資料來源

空氣品質監測資料

自 2017 年 1 月 1 日至 2017 年 12 月 31 日的高雄左營地區空氣品質觀測資料，取自於行政院環境保護署空氣品質監測網 (https://taqm.epa.gov.tw/taqm/tw/YearlyDataDownload.aspx)，當中包含每日每小時的各項監測濃度，我們取用其中的 PM2.5、PM10、NO_2、NO、SO_2、CO 與 O_3，並計算每日的百分位距 90% 作為當日監測資料。

蕁麻疹就診人數資料

資料來自高雄榮民總醫院 (皮膚科)，為 2017 年 1 月 1 日至 2017 年 12 月 31 日診斷 ICD-9 代碼為 708(蕁麻疹) 每日就診人數資料，此篇為蕁麻疹的結果。

univariate gam

Generalized additive Poisson model

$$\ln(patient) = Intercept + \beta \times Airpollution + s(temperature) + s(humidity) + s(time)$$

s= a cyclic cubic regression splines
下列依不同的空汙指標分別做單變數 Generalized additive Poisson model，並以時間趨勢、當天的溫度與濕度作為共變量做平滑函數的擬合，下列各空汙列出了不同的滯後天數 (row, 當天 前七天) 與不同的移動平均天數 (colum, 當天平均 七天平均) 的模型結果 (p-value 與空汙估計係數)

CO

Table 1: linear term p-value with lag and moving average data

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.172	0.381	0.533	0.231	0.215	0.452	0.843
2	0.183	0.952	0.998	0.915	0.339	0.258	0.433
3	0.009	0.379	0.175	0.198	0.184	0.026	0.012
4	0.137	0.007	0.106	0.063	0.104	0.100	0.013
5	0.332	0.316	0.062	0.264	0.153	0.223	0.248
6	0.597	0.347	0.325	0.084	0.231	0.095	0.110
7	0.122	0.152	0.144	0.161	0.048	0.172	0.082
8	0.160	0.513	0.713	0.991	0.880	0.425	0.698

row:lag days,col:moving average for the n days

Table 2: Parametric coefficients with lag and moving average data

	beta	mv2	mv3	mv4	mv5	mv6	mv7
1	0.461	0.355	0.285	0.614	0.716	0.487	0.141
2	-0.459	-0.024	-0.001	0.055	0.551	0.730	0.553
3	0.862	0.352	0.607	0.655	0.764	1.430	1.767
4	0.503	1.070	0.727	0.941	0.933	1.058	1.747
5	0.332	0.405	0.840	0.571	0.821	0.786	0.815
6	0.182	0.382	0.446	0.877	0.687	1.072	1.125
7	0.533	0.586	0.668	0.716	1.130	0.878	1.227
8	-0.496	-0.271	-0.171	0.006	0.087	0.513	0.274

SO2

Table 3: linear term p-value with lag and moving average data

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.022	0.025	0.281	0.002	0.013	0.064	0.091
2	0.014	0.738	0.347	0.639	0.010	0.028	0.087
3	0.000	0.126	0.003	0.002	0.012	0.000	0.000
4	0.119	0.058	0.844	0.119	0.079	0.183	0.004
5	0.336	0.059	0.438	0.568	0.496	0.335	0.551
6	0.728	0.341	0.098	0.629	0.531	0.608	0.391
7	0.533	0.386	0.198	0.066	0.925	0.251	0.929
8	0.343	0.907	0.876	0.452	0.207	0.804	0.603

row:lag days,col:moving average for the n days

Table 4: Parametric coefficients with lag and moving average data

	beta	mv2	mv3	mv4	mv5	mv6	mv7
1	0.056	0.084	0.050	0.159	0.141	0.113	0.110
2	-0.079	0.013	0.044	0.025	0.145	0.134	0.111
3	0.090	0.057	0.133	0.158	0.141	0.260	0.257
4	-0.048	0.070	0.009	0.081	0.100	0.082	0.189
5	-0.029	-0.079	0.036	-0.030	0.039	0.059	0.039
6	-0.010	-0.039	-0.080	0.025	-0.036	0.032	0.056
7	-0.018	-0.035	-0.062	-0.099	-0.005	-0.071	-0.006
8	0.025	0.005	-0.007	-0.040	-0.073	0.015	-0.034

