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，此篇為過敏的結果。

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	0.523	0.772	0.986	0.673	0.905	0.529	0.496
2	0.649	0.545	0.646	0.824	0.786	0.917	0.845
3	0.080	0.718	0.912	0.993	0.835	0.573	0.704
4	0.357	0.657	0.835	0.585	0.581	0.733	0.962
5	0.614	0.720	0.624	0.942	0.694	0.745	0.937
6	0.081	0.391	0.978	0.626	0.899	0.606	0.537
7	0.252	0.903	0.806	0.412	0.895	0.636	0.511
8	0.642	0.985	0.427	0.572	0.985	0.628	0.918

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	0.224	0.125	0.009	-0.242	0.077	0.447	0.527
2	0.160	0.261	0.231	0.127	-0.174	-0.074	0.150
3	-0.657	-0.159	0.056	0.005	-0.133	-0.398	-0.294
4	0.322	-0.195	0.105	0.312	0.352	0.241	0.037
5	-0.184	0.156	-0.249	0.042	0.252	0.230	0.061
6	-0.664	-0.383	0.014	-0.281	0.082	0.366	0.480
7	0.401	-0.054	0.125	0.468	0.084	0.335	0.507
8	-0.171	-0.008	-0.409	-0.325	-0.012	-0.343	-0.080

SO2

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.208	0.108	0.450	0.862	0.492	0.654	0.697
2	0.901	0.394	0.261	0.543	0.820	0.714	0.889
3	0.584	0.680	0.336	0.619	0.996	0.536	0.935
4	0.689	0.733	0.860	0.624	0.403	0.654	0.955
5	0.099	0.514	0.713	0.736	0.942	0.316	0.522
6	0.324	0.644	0.974	0.916	0.999	0.761	0.443
7	0.839	0.418	0.990	0.728	0.569	0.553	0.337
8	0.683	0.676	0.780	0.882	0.849	0.765	0.733

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	-0.053	0.085	0.046	-0.012	0.050	0.035	0.032
2	0.005	-0.045	0.068	0.041	-0.016	0.028	0.011
3	-0.023	-0.022	-0.058	0.033	0.000	-0.048	-0.007
4	-0.017	-0.018	-0.011	-0.033	0.061	0.035	-0.005
5	0.071	0.034	0.022	0.023	-0.005	0.078	0.053
6	-0.042	0.024	0.002	-0.007	0.000	-0.024	0.064
7	0.009	-0.042	0.001	-0.023	-0.042	-0.046	-0.078
8	0.017	0.022	-0.017	0.010	-0.014	-0.023	-0.028

O3

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.965	0.999	0.511	0.434	0.475	0.411	0.367
2	0.300	0.297	0.439	0.993	0.844	0.825	0.688
3	0.292	0.258	0.308	0.356	0.728	0.861	0.781
4	0.062	0.328	0.551	0.617	0.619	0.328	0.246
5	0.401	0.920	0.953	0.904	0.888	0.957	0.698
6	0.580	0.573	0.953	0.999	0.917	0.871	0.886
7	0.942	0.513	0.501	0.836	0.742	0.608	0.516
8	0.072	0.256	0.171	0.155	0.347	0.320	0.269

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	0.000	-0.000	0.003	0.003	0.003	0.004	0.004
2	-0.004	-0.004	-0.003	-0.000	0.001	0.001	0.002
3	-0.004	-0.004	-0.004	-0.004	-0.002	-0.001	-0.001
4	0.006	0.004	0.002	0.002	0.002	0.004	0.005
5	-0.003	0.000	-0.000	-0.000	-0.001	-0.000	0.002
6	-0.002	-0.002	0.000	0.000	-0.000	-0.001	-0.001
7	-0.000	-0.002	-0.003	-0.001	-0.001	-0.002	-0.003
8	-0.006	-0.004	-0.005	-0.006	-0.004	-0.005	-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	0.408	0.219	0.676	0.492	0.499	0.267	0.079
2	0.004	0.081	0.335	0.047	0.354	0.270	0.509
3	0.081	0.637	0.874	0.870	0.365	0.950	0.697
4	0.454	0.411	0.674	0.962	0.731	0.602	0.735
5	0.347	0.213	0.931	0.344	0.534	0.762	0.271
6	0.300	0.462	0.401	0.806	0.697	0.932	0.780
7	0.079	0.054	0.113	0.112	0.466	0.178	0.265
8	0.922	0.216	0.099	0.099	0.087	0.355	0.125

