

The men-track-field data

March 24, 2011

The data:

10.39	20.81	46.84	1.81	3.70	14.04	29.36	137.72	ar
10.31	20.06	44.84	1.74	3.57	13.28	27.66	128.30	au
10.44	20.81	46.82	1.79	3.60	13.26	27.72	135.90	at
10.34	20.68	45.04	1.73	3.60	13.22	27.45	129.95	be
10.28	20.58	45.91	1.80	3.75	14.68	30.55	146.62	bm
10.22	20.43	45.21	1.73	3.66	13.62	28.62	133.13	br
10.64	21.52	48.30	1.80	3.85	14.45	30.28	139.95	bu
10.17	20.22	45.68	1.76	3.63	13.55	28.09	130.15	ca
10.34	20.80	46.20	1.79	3.71	13.61	29.30	134.03	cl
10.51	21.04	47.30	1.81	3.73	13.90	29.13	133.53	cn
10.43	21.05	46.10	1.82	3.74	13.49	27.88	131.35	co
12.18	23.20	52.94	2.02	4.24	16.70	35.38	164.70	ck
10.94	21.90	48.66	1.87	3.84	14.03	28.81	136.58	cr
10.35	20.65	45.64	1.76	3.58	13.42	28.19	134.32	cz
10.56	20.52	45.89	1.78	3.61	13.50	28.11	130.78	dk
10.14	20.65	46.80	1.82	3.82	14.91	31.45	154.12	dr
10.43	20.69	45.49	1.74	3.61	13.27	27.52	130.87	fi
10.11	20.38	45.28	1.73	3.57	13.34	27.97	132.30	fr
10.12	20.33	44.87	1.73	3.56	13.17	27.42	129.92	dee
10.16	20.37	44.50	1.73	3.53	13.21	27.61	132.23	dew
10.11	20.21	44.93	1.70	3.51	13.01	27.51	129.13	uk
10.22	20.71	46.56	1.78	3.64	14.59	28.45	134.60	gr
10.98	21.82	48.40	1.89	3.80	14.16	30.11	139.33	gu
10.26	20.62	46.02	1.77	3.62	13.49	28.44	132.58	hu
10.60	21.42	45.73	1.76	3.73	13.77	28.81	131.98	in
10.59	21.49	47.80	1.84	3.92	14.73	30.79	148.83	id
10.61	20.96	46.30	1.79	3.56	13.32	27.81	132.35	ir
10.71	21.00	47.80	1.77	3.72	13.66	28.93	137.55	il
10.01	19.72	45.26	1.73	3.60	13.23	27.52	131.08	it
10.34	20.81	45.86	1.79	3.64	13.41	27.72	128.63	jp
10.46	20.66	44.92	1.73	3.55	13.10	27.38	129.75	ke
10.34	20.89	46.90	1.79	3.77	13.96	29.23	136.25	kr
10.91	21.94	47.30	1.85	3.77	14.13	29.67	130.87	krr

10.35	20.77	47.40	1.82	3.67	13.64	29.08	141.27	lu
10.40	20.92	46.30	1.82	3.80	14.64	31.01	154.10	my
11.19	22.45	47.70	1.88	3.83	15.06	31.77	152.23	mt
10.42	21.30	46.10	1.80	3.65	13.46	27.95	129.20	mx
10.52	20.95	45.10	1.74	3.62	13.36	27.61	129.02	nl
10.51	20.88	46.10	1.74	3.54	13.21	27.70	128.98	nz
10.55	21.16	46.71	1.76	3.62	13.34	27.69	131.48	no
10.96	21.78	47.90	1.90	4.01	14.72	31.36	148.22	png
10.78	21.64	46.24	1.81	3.83	14.74	30.64	145.27	ph
10.16	20.24	45.36	1.76	3.60	13.29	27.89	131.58	pl
10.53	21.17	46.70	1.79	3.62	13.13	27.38	128.65	pt
10.41	20.98	45.87	1.76	3.64	13.25	27.67	132.50	rm
10.38	21.28	47.40	1.88	3.89	15.11	31.32	157.77	sg
10.42	20.77	45.98	1.76	3.55	13.31	27.73	131.57	es
10.25	20.61	45.63	1.77	3.61	13.29	27.94	130.63	se
10.37	20.46	45.78	1.78	3.55	13.22	27.91	131.20	ch
10.59	21.29	46.80	1.79	3.77	14.07	30.07	139.27	tw
10.39	21.09	47.91	1.83	3.84	15.23	32.56	149.90	th
10.71	21.43	47.60	1.79	3.67	13.56	28.58	131.50	tr
9.93	19.75	43.86	1.73	3.53	13.20	27.43	128.22	us
10.07	20.00	44.60	1.75	3.59	13.20	27.53	130.55	ru
10.82	21.86	49.00	2.02	4.24	16.28	34.71	161.83	ws

The SAS code and output:

```
options linesize=70;

data track;
    infile "men_track_field.dat";
    input m100 m200 m400 m800 m1500 m5000 m10000 marathon
           country $;

proc princomp out=PC;

proc print;
    var country Prin1 Prin2;

symbol1 pointlabel=('country');

proc gplot;
    plot Prin2*Prin1;

run;
```

