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，並計算每日的平均值作為當日監測資料。

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	0.549	0.699	0.910	0.960	0.563	0.503	0.822
2	0.004	0.105	0.060	0.184	0.211	0.068	0.044
3	0.316	0.012	0.077	0.043	0.106	0.101	0.016
4	0.345	0.106	0.004	0.019	0.014	0.051	0.053
5	0.784	0.757	0.465	0.072	0.165	0.114	0.225
6	0.939	0.829	0.509	0.339	0.059	0.104	0.044
7	0.435	0.805	0.640	0.488	0.397	0.106	0.189
8	0.025	0.018	0.049	0.088	0.220	0.372	0.955

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

Table2 為每個模型的空汙係數估計值，以我挑選的滯後兩天為例，0.977 代表此空汙若上升一單位，就診人數便上升 0.977 單位

Table 2: Parametric coefficients with lag and moving average data

	beta	mv2	mv3	mv4	mv5	mv6	mv7
1	-0.252	0.207	0.072	0.035	0.455	0.580	0.216
2	1.165	0.847	1.164	0.932	0.975	1.571	1.909
3	0.407	1.291	1.092	1.406	1.260	1.409	2.286
4	0.389	0.849	1.793	1.638	1.913	1.682	1.841
5	-0.116	0.166	0.460	1.260	1.082	1.360	1.157
6	0.032	0.116	0.415	0.670	1.465	1.394	1.906
7	-0.335	0.134	0.297	0.490	0.660	1.385	1.246
8	-0.978	-1.315	-1.266	-1.217	-0.961	-0.769	-0.054

SO2

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.013	0.963	0.594	0.913	0.194	0.202	0.464
2	0.000	0.180	0.006	0.003	0.022	0.000	0.001
3	0.074	0.099	0.763	0.078	0.038	0.090	0.002
4	0.412	0.053	0.458	0.788	0.311	0.188	0.338
5	0.316	0.156	0.021	0.896	0.305	0.853	0.564
6	0.658	0.323	0.179	0.042	0.835	0.331	0.885
7	0.317	0.911	0.519	0.299	0.077	0.746	0.252
8	0.185	0.748	0.425	0.239	0.116	0.034	0.461

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	-2.680	-0.062	0.848	-0.195	2.511	2.644	1.623
2	2.845	1.693	4.190	5.046	4.401	7.188	7.370
3	-1.809	2.048	0.469	3.035	3.962	3.488	6.761
4	-0.800	-2.676	1.156	-0.474	1.952	2.715	2.116
5	-0.991	-1.950	-3.804	-0.231	-2.007	0.384	1.278
6	-0.417	-1.332	-2.160	-3.642	-0.406	-2.020	0.320
7	0.879	0.148	-1.032	-1.854	-3.476	-0.672	-2.534
8	-1.317	-0.426	-1.275	-2.092	-3.073	-4.410	-1.632

O3

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.194	0.207	0.217	0.256	0.257	0.128	0.132
2	0.077	0.036	0.031	0.036	0.045	0.046	0.020
3	0.010	0.020	0.013	0.012	0.015	0.020	0.024
4	0.594	0.394	0.251	0.149	0.126	0.131	0.158
5	0.070	0.275	0.901	0.610	0.374	0.262	0.217
6	0.531	0.314	0.597	0.669	0.429	0.252	0.172
7	0.281	0.384	0.327	0.532	0.907	0.637	0.409
8	0.289	0.616	0.697	0.894	0.750	0.325	0.175

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	0.005	0.005	0.005	0.005	0.005	0.007	0.008
2	0.007	0.009	0.010	0.010	0.010	0.010	0.012
3	0.010	0.010	0.011	0.012	0.012	0.011	0.012
4	-0.002	0.004	0.005	0.007	0.007	0.007	0.007
5	-0.008	-0.005	0.001	0.002	0.004	0.006	0.006
6	-0.003	-0.004	-0.002	0.002	0.004	0.006	0.007
7	-0.004	-0.004	-0.004	-0.003	0.001	0.002	0.004
8	0.004	0.002	0.002	0.001	0.002	0.005	0.007

PM2.5

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.886	0.057	0.258	0.331	0.130	0.234	0.282
2	0.000	0.058	0.009	0.091	0.153	0.065	0.124
3	0.485	0.015	0.085	0.017	0.081	0.106	0.040
4	0.798	0.673	0.055	0.120	0.029	0.100	0.128
5	0.162	0.356	0.728	0.384	0.501	0.206	0.375
6	0.220	0.209	0.431	0.811	0.392	0.413	0.149
7	0.933	0.808	0.711	0.905	0.797	0.267	0.263
8	0.435	0.584	0.429	0.360	0.476	0.761	0.589

