Department of Statistics

COURSE STATS 330

Assignment 1, 2004

Instructions: Hand in your completed assignment to the Student Resource Centre by 4pm on Thursday 5th August.

The data set `cpu.csv` contains data on 209 models of computer in use in the 60's and 70's. This file (in the form of a csv file) can be downloaded from the course web page. The data are also reproduced at the end of this assignment.

The data set has four variables:

`name`: manufacturer and model

`mem`: main memory in kilobytes

`cach`: cache size in kilobytes

`perf`: published performance on a benchmark mix relative to an IBM 370/158-3

Load the data into R. Then answer the following:

1. Do you think the IBM computers have better performance than the other brands? Support your conclusion with suitable graphs.

2. Is there a relationship between performance and memory size? If so, is the relationship different for different cache sizes?

3. Fit a regression model to the data, using memory size and cache size to explain the performance. Do the variables `mem` and `cach` in fact help explain the performance of the different computers? Do we need both variables, or will one be sufficient?

4. Do you think that the relationship between these variables (if one exists) can be adequately represented by a linear (planar) surface?

	name	mmax	cach	perf
1	ADVISOR 32/60	6000	256	198
2	AMDAHL 470V/7	32000	32	269
3	AMDAHL 470/7A	32000	32	220
4	AMDAHL 470V/7B	32000	32	172
5	AMDAHL 470V/7C	16000	32	132
6	AMDAHL 470V/8	32000	64	318
7	AMDAHL 580-5840	32000	64	367
8	AMDAHL 580-5850	32000	64	489
9	AMDAHL 580-5860	64000	64	636
10	AMDAHL 580 5880	64000	128	1144
11	APOLLO DN320	3000	0	38
12	APOLLO DN420	3500	4	40
13	BASF 7/65	8000	65	92
14	BASF 7/68	16000	65	138
15	BTI 5000	64	0	10
16	BTI 8000	16000	0	35
17	BURROUGHS B1955	2000	8	19
18	BURROUGHS B2900	5000	0	28
19	BURROUGHS B2925	2000	0	31
20	BURROUGHS B4955	5000	142	120
21	BURROUGHS B5900	6300	0	30
22	BURROUGHS B5920	6200	0	33
23	BURROUGHS B6900	6200	0	61
24	BURROUGHS B6925	6200	0	76
25	C.R.D. 68/10-80	6000	0	23
26	C.R.D. UNIVERSE 2203T	2000	4	69
27	C.R.D. UNIVERSE 68	6000	0	33
28	C.R.D. UNIVERSE 68/05	3000	4	27
29	C.R.D. UNIVERSE 68/137	5000	4	77
30	C.R.D. UNIVERSE 68/37	5000	4	27
31	CDC CYBER 170/750	2620	131	274
32	CDC CYBER 170/760	2620	131	368
33	CDC CYBER 170/815	10480	30	32
34	CDC CYBER 170/825	10480	30	63
35	CDC CYBER 170/835	20970	30	106
36	CDC CYBER 170/845	20970	30	208
37	CDC OMEGA 480-I	2000	8	20
38	CDC OMEGA 480-II	4000	8	29
39	CDC OMEGA 480-III	8000	8	71
40	CAMBEX 1636-1	4000	8	26
41	CAMBEX 1636-10	8000	8	36
42	CAMBEX 1641-1	16000	8	40
43	CAMBEX 1641-11	16000	8	52
44	CAMBEX 1651-1	16000	8	60
45	DEC DECSYS 10 1091	12000	9	72
46	DEC DECSYS 20 2060	8000	9	72
47	DEC MICROVAX-1	512	8	18
48	DEC VAX 11/730	5000	0	20
49	DEC VAX 11/750	8000	4	40
50	DEC VAX 11/780	8000	8	62
51	DG ECLIPSE C/350	8000	0	24
52	DG ECLIPSE M/600	2000	0	24
53	DG ECLIPSE MV/1000	16000	16	138

54	DG ECLIPSE MV/4000	8000	0	36
55	DG ECLIPSE MV/6000	4000	16	26
56	DG ECLIPSE MV/8000	12000	16	60
57	DG ECLIPSE MV/8000 II	8000	16	71
58	FORMATION F4000/100	8000	0	12
59	FORMATION F4000/200	8000	0	14
60	FORMATION F4000/200AP	8000	0	20
61	FORMATION F4000/300	8000	0	16
62	FORMATION F4000/300AP	8000	0	22
63	FOUR PHASE 2000/260	1000	0	36
64	GOULD CONCEPT 32/8705	8000	64	144
65	GOULD CONCEPT 32/8750	16000	64	144
66	GOULD CONCEPT 32/8780	16000	128	259
67	HP 3000/30	1000	0	17
68	HP 3000/40	2000	0	26
69	HP 3000/44	4000	0	32
70	HP 3000/48	4000	8	32
71	HP 3000/64	8000	8	62
72	HP 3000/88	8000	8	64
73	HP 3000/III	2000	0	22
74	HARRIS 100	3000	0	36
75	HARRIS 300	3000	6	44
76	HARRIS 500	12000	6	50
77	HARRIS 600	4500	0	45
78	HARRIS 700	12000	6	53
79	HARRIS 80	768	6	36
80	HARRIS 800	12000	6	84
81	HONEYWELL DPS 6/35	3000	0	16
82	HONEYWELL DPS 6/92	4000	8	38
83	HONEYWELL DPS 6/96	16000	8	38
84	HONEYWELL DPS 7/35	2000	0	16
85	HONEYWELL DPS 7/45	4000	0	22
86	HONEYWELL DPS 7/55	4000	0	29
87	HONEYWELL DPS 7/65	4000	0	40
88	HONEYWELL DPS 8/44	4000	8	35
89	HONEYWELL DPS 8/49	32000	32	134
90	HONEYWELL DPS 8/50	8000	32	66
91	HONEYWELL DPS 8/52	32000	32	141
92	HONEYWELL DPS 8/62	32000	32	189
93	HONEYWELL DPS 8/20	4000	8	22
94	IBM 3033 S	16000	1	132
95	IBM 3033 U	24000	64	237
96	IBM 3081	32000	64	465
97	IBM 3081 D	32000	64	465
98	IBM 3083 B	32000	0	277
99	IBM 3083 E	16000	0	185
100	IBM 370/125-2	512	0	6
101	IBM 370/148	2000	0	24
102	IBM 370/158-3	6000	16	45
103	IBM 38/3	1500	0	7
104	IBM 38/4	2000	0	13
105	IBM 38/5	2000	0	16
106	IBM 38/7	4000	0	32
107	IBM 38/8	8000	0	32

