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	0.237	0.392	0.324	0.160	0.120	0.372	0.641
2	0.311	0.877	0.801	0.534	0.181	0.096	0.243
3	0.005	0.268	0.143	0.150	0.085	0.012	0.003
4	0.029	0.001	0.035	0.026	0.040	0.025	0.003
5	0.286	0.100	0.011	0.088	0.059	0.082	0.063
6	0.512	0.230	0.104	0.014	0.060	0.026	0.027
7	0.202	0.221	0.170	0.109	0.024	0.092	0.051
8	0.071	0.220	0.358	0.702	0.949	0.410	0.634

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	0.264	0.234	0.306	0.488	0.607	0.390	0.223
2	-0.230	0.042	0.078	0.217	0.521	0.725	0.554
3	0.619	0.299	0.446	0.498	0.673	1.090	1.408
4	0.484	0.880	0.643	0.768	0.798	0.979	1.414
5	0.240	0.447	0.772	0.591	0.735	0.755	0.882
6	0.149	0.329	0.498	0.844	0.732	0.963	1.044
7	0.292	0.340	0.427	0.556	0.877	0.731	0.922
8	-0.423	-0.343	-0.290	-0.136	0.025	0.361	0.228

SO2

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.006	0.001	0.051	0.001	0.004	0.044	0.031
2	0.036	0.339	0.037	0.145	0.003	0.006	0.046
3	0.000	0.139	0.001	0.000	0.002	0.000	0.000
4	0.072	0.139	0.910	0.092	0.017	0.048	0.002
5	0.351	0.048	0.669	0.501	0.442	0.142	0.258
6	0.445	0.261	0.063	0.906	0.449	0.575	0.207
7	0.579	0.262	0.139	0.032	0.533	0.136	0.767
8	0.330	0.843	0.715	0.388	0.129	0.831	0.405

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	0.047	0.082	0.060	0.112	0.109	0.080	0.090
2	-0.044	0.025	0.064	0.050	0.109	0.110	0.083
3	0.063	0.037	0.097	0.127	0.118	0.178	0.182
4	-0.037	0.038	0.004	0.058	0.089	0.079	0.131
5	-0.019	-0.054	0.013	-0.023	0.029	0.059	0.047
6	-0.015	-0.030	-0.059	0.004	-0.028	0.022	0.053
7	-0.011	-0.030	-0.047	-0.075	-0.023	-0.060	-0.012
8	0.018	0.005	-0.011	-0.030	-0.057	-0.009	-0.035

O3

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.614	0.576	0.614	0.424	0.157	0.208	0.101
2	0.093	0.119	0.148	0.160	0.087	0.026	0.035
3	0.056	0.028	0.036	0.059	0.079	0.052	0.020
4	0.002	0.004	0.006	0.018	0.042	0.074	0.060
5	0.523	0.027	0.024	0.020	0.025	0.037	0.050
6	0.311	0.860	0.099	0.055	0.032	0.030	0.033
7	0.404	0.353	0.873	0.339	0.184	0.105	0.080
8	0.576	0.427	0.385	0.849	0.328	0.138	0.051

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	0.001	0.001	0.001	0.002	0.003	0.003	0.004
2	0.003	0.003	0.003	0.003	0.004	0.006	0.006
3	0.003	0.004	0.004	0.004	0.004	0.005	0.006
4	0.005	0.006	0.006	0.005	0.005	0.004	0.005
5	0.001	0.004	0.005	0.005	0.005	0.005	0.005
6	-0.002	0.000	0.004	0.004	0.005	0.005	0.006
7	-0.001	-0.002	-0.000	0.002	0.003	0.004	0.005
8	-0.001	-0.002	-0.002	-0.000	0.002	0.004	0.005

PM2.5

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.010	0.397	0.918	0.421	0.814	0.817	0.920
2	0.792	0.208	0.841	0.728	0.593	0.907	0.784
3	0.000	0.004	0.000	0.017	0.079	0.013	0.051
4	0.052	0.000	0.000	0.000	0.002	0.019	0.003
5	0.320	0.062	0.000	0.001	0.000	0.005	0.029
6	0.626	0.625	0.156	0.001	0.002	0.000	0.003
7	0.760	0.840	0.399	0.129	0.001	0.003	0.000
8	0.483	0.770	0.898	0.745	0.282	0.005	0.008