O3

Table 5: linear term p-value with lag and moving average data

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.561	0.542	0.693	0.604	0.272	0.339	0.180
2	0.104	0.128	0.153	0.201	0.169	0.066	0.084
3	0.535	0.172	0.131	0.146	0.197	0.176	0.087
4	0.006	0.077	0.064	0.089	0.125	0.204	0.210
5	0.744	0.075	0.172	0.119	0.110	0.118	0.147
6	0.277	0.853	0.258	0.301	0.188	0.149	0.137
7	0.914	0.616	0.989	0.348	0.346	0.216	0.161
8	0.924	0.989	0.819	0.868	0.264	0.209	0.099

row:lag days,col:moving average for the n days

Table 6: Parametric coefficients with lag and moving average data

	beta	mv2	mv3	mv4	mv5	mv6	mv7
1	0.002	0.002	0.001	0.002	0.004	0.004	0.005
2	0.004	0.004	0.005	0.004	0.005	0.007	0.007
3	0.002	0.004	0.005	0.005	0.004	0.005	0.006
4	0.007	0.005	0.006	0.006	0.005	0.005	0.005
5	0.001	0.005	0.004	0.005	0.006	0.006	0.006
6	-0.003	-0.001	0.004	0.004	0.005	0.005	0.006
7	-0.000	-0.002	-0.000	0.003	0.003	0.005	0.005
8	-0.000	0.000	-0.001	0.001	0.004	0.005	0.006

PM2.5

Table 7: linear term p-value with lag and moving average data

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.007	0.353	0.716	0.155	0.344	0.569	0.740
2	0.468	0.350	0.958	0.762	0.365	0.573	0.748
3	0.000	0.014	0.002	0.035	0.078	0.006	0.019
4	0.014	0.000	0.001	0.000	0.005	0.014	0.001
5	0.684	0.114	0.001	0.010	0.002	0.026	0.054
6	0.852	0.791	0.194	0.004	0.014	0.002	0.016
7	0.667	0.765	0.591	0.175	0.006	0.014	0.002
8	0.310	0.553	0.767	0.696	0.227	0.010	0.015

row:lag days,col:moving average for the n days

Table 8: Parametric coefficients with lag and moving average data

	beta	mv2	mv3	mv4	mv5	mv6	mv7
1	0.009	0.004	0.002	0.008	0.006	0.004	0.002
2	-0.002	0.004	-0.000	-0.002	0.006	0.004	0.002
3	0.015	0.010	0.016	0.012	0.011	0.019	0.017
4	0.008	0.019	0.017	0.022	0.018	0.017	0.025
5	0.001	0.007	0.017	0.015	0.019	0.015	0.014
6	-0.001	0.001	0.007	0.016	0.015	0.021	0.018
7	0.002	0.001	0.003	0.008	0.017	0.017	0.023
8	0.004	0.003	0.002	0.002	0.008	0.018	0.018

PM10

Table 9: linear term p-value with lag and moving average data

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.110	0.377	0.079	0.413	0.288	0.434	0.464
2	0.364	0.663	0.263	0.098	0.535	0.399	0.629
3	0.009	0.179	0.042	0.560	0.998	0.376	0.558
4	0.356	0.018	0.104	0.037	0.488	0.948	0.440
5	0.067	0.359	0.707	0.991	0.585	0.564	0.295
6	0.270	0.095	0.302	0.960	0.850	0.671	0.636
7	0.546	0.363	0.150	0.322	0.914	0.727	0.810
8	0.734	0.656	0.350	0.141	0.315	0.895	0.826

