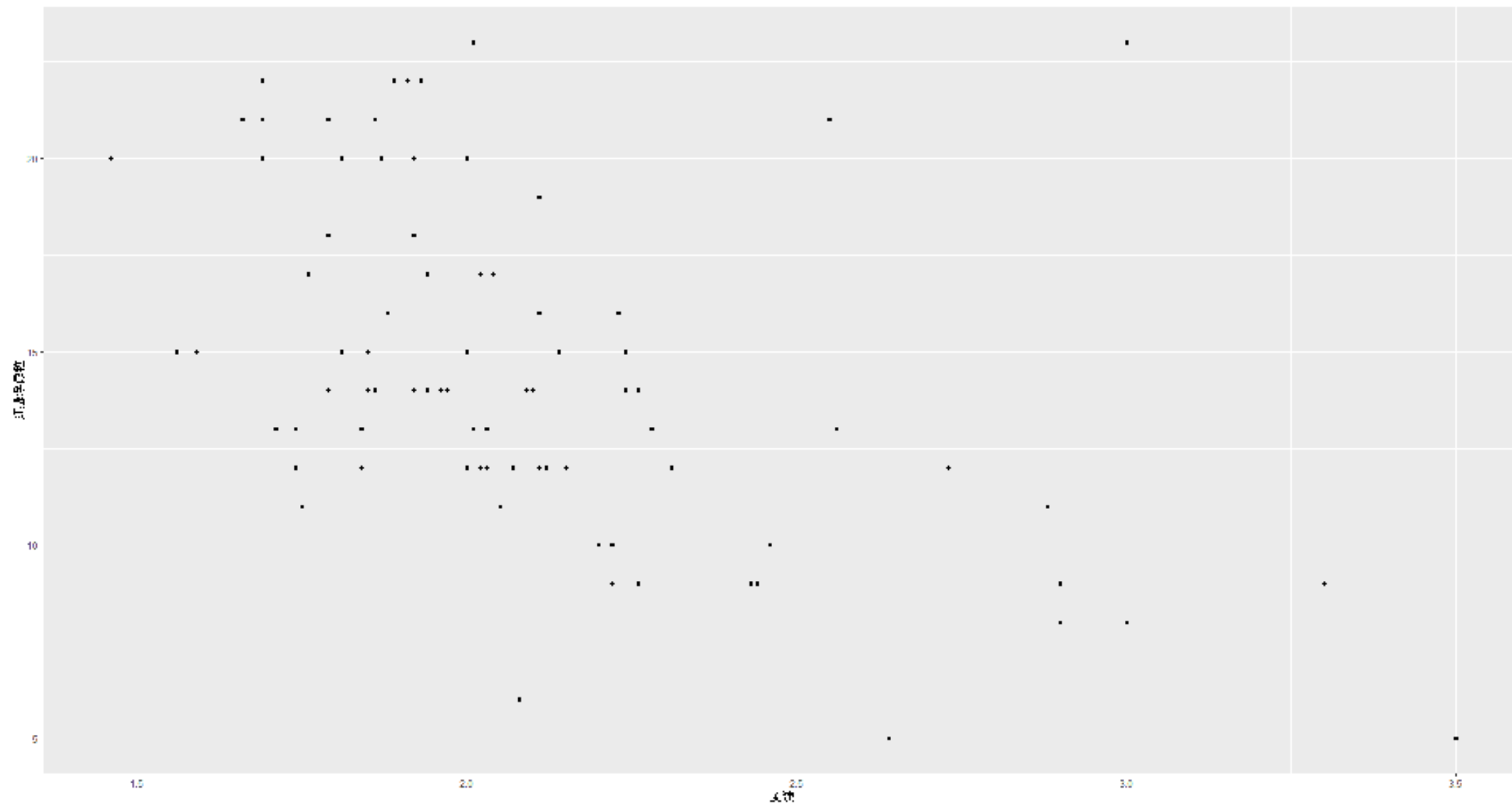
```
> cor(test_data)
```

	二氧化硫	一氧化碳	懸浮微粒	細懸浮微粒	氮氧化物	一氧化氮	二氧化氮	風速	溫度
二氧化硫	1.0000000	0.57250579	0.5923453	0.5072204	0.57645917	0.50268134	0.5805018	-0.3768969	0.46673545
一氧化碳	0.5725058	1.00000000	0.7361274	0.4202303	0.97339125	0.95162651	0.8552522	-0.2561687	0.08683305
懸浮微粒	0.5923453	0.73612744	1.0000000	0.8538053	0.73509475	0.60193828	0.7878544	-0.4194406	0.14416147
細懸浮微粒	0.5072204	0.42023029	0.8538053	1.0000000	0.43405140	0.26809077	0.5713887	-0.5071687	0.16701651
氮氧化物	0.5764592	0.97339125	0.7350947	0.4340514	1.00000000	0.94531937	0.9178713	-0.3156338	0.08018425
一氧化氮	0.5026813	0.95162651	0.6019383	0.2680908	0.94531937	1.00000000	0.7382426	-0.1357826	0.04838586
二氧化氮	0.5805018	0.85525217	0.7878544	0.5713887	0.91787126	0.73824262	1.0000000	-0.4872925	0.10666067
風速	-0.3768969	-0.25616869	-0.4194406	-0.5071687	-0.31563376	-0.13578256	-0.4872925	1.0000000	-0.25881569
溫度	0.4667355	0.08683305	0.1441615	0.1670165	0.08018425	0.04838586	0.1066607	-0.2588157	1.00000000
相對濕度	-0.4546278	-0.29184830	-0.5811749	-0.5531793	-0.34267946	-0.15503867	-0.5201881	0.4557939	-0.59701193
相對濕度	-0.4546278	-0.2918483	-0.5811749	-0.5531793	-0.3426795	-0.1550387	-0.5201881	0.4557939	-0.5970119
二氧化硫	-0.4546278	-0.2918483	-0.5811749	-0.5531793	-0.3426795	-0.1550387	-0.5201881	0.4557939	-0.5970119
一氧化碳	-0.2918483	-0.5811749	-0.5531793	-0.3426795	-0.1550387	-0.5201881	0.4557939	-0.5970119	1.0000000
懸浮微粒	-0.5811749	-0.5531793	-0.3426795	-0.1550387	-0.5201881	0.4557939	-0.5970119	1.0000000	
細懸浮微粒	-0.5531793	-0.3426795	-0.1550387	-0.5201881	0.4557939	-0.5970119	1.0000000		
氮氧化物	-0.3426795	-0.1550387	-0.5201881	0.4557939	-0.5970119	1.0000000			
一氧化氮	-0.1550387	-0.5201881	0.4557939	-0.5970119	1.0000000				
二氧化氮	-0.5201881	0.4557939	-0.5970119	1.0000000					
風速	0.4557939	-0.5970119	1.0000000						
溫度	-0.5970119	1.0000000							
相對濕度	1.0000000								

# 各數據散部圖及相關係數



# 風速-細懸浮微粒散部圖



# 風速與細懸浮微粒的迴歸分析

```