The PRINCOMP Procedure
Observations 55

Variables

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Simple Statistics				
	m100	m200	m400	m800
Mean	10.47109091	20.94036364	46.43872727	1.793272727
Std	0.35142921	0.64464737	1.45701757	0.063684830
Simple Statistics				
	m1500	m5000	m10000	marathon
Mean	3.698181818	13.84581818	28.98909091	136.6240000
Std	0.155909410	0.80116048	1.80773162	9.2270335

Correlation Matrix					
	m100	m200	m400	m800	m1500
m100	1.0000	0.9226	0.8411	0.7560	0.7002
m200	0.9226	1.0000	0.8507	0.8066	0.7750
m400	0.8411	0.8507	1.0000	0.8702	0.8353
m800	0.7560	0.8066	0.8702	1.0000	0.9180
m1500	0.7002	0.7750	0.8353	0.9180	1.0000
m5000	0.6195	0.6954	0.7786	0.8636	0.9281
m10000	0.6325	0.6965	0.7872	0.8690	0.9347
marathon	0.5199	0.5962	0.7050	0.8065	0.8655

Correlation Matrix			
	m5000	m10000	marathon
m100	0.6195	0.6325	0.5199
m200	0.6954	0.6965	0.5962
m400	0.7786	0.7872	0.7050
m800	0.8636	0.8690	0.8065
m1500	0.9281	0.9347	0.8655
m5000	1.0000	0.9746	0.9322
m10000	0.9746	1.0000	0.9432
marathon	0.9322	0.9432	1.0000

Eigenvalues of the Correlation Matrix				
	Eigenvalue	Difference	Proportion	Cumulative
1	6.62214613	5.74452784	0.8278	0.8278
2	0.87761829	0.71829715	0.1097	0.9375
3	0.15932114	0.03527176	0.0199	0.9574
4	0.12404939	0.04416911	0.0155	0.9729
5	0.07988027	0.01191512	0.0100	0.9829
6	0.06796515	0.02154562	0.0085	0.9914

The PRINCOMP Procedure

Eigenvalues of the Correlation Matrix				
	Eigenvalue	Difference	Proportion	Cumulative
7	0.04641953	0.02381943	0.0058	0.9972
8	0.02260010		0.0028	1.0000

	Eigenvectors			
	Prin1	Prin2	Prin3	Prin4
m100	0.317556	0.566878	0.332262	0.127628
m200	0.336979	0.461626	0.360657	-.259116
m400	0.355645	0.248273	-.560467	0.652341
m800	0.368684	0.012430	-.532482	-.479999
m1500	0.372810	-.139797	-.153443	-.404510
m5000	0.364374	-.312030	0.189764	0.029588
m10000	0.366773	-.306860	0.181752	0.080069
marathon	0.341926	-.438963	0.263209	0.299512

	Eigenvectors			
	Prin5	Prin6	Prin7	Prin8
m100	0.262555	-.593704	0.136241	0.105542
m200	-.153957	0.656137	-.112640	-.096054
m400	-.218323	0.156625	-.002854	-.000127
m800	0.540053	-.014692	-.238016	-.038165
m1500	-.487715	-.157843	0.610011	0.139291
m5000	-.253979	-.141299	-.591299	0.546697
m10000	-.133176	-.219017	-.176871	-.796795
marathon	0.497928	0.315285	0.398822	0.158164

Obs	country	Prin1	Prin2
1	ar	0.2619	-0.34488
2	au	-2.4464	-0.21617
3	at	-0.8076	0.48689
4	be	-2.0413	0.26195
5	bm	0.7393	-1.76694
6	br	-1.5583	-0.64115
7	bu	1.9719	0.25720
8	ca	-1.7464	-0.50035
9	cl	-0.3811	-0.20141
10	cn	0.4090	0.35778
11	co	-0.3901	0.49998
12	ck	10.5556	1.50877
13	cr	2.2966	1.67064
14	cz	-1.3726	-0.02878
15	dk	-1.1132	0.38730
16	dr	1.7149	-2.44900
17	fi	-1.6920	0.40882
18	fr	-2.1719	-0.50289
19	dee	-2.5901	-0.31067
20	dew	-2.5527	-0.41137
21	uk	-3.0242	-0.27891
22	gr	-0.3796	-0.60178
23	gu	2.6724	1.27121

24	hu	-1.2052	-0.15153
25	in	-0.1652	0.67647
26	id	2.7478	-0.60317
27	ir	-0.8842	0.94602
28	il	0.4346	0.67428
29	it	-2.7269	-0.98986
30	jp	-1.2379	0.41357
31	ke	-2.1683	0.53371
32	kr	0.2075	-0.30153
33	krr	1.6837	1.56473
34	lu	0.2205	-0.27934
35	my	1.7083	-1.72273
36	mt	4.2587	0.66695
37	mx	-0.6785	0.84175
38	nl	-1.5554	0.70244
39	nz	-1.5997	0.92336
40	no	-0.8115	1.05664
41	png	3.9092	0.08554
42	ph	2.0704	-0.18932
43	pl	-2.0006	-0.46260
44	pt	-0.9164	1.30473
45	rm	-1.1965	0.53077
46	sg	3.1221	-1.78902
47	es	-1.4806	0.50665
48	se	-1.6032	0.02323
49	ch	-1.6390	0.19593
50	tw	0.9505	0.04203
51	th	2.7618	-1.66979
52	tr	0.2661	1.38304
53	us	-3.4306	-1.11019
54	ru	-2.6269	-0.75696
55	ws	7.2312	-1.90208