row:lag days,col:moving average for the n days

Table 10: Parametric coefficients with lag and moving average data

	beta	mv2	mv3	mv4	mv5	mv6	mv7
1	0.003	-0.002	-0.005	-0.003	-0.004	-0.003	-0.003
2	-0.002	0.001	-0.003	-0.005	-0.002	-0.003	-0.002
3	0.005	0.003	0.006	0.002	-0.000	0.003	0.002
4	0.002	0.006	0.005	0.007	0.002	0.000	0.003
5	-0.004	-0.002	0.001	-0.000	0.002	-0.002	-0.004
6	-0.002	-0.004	-0.003	0.000	-0.001	0.002	-0.002
7	-0.001	-0.002	-0.004	-0.003	-0.000	-0.001	0.001
8	0.001	-0.001	-0.003	-0.005	-0.004	-0.000	-0.001

NO

Table 11: linear term p-value with lag and moving average data

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.909	0.253	0.272	0.391	0.244	0.315	0.669
2	0.078	0.259	0.959	0.898	0.910	0.594	0.709
3	0.856	0.357	0.580	0.754	0.575	0.554	0.264
4	0.078	0.473	0.231	0.387	0.884	0.852	0.750
5	0.680	0.258	0.440	0.194	0.255	0.583	0.720
6	0.343	0.662	0.132	0.200	0.097	0.150	0.373
7	0.295	0.988	0.886	0.253	0.222	0.089	0.106
8	0.208	0.463	0.200	0.246	0.046	0.038	0.014

row:lag days,col:moving average for the n days

Table 12: Parametric coefficients with lag and moving average data

	beta	mv2	mv3	mv4	mv5	mv6	mv7
1	-0.002	0.028	0.030	0.026	0.039	0.036	0.016
2	-0.037	-0.029	-0.002	0.004	0.004	0.019	0.014
3	0.004	-0.023	-0.016	0.010	0.019	0.021	0.043
4	-0.038	-0.018	-0.035	-0.028	-0.005	0.007	0.012
5	0.008	-0.029	-0.022	-0.041	-0.039	-0.020	-0.014
6	-0.020	-0.011	-0.044	-0.041	-0.057	-0.053	-0.035
7	0.020	-0.000	-0.004	-0.036	-0.042	-0.063	-0.063
8	-0.026	-0.018	-0.036	-0.036	-0.068	-0.076	-0.095

NO2

Table 13: linear term p-value with lag and moving average data

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.085	0.989	0.819	0.670	0.848	0.810	0.448
2	0.024	0.803	0.395	0.475	0.856	0.873	0.932
3	0.015	0.692	0.192	0.540	0.566	0.190	0.287
4	0.563	0.178	0.828	0.377	0.833	0.829	0.391
5	0.795	0.268	0.914	0.489	0.984	0.585	0.555
6	0.782	0.986	0.461	0.933	0.561	0.963	0.701
7	0.415	0.449	0.754	0.658	0.901	0.579	0.979
8	0.925	0.866	0.843	0.696	0.338	0.632	0.342

row:lag days,col:moving average for the n days

Table 14: Parametric coefficients with lag and moving average data

	beta	mv2	mv3	mv4	mv5	mv6	mv7
1	0.014	0.000	-0.002	0.005	-0.002	-0.003	-0.011
2	-0.018	-0.002	-0.009	-0.008	0.002	-0.002	-0.001
3	0.019	0.004	0.014	0.007	0.007	0.018	0.015
4	-0.005	0.013	0.002	0.010	0.003	0.003	0.012
5	-0.002	-0.011	0.001	-0.008	-0.000	-0.007	-0.008
6	0.002	0.000	-0.008	0.001	-0.007	0.001	-0.005
7	0.007	0.007	0.003	-0.005	0.002	-0.007	-0.000
8	0.001	-0.002	-0.002	-0.005	-0.012	-0.006	-0.013