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	0.006	0.003	0.000	0.004	0.001	0.001	-0.001
2	-0.001	0.004	0.001	-0.002	0.003	0.001	0.002
3	0.011	0.009	0.013	0.010	0.008	0.013	0.011
4	0.005	0.014	0.013	0.018	0.015	0.013	0.018
5	0.002	0.006	0.015	0.014	0.018	0.015	0.013
6	-0.001	0.002	0.005	0.015	0.015	0.020	0.018
7	0.001	0.001	0.003	0.007	0.016	0.016	0.022
8	0.002	0.001	-0.000	0.001	0.005	0.015	0.016

PM10

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.164	0.663	0.101	0.430	0.264	0.504	0.661
2	0.073	0.031	0.530	0.615	0.733	0.969	0.663
3	0.060	0.009	0.003	0.090	0.510	0.119	0.260
4	0.360	0.046	0.007	0.003	0.079	0.492	0.164
5	0.544	0.924	0.450	0.168	0.083	0.491	0.842
6	0.086	0.193	0.510	0.829	0.342	0.127	0.483
7	0.271	0.856	0.817	0.993	0.536	0.267	0.095
8	0.358	0.902	0.303	0.285	0.536	0.879	0.446

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	0.002	-0.001	-0.004	-0.002	-0.003	-0.002	-0.001
2	0.002	0.004	0.001	-0.001	0.001	-0.000	0.001
3	0.003	0.005	0.007	0.004	0.002	0.005	0.004
4	0.001	0.004	0.006	0.007	0.005	0.002	0.004
5	-0.001	-0.000	0.002	0.004	0.005	0.002	-0.001
6	-0.002	-0.002	-0.002	0.001	0.003	0.005	0.002
7	0.002	-0.000	-0.000	0.000	0.002	0.003	0.005
8	-0.001	-0.000	-0.002	-0.003	-0.002	0.000	0.002

NO

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.232	0.068	0.313	0.537	0.333	0.456	0.909
2	0.202	0.858	0.645	0.979	0.844	0.804	0.980
3	0.691	0.313	0.858	0.674	0.867	0.898	0.482
4	0.264	0.510	0.345	0.762	0.848	0.917	0.855
5	0.980	0.339	0.387	0.222	0.447	0.757	0.661
6	0.683	0.880	0.433	0.386	0.242	0.501	0.778
7	0.154	0.261	0.558	0.776	0.554	0.330	0.525
8	0.910	0.756	0.877	0.967	0.447	0.326	0.172

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	0.014	0.026	0.017	0.011	0.019	0.016	-0.003
2	-0.016	-0.003	0.008	0.000	-0.004	0.005	0.001
3	-0.005	-0.015	-0.003	0.008	0.003	0.003	0.016
4	-0.014	-0.010	-0.016	-0.006	0.004	0.002	0.004
5	0.000	-0.014	-0.015	-0.023	-0.016	-0.007	-0.010
6	0.005	0.002	-0.013	-0.016	-0.024	-0.015	-0.007
7	0.017	0.017	0.010	-0.005	-0.012	-0.022	-0.015
8	0.001	0.004	0.003	-0.001	-0.015	-0.021	-0.032

NO2

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.040	0.697	0.690	0.330	0.819	0.837	0.915
2	0.107	0.624	0.815	0.974	0.394	0.641	0.559
3	0.005	0.354	0.044	0.195	0.172	0.033	0.065
4	0.659	0.084	0.457	0.118	0.388	0.330	0.095
5	0.585	0.253	0.739	0.648	0.709	0.879	0.946
6	0.087	0.360	0.919	0.286	0.719	0.260	0.518
7	0.912	0.310	0.632	0.738	0.677	0.818	0.629
8	0.676	0.222	0.650	0.526	0.254	0.648	0.382

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	0.011	0.003	0.003	0.009	0.002	0.002	-0.001
2	-0.009	0.004	-0.002	-0.000	0.009	0.005	0.007
3	0.015	0.007	0.016	0.012	0.014	0.024	0.022
4	-0.002	0.012	0.006	0.014	0.009	0.011	0.020
5	-0.003	-0.008	0.003	-0.004	0.004	-0.002	-0.001
6	0.010	0.006	0.001	0.010	0.004	0.012	0.007
7	-0.001	0.007	0.004	-0.003	0.004	-0.002	0.006
8	-0.002	-0.009	-0.004	-0.006	-0.011	-0.005	-0.010