108	IBM 4321	1000	0	11
109	IBM 4331-1	1000	0	11
110	IBM 4331-11	4000	4	18
111	IBM 4331-2	4000	8	22
112	IBM 4341	4000	0	37
113	IBM 4341-1	4000	8	40
114	IBM 4341-10	4000	8	34
115	IBM 4341-11	8000	8	50
116	IBM 4341-12	16000	16	76
117	IBM 4341-2	16000	16	66
118	IBM 4341-9	4000	2	24
119	IBM 4361-4	12000	8	49
120	IBM 4361-5	12000	16	66
121	IBM 4381-1	16000	8	100
122	IBM 4381-2	16000	32	133
123	IBM 8130 A	1000	0	12
124	IBM 8130 B	2000	0	18
125	IBM 8140	2000	0	20
126	IPL 4436	4000	0	27
127	IPL 4443	8000	8	45
128	IPL 4445	8000	8	56
129	IPL 4446	16000	24	70
130	IPL 4460	16000	24	80
131	IPL 4480	16000	48	136
132	MAGNUSON M80/30	8000	0	16
133	MAGNUSON M80/31	8000	24	26
134	MAGNUSON M80/32	8000	24	32
135	MAGNUSON M80/42	16000	12	45
136	MAGNUSON M80/43	16000	24	54
137	MAGNUSON M80/44	16000	24	65
138	MICRODATA SEQ.MS/3200	4000	0	30
139	NAS AS/3000	8000	16	50
140	NAS AS/3000 N	4000	2	40
141	NAS AS/5000	8000	32	62
142	NAS AS/5000 E	8000	32	60
143	NAS AS/5000 N	8000	4	50
144	NAS AS/6130	16000	16	66
145	NAS AS/6150	16000	32	86
146	NAS AS/6620	16000	64	74
147	NAS AS/6630	16000	64	93
148	NAS AS/6650	16000	64	110
149	NAS AS/7000	16000	64	143
150	NAS AS/7000 N	8000	16	105
151	NAS AS/8040	16000	32	214
152	NAS AS/8050	32000	64	277
153	NAS AS/8060	32000	64	370
154	NAS AS/9000 DPC	32000	128	510
155	NAS AS/9000 N	24000	32	214
156	NAS AS/9040	32000	64	326
157	NAS AS/9060	32000	256	510
158	NCR V8535 II	1000	0	8
159	NCR V8545 II	2000	0	12
160	NCR V8555 II	4000	0	17
161	NCR V8565 II	6000	0	21

162	NCR V8565 II E	8000	0	24
163	NCR V8575 II	8000	0	34
164	NCR V8585 II	12000	0	42
165	NCR V8595 II	16000	0	46
166	NCR V8635	8000	32	51
167	NCR V8650	8000	32	116
168	NCR V8635	16000	64	100
169	NCR V8665	24000	160	140
170	NCR V8670	16000	128	212
171	NIXDORF 8890/30	2000	0	25
172	NIXDORF 8890/50	4000	0	30
173	NIXDORF 8890/70	8000	64	41
174	PERKIN-ELMER 3205	4000	0	25
175	PERKIN-ELMER 3210	4000	0	50
176	PERKIN-ELMER 3230	16000	1	50
177	PRIME 50-2250	4000	2	30
178	PRIME 50-250 II	2000	2	32
179	PRIME 50-550 II	4000	8	38
180	PRIME 50-750 II	8000	16	60
181	PRIME 50-850 II	8000	32	109
182	SIEMENS 7.521	1000	8	6
183	SIEMENS 7.531	2000	8	11
184	SIEMENS 7.536	4000	8	22
185	SIEMENS 7.541	6000	16	33
186	SIEMENS 7.551	8000	16	58
187	SIEMENS 7.561	16000	32	130
188	SIEMENS 7.865-2	12000	8	75
189	SIEMENS 7.870-2	12000	32	113
190	SIEMENS 7.872-2	16000	64	188
191	SIEMENS 7.875-2	24000	32	173
192	SIEMENS 7.880-2	32000	64	248
193	SIEMENS 7.881-2	32000	128	405
194	SPERRY 1100/61 H1	8000	32	70
195	SPERRY 1100/81	32000	24	114
196	SPERRY 1100/82	32000	48	208
197	SPERRY 1100/83	32000	112	307
198	SPERRY 1100/84	32000	112	397
199	SPERRY 1100/93	64000	96	915
200	SPERRY 1100/94	64000	128	1150
201	SPERRY 80/3	4000	0	12
202	SPERRY 80/4	4000	0	14
203	SPERRY 80/5	4000	0	18
204	SPERRY 80/6	4000	0	21
205	SPERRY 80/8	8000	0	42
206	SPERRY 90/80 MODEL 3	8000	32	46
207	STRATUS 32	8000	0	52
208	WANG VS10	8000	32	67
209	WANG VS 90	4000	0	45