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	0.003	0.006	-0.002	0.004	0.005	0.008	0.014
2	-0.012	-0.009	-0.005	-0.012	-0.006	-0.008	-0.005
3	0.007	-0.002	-0.001	0.001	-0.006	-0.000	-0.003
4	-0.003	0.004	-0.002	-0.000	0.002	-0.004	0.003
5	-0.004	-0.006	-0.000	-0.006	-0.004	-0.002	-0.009
6	-0.004	-0.004	-0.005	0.002	-0.003	-0.001	0.002
7	-0.007	-0.010	-0.009	-0.010	-0.005	-0.010	-0.009
8	-0.000	-0.006	-0.009	-0.010	-0.012	-0.007	-0.012

PM10

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.004	0.063	0.776	0.782	0.611	0.427	0.051
2	0.141	0.506	0.636	0.286	0.610	0.683	0.910
3	0.270	0.883	0.210	0.349	0.571	0.921	0.828
4	0.123	0.966	0.628	0.334	0.364	0.776	0.779
5	0.043	0.947	0.465	0.846	0.202	0.253	0.960
6	0.119	0.510	0.799	0.663	0.953	0.294	0.321
7	0.001	0.002	0.252	0.099	0.328	0.194	0.699
8	0.925	0.019	0.005	0.133	0.046	0.160	0.080

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

NO

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.732	0.673	0.642	0.273	0.413	0.518	0.376
2	0.080	0.778	0.947	0.562	0.283	0.414	0.471
3	0.923	0.473	0.985	0.754	0.846	0.552	0.801
4	0.351	0.280	0.093	0.270	0.371	0.144	0.054
5	0.288	0.510	0.794	0.666	0.972	0.987	0.606
6	0.387	0.791	0.806	0.967	0.568	0.846	0.993
7	0.408	0.665	0.339	0.386	0.545	0.872	0.603
8	0.650	0.505	0.566	0.248	0.251	0.284	0.475

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	0.010	0.014	-0.017	-0.045	-0.036	-0.030	-0.044
2	-0.052	-0.009	0.002	-0.024	-0.048	-0.038	-0.036
3	0.003	-0.024	0.001	0.013	-0.008	-0.028	-0.012
4	-0.027	-0.036	-0.064	-0.046	-0.039	-0.069	-0.096
5	0.030	0.022	0.010	-0.018	-0.002	0.001	-0.025
6	-0.025	0.009	0.009	-0.002	-0.025	-0.009	-0.000
7	0.024	0.014	0.035	0.035	0.027	0.008	0.026
8	0.013	0.022	0.021	0.047	0.050	0.050	0.035

NO2

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.206	0.354	0.577	0.773	0.759	0.884	0.689
2	0.000	0.129	0.286	0.046	0.082	0.067	0.152
3	0.831	0.064	0.442	0.543	0.116	0.167	0.130
4	0.006	0.060	0.006	0.100	0.190	0.036	0.069
5	0.672	0.234	0.311	0.056	0.239	0.301	0.073
6	0.180	0.912	0.516	0.646	0.241	0.614	0.799
7	0.179	0.173	0.787	0.382	0.407	0.120	0.297
8	0.397	0.446	0.269	0.657	0.314	0.382	0.117

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	0.012	-0.008	-0.005	-0.005	0.003	0.008
2	-0.042	-0.020	-0.016	-0.033	-0.031	-0.036	-0.029
3	-0.002	-0.025	-0.011	-0.010	-0.028	-0.027	-0.031
4	-0.031	-0.025	-0.041	-0.027	-0.024	-0.041	-0.037
5	0.005	-0.016	-0.015	-0.032	-0.021	-0.020	-0.037
6	-0.015	0.002	-0.010	-0.008	-0.021	-0.010	-0.005
7	-0.015	-0.018	-0.004	-0.014	-0.015	-0.030	-0.021
8	0.009	-0.010	-0.017	-0.007	-0.018	-0.017	-0.032