univariate gam

Generalized additive Poisson model

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

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	0.013	0.027	0.186	0.131	0.048	0.128	0.138
2	0.308	0.579	0.299	0.594	0.426	0.357	0.494
3	0.183	0.769	0.170	0.092	0.245	0.158	0.102
4	0.145	0.123	0.654	0.140	0.080	0.272	0.142
5	0.542	0.236	0.087	0.418	0.088	0.072	0.207
6	0.661	0.927	0.701	0.342	0.797	0.244	0.175
7	0.432	0.895	0.705	0.545	0.321	0.924	0.470
8	0.388	0.857	0.849	0.956	0.739	0.472	0.986

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	0.559	0.600	0.422	0.549	0.808	0.685	0.737
2	-0.236	0.152	0.330	0.195	0.327	0.414	0.342
3	0.302	0.080	0.435	0.611	0.476	0.631	0.809
4	0.332	0.417	0.142	0.535	0.714	0.493	0.727
5	0.141	0.323	0.538	0.292	0.694	0.805	0.625
6	-0.103	0.025	0.123	0.344	0.105	0.521	0.671
7	0.185	0.037	0.123	0.221	0.406	0.043	0.359
8	-0.203	-0.050	-0.062	0.020	0.136	0.322	-0.008

SO2

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.485	0.007	0.545	0.072	0.111	0.461	0.762
2	0.337	0.918	0.081	0.895	0.256	0.448	0.920
3	0.000	0.006	0.013	0.000	0.044	0.005	0.016
4	0.004	0.115	0.450	0.415	0.062	0.520	0.133
5	0.704	0.070	0.190	0.498	0.422	0.078	0.477
6	0.856	0.895	0.102	0.441	0.778	0.584	0.139
7	0.025	0.091	0.312	0.031	0.926	0.524	0.703
8	0.179	0.563	0.693	1.000	0.280	0.547	0.942

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	0.013	0.069	0.019	0.064	0.064	0.032	0.014
2	-0.019	-0.003	0.055	0.005	0.046	0.034	0.005
3	0.073	0.069	0.078	0.125	0.081	0.125	0.115
4	-0.061	0.040	0.024	0.029	0.075	0.028	0.072
5	0.007	-0.050	0.041	0.024	0.032	0.078	0.034
6	-0.003	0.004	-0.053	0.028	0.011	0.024	0.071
7	-0.047	-0.046	-0.033	-0.079	-0.004	-0.028	-0.018
8	0.024	-0.016	-0.013	-0.000	-0.044	0.027	-0.004

O3

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.686	0.901	0.507	0.301	0.245	0.333	0.203
2	0.178	0.367	0.637	0.414	0.303	0.357	0.401
3	0.508	0.404	0.691	0.963	0.611	0.482	0.455
4	0.001	0.014	0.030	0.152	0.382	0.287	0.233
5	0.673	0.114	0.105	0.093	0.252	0.505	0.402
6	0.092	0.200	0.883	0.626	0.414	0.564	0.817
7	0.543	0.190	0.280	0.980	0.839	0.617	0.779
8	0.113	0.237	0.094	0.179	0.763	0.804	0.995

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

PM2.5

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.000	0.020	0.925	0.081	0.406	0.321	0.191
2	0.075	0.294	0.527	0.294	0.533	0.661	0.870
3	0.000	0.041	0.001	0.007	0.279	0.014	0.179
4	0.609	0.001	0.145	0.006	0.025	0.453	0.032
5	0.855	0.716	0.008	0.200	0.013	0.048	0.528
6	0.171	0.469	0.572	0.123	0.586	0.085	0.171
7	0.437	0.164	0.254	0.308	0.422	0.880	0.378
8	0.973	0.724	0.402	0.453	0.558	0.333	0.933

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

PM10

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.000	0.054	0.484	0.368	0.848	0.483	0.190
2	0.258	0.122	0.495	0.166	0.908	0.335	0.769
3	0.000	0.041	0.001	0.024	0.750	0.119	0.618
4	0.662	0.019	0.275	0.018	0.134	0.768	0.314
5	0.296	0.275	0.195	0.673	0.095	0.386	0.502
6	0.102	0.090	0.042	0.979	0.570	0.447	0.897
7	0.016	0.013	0.011	0.007	0.355	0.109	0.670
8	0.860	0.147	0.072	0.050	0.039	0.509	0.156

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

NO

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.488	0.013	0.025	0.236	0.159	0.156	0.450
2	0.020	0.291	0.451	0.372	0.869	0.570	0.494
3	0.323	0.072	0.485	0.485	0.419	0.781	0.543
4	0.319	0.149	0.031	0.284	0.903	0.733	0.950
5	0.386	0.950	0.602	0.190	0.621	0.648	0.503
6	0.457	0.845	0.729	0.476	0.153	0.459	0.906
7	0.212	0.776	0.534	0.890	0.731	0.210	0.446
8	0.339	0.884	0.917	0.825	0.931	0.693	0.221

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	0.009	0.041	0.043	0.025	0.032	0.035	0.020
2	-0.033	-0.018	0.014	0.019	0.004	0.014	0.018
3	-0.013	-0.031	-0.013	0.015	0.018	0.007	0.016
4	-0.014	-0.024	-0.042	-0.023	0.003	0.008	-0.002
5	0.011	-0.001	-0.010	-0.028	-0.011	0.011	0.017
6	-0.010	0.003	-0.007	-0.015	-0.033	-0.018	0.003
7	0.017	0.005	0.012	0.003	-0.008	-0.031	-0.020
8	-0.013	0.002	-0.002	0.005	-0.002	-0.010	-0.032

NO2

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

	p.pv	mv2	mv3	mv4	mv5	mv6	mv7
1	0.002	0.033	0.621	0.206	0.521	0.642	0.781
2	0.008	0.907	0.815	0.450	0.963	0.598	0.602
3	0.115	0.549	0.337	0.457	0.844	0.715	0.898
4	0.136	0.983	0.172	0.881	0.971	0.435	0.851
5	0.658	0.524	0.614	0.495	0.614	0.801	0.630
6	0.962	0.812	0.423	0.931	0.383	0.859	0.962
7	0.469	0.669	0.926	0.415	0.855	0.238	0.701
8	0.431	0.914	0.969	0.791	0.721	0.958	0.370

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	0.017	0.014	0.004	0.010	0.005	0.004	0.003
2	-0.014	0.001	0.002	-0.006	0.000	-0.005	-0.005
3	0.008	-0.004	0.007	0.006	-0.002	0.003	-0.001
4	-0.008	0.000	-0.010	0.001	0.000	-0.007	-0.002
5	0.002	-0.004	0.004	-0.005	0.004	0.002	-0.004
6	-0.000	0.002	-0.006	0.001	-0.007	0.002	-0.000
7	-0.004	-0.003	-0.001	-0.006	-0.002	-0.010	-0.004
8	0.004	-0.001	0.000	0.002	-0.003	0.000	-0.008