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	-0.001	0.015	0.010	0.009	0.014	0.011	0.011
2	0.023	0.015	0.022	0.015	0.013	0.018	0.015
3	0.005	0.019	0.014	0.021	0.016	0.015	0.020
4	-0.002	0.003	0.016	0.014	0.020	0.016	0.015
5	-0.010	-0.007	-0.003	0.008	0.006	0.012	0.009
6	-0.008	-0.010	-0.007	-0.002	0.008	0.008	0.014
7	0.001	-0.002	-0.003	-0.001	0.002	0.010	0.011
8	-0.005	-0.004	-0.007	-0.008	-0.006	-0.003	0.005

PM10

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.198	0.817	0.325	0.209	0.294	0.272	0.333
2	0.160	0.740	0.294	0.936	0.734	0.846	0.788
3	0.420	0.667	0.910	0.416	0.986	0.921	0.873
4	0.049	0.173	0.867	0.814	0.671	0.808	0.700
5	0.022	0.007	0.018	0.144	0.144	0.393	0.176
6	0.060	0.040	0.028	0.060	0.268	0.297	0.663
7	0.691	0.324	0.215	0.143	0.184	0.437	0.428
8	0.061	0.072	0.031	0.019	0.013	0.025	0.098

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	-0.005	0.001	-0.004	-0.006	-0.005	-0.006	-0.005
2	0.005	0.001	0.005	-0.000	-0.002	-0.001	-0.001
3	-0.003	0.002	0.000	0.004	0.000	-0.000	0.001
4	-0.007	-0.006	-0.001	-0.001	0.002	-0.001	-0.002
5	-0.009	-0.012	-0.011	-0.007	-0.007	-0.004	-0.007
6	-0.007	-0.009	-0.010	-0.009	-0.005	-0.005	-0.002
7	-0.002	-0.004	-0.006	-0.007	-0.007	-0.004	-0.004
8	-0.007	-0.008	-0.010	-0.011	-0.012	-0.011	-0.008

NO

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.082	0.125	0.453	0.681	0.742	0.900	0.918
2	0.571	0.186	0.178	0.393	0.534	0.592	0.750
3	0.182	0.316	0.154	0.175	0.391	0.584	0.742
4	0.736	0.772	0.874	0.609	0.590	0.840	0.968
5	0.621	0.792	0.471	0.489	0.293	0.255	0.396
6	0.977	0.845	0.880	0.530	0.472	0.288	0.262
7	0.145	0.544	0.571	0.562	0.314	0.237	0.122
8	0.000	0.001	0.004	0.006	0.012	0.006	0.004

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	-0.110	-0.107	-0.056	-0.032	-0.027	-0.011	-0.009
2	-0.035	-0.092	-0.102	-0.068	-0.052	-0.047	-0.029
3	-0.084	-0.069	-0.107	-0.109	-0.072	-0.048	-0.030
4	0.020	-0.020	-0.012	-0.041	-0.045	-0.018	0.004
5	-0.030	-0.018	-0.054	-0.055	-0.089	-0.101	-0.078
6	0.002	-0.013	-0.011	-0.050	-0.060	-0.094	-0.104
7	-0.092	-0.042	-0.043	-0.046	-0.085	-0.104	-0.143
8	-0.261	-0.250	-0.218	-0.219	-0.211	-0.243	-0.262

NO2

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.440	0.881	0.648	0.576	0.720	0.657	0.654
2	0.686	0.928	0.834	0.946	0.852	0.959	0.961
3	0.403	0.892	0.840	0.876	0.958	0.988	0.741
4	0.964	0.852	0.756	0.781	0.599	0.724	0.810
5	0.562	0.556	0.397	0.553	0.499	0.637	0.561
6	0.564	0.683	0.743	0.606	0.732	0.675	0.824
7	0.805	0.972	0.920	0.941	0.846	0.868	0.743
8	0.064	0.114	0.123	0.138	0.150	0.117	0.140

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	-0.010	-0.002	-0.007	-0.009	-0.006	-0.008	-0.008
2	0.005	-0.001	0.003	-0.001	-0.003	0.001	0.001
3	-0.011	-0.002	-0.003	0.003	0.001	0.000	0.006
4	-0.001	-0.003	0.005	0.005	0.009	0.006	0.004
5	-0.008	-0.009	-0.013	-0.010	-0.011	-0.008	-0.010
6	-0.008	-0.006	-0.005	-0.008	-0.006	-0.007	-0.004
7	-0.003	-0.000	0.002	0.001	-0.003	-0.003	-0.006
8	-0.025	-0.024	-0.024	-0.024	-0.024	-0.027	-0.027