> test_data.lm <- lm(細懸浮微粒 ~ 風速, data=test_data)
> summary(test_data.lm)
```

Call:

```
lm(formula = 細懸浮微粒 ~ 風速, data = test_data)
```

Residuals:

Min	1Q	Median	3Q	Max
-8.6430	-2.5081	-0.7685	1.8606	13.6209

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	26.544	2.289	11.599	< 2e-16 ***
風速	-5.722	1.074	-5.329	8.51e-07 ***

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

Residual standard error: 3.77 on 82 degrees of freedom

Multiple R-squared: 0.2572, Adjusted R-squared: 0.2482

F-statistic: 28.4 on 1 and 82 DF, p-value: 8.511e-07

反映變數Y=細懸浮微粒

解釋變數X=風速

$Y=26.544-5.722X$

風速越大, 細懸浮微粒濃度越低

# 與整體資料迴歸分析

細懸浮微粒(反映變數)= $1.35157+0.53404 \times \text{二氧化碳}-5.60461 \times \text{一氧化碳}+0.40403 \times \text{懸浮微粒}-0.13090 \times \text{氮氧化物}+0.07753 \times \text{一氧化氮}+0.144414 \times \text{二氧化氮}-1.628822 \times \text{風速}+0.02828 \times \text{溫度}+0.06157 \times \text{相對濕度}$

```
> summary(test_data1.lm)

call:
lm(formula = 細懸浮微粒 ~ 二氧化碳 + 一氧化碳 + 懸浮微粒 + 氮氧化物 +
    一氧化氮 + 二氧化氮 + 風速 + 溫度 + 相對濕度, data = test_data)

Residuals:
    Min       1Q   Median       3Q      Max
-4.3675 -0.9036 -0.1066  1.0315  5.0552

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  1.35157    5.84056   0.231   0.8176
二氧化碳     0.53404    0.50014   1.068   0.2891
一氧化碳    -5.60461    3.83133  -1.463   0.1477
懸浮微粒     0.40403    0.03415  11.831 <2e-16 ***
氮氧化物    -0.13090   14.11906  -0.009   0.9926
一氧化氮     0.07753   14.13890   0.005   0.9956
二氧化氮     0.14414   14.13318   0.010   0.9919
風速        -1.62822    0.65849  -2.473   0.0157 *
溫度         0.02828    0.06451   0.438   0.6624
相對濕度     0.06157    0.05133   1.199   0.2342
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.779 on 74 degrees of freedom
Multiple R-squared:  0.8507,    Adjusted R-squared:  0.8325
F-statistic: 46.83 on 9 and 74 DF,  p-value: < 2.2e-16
```

R-squared 的值為 0.8586, Adjusted R-squared 的值為 0.8557, 表示模型的配適情況不錯。