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#R codes for analysis of bladder tumor recurrence data
library(survival)
alive.f=read.table("C:\\bladder.txt",header=F)
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	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14
1	0	0	0	0	0	0	0	0	0.5	1	1	0	0	
2	0	0	0	0	0	0	0	0	1.0	1	3	0	0	
3	0	0	0	0	0	0	0	0	4.0	2	1	0	0	
4	0	0	0	0	0	0	0	0	7.0	1	1	0	0	
5	0	0	0	0	0	0	0	0	10.0	5	1	0	0	
6	6	0	0	0	0	0	0	0	10.0	4	1	0	1	
7	0	0	0	0	0	0	0	0	14.0	1	1	0	0	
8	0	0	0	0	0	0	0	0	18.0	1	1	0	0	
9	5	0	0	0	0	0	0	0	18.0	1	3	0	1	
10	12	16	0	0	0	0	0	0	18.0	1	1	0	2	
11	0	0	0	0	0	0	0	0	23.0	3	3	0	0	
12	10	15	0	0	0	0	0	0	23.0	1	3	0	2	
13	3	16	23	0	0	0	0	0	23.0	1	1	0	3	
14	3	9	21	0	0	0	0	0	23.0	3	1	0	3	
15	7	10	16	24	0	0	0	0	24.0	2	3	0	4	
16	3	15	25	0	0	0	0	0	25.0	1	1	0	3	
17	0	0	0	0	0	0	0	0	26.0	1	2	0	0	
18	1	0	0	0	0	0	0	0	26.0	8	1	0	1	
19	2	26	0	0	0	0	0	0	26.0	1	4	0	2	
20	25	0	0	0	0	0	0	0	28.0	1	2	0	1	
21	0	0	0	0	0	0	0	0	29.0	1	4	0	0	
22	0	0	0	0	0	0	0	0	29.0	1	2	0	0	
23	0	0	0	0	0	0	0	0	29.0	4	1	0	0	
24	28	30	0	0	0	0	0	0	30.0	1	6	0	2	
25	2	17	22	0	0	0	0	0	30.0	1	5	0	3	
26	3	6	8	12	26	0	0	0	30.0	2	1	0	5	
27	12	15	24	0	0	0	0	0	31.0	1	3	0	3	
28	0	0	0	0	0	0	0	0	32.0	1	2	0	0	
29	0	0	0	0	0	0	0	0	34.0	2	1	0	0	
30	0	0	0	0	0	0	0	0	36.0	2	1	0	0	
31	29	0	0	0	0	0	0	0	36.0	3	1	0	1	
32	0	0	0	0	0	0	0	0	37.0	1	2	0	0	
33	9	17	22	24	0	0	0	0	40.0	4	1	0	4	
34	16	19	23	29	34	40	0	0	40.0	5	1	0	6	
35	0	0	0	0	0	0	0	0	41.0	1	2	0	0	
36	3	0	0	0	0	0	0	0	43.0	1	1	0	1	
37	6	0	0	0	0	0	0	0	43.0	2	6	0	1	
38	3	6	9	0	0	0	0	0	44.0	2	1	0	3	
39	9	11	20	26	30	0	0	0	45.0	1	1	0	5	
40	18	0	0	0	0	0	0	0	48.0	1	1	0	1	
41	0	0	0	0	0	0	0	0	49.0	1	3	0	0	

42 35 0 0 0 0 0 0 0 0 51.0 3 1 0 1
43 17 0 0 0 0 0 0 0 0 53.0 1 7 0 1
44 3 15 46 51 53 0 0 0 0 53.0 3 1 0 5
45 0 0 0 0 0 0 0 0 0 0 59.0 1 1 0 0
46 2 15 24 30 34 39 43 49 52 61.0 3 2 0 9
47 5 14 19 27 41 0 0 0 0 64.0 1 3 0 5
48 2 8 12 13 17 21 33 49 0 64.0 2 3 0 8
49 0 0 0 0 0 0 0 0 0 0 1.0 1 3 1 0
50 0 0 0 0 0 0 0 0 0 0 1.0 1 1 1 0
51 5 0 0 0 0 0 0 0 0 0 5.0 8 1 1 1
52 0 0 0 0 0 0 0 0 0 0 9.0 1 2 1 0
53 0 0 0 0 0 0 0 0 0 0 10.0 1 1 1 0
54 0 0 0 0 0 0 0 0 0 0 13.0 1 1 1 0
55 3 0 0 0 0 0 0 0 0 0 14.0 2 6 1 1
56 1 3 5 7 10 0 0 0 0 0 17.0 5 3 1 5
57 0 0 0 0 0 0 0 0 0 0 18.0 5 1 1 0
58 17 0 0 0 0 0 0 0 0 0 18.0 1 3 1 1
59 2 0 0 0 0 0 0 0 0 0 19.0 5 1 1 1
60 17 19 0 0 0 0 0 0 0 21.0 1 1 1 2
61 0 0 0 0 0 0 0 0 0 0 22.0 1 1 1 0
62 0 0 0 0 0 0 0 0 0 0 25.0 1 3 1 0
63 0 0 0 0 0 0 0 0 0 0 25.0 1 5 1 0
64 0 0 0 0 0 0 0 0 0 0 25.0 1 1 1 0
65 6 12 13 0 0 0 0 0 0 0 26.0 1 1 1 3
66 6 0 0 0 0 0 0 0 0 0 27.0 1 1 1 1
67 2 0 0 0 0 0 0 0 0 0 29.0 2 1 1 1
68 26 35 0 0 0 0 0 0 0 36.0 8 3 1 2
69 0 0 0 0 0 0 0 0 0 0 38.0 1 1 1 0
70 22 23 27 32 0 0 0 0 0 39.0 1 1 1 4
71 4 16 23 27 33 36 37 0 0 39.0 6 1 1 7
72 24 26 29 40 0 0 0 0 0 40.0 3 1 1 4
73 0 0 0 0 0 0 0 0 0 0 41.0 3 2 1 0
74 0 0 0 0 0 0 0 0 0 0 41.0 1 1 1 0
75 1 27 0 0 0 0 0 0 0 0 43.0 1 1 1 2
76 0 0 0 0 0 0 0 0 0 0 44.0 1 1 1 0
77 2 20 23 27 38 0 0 0 0 44.0 6 1 1 5
78 0 0 0 0 0 0 0 0 0 0 45.0 1 2 1 0
79 2 0 0 0 0 0 0 0 0 0 46.0 1 4 1 1
80 0 0 0 0 0 0 0 0 0 0 46.0 1 4 1 0
81 0 0 0 0 0 0 0 0 0 0 49.0 3 3 1 0
82 0 0 0 0 0 0 0 0 0 0 50.0 1 1 1 0
83 4 24 47 0 0 0 0 0 0 50.0 4 1 1 3
84 0 0 0 0 0 0 0 0 0 0 54.0 3 4 1 0
85 38 0 0 0 0 0 0 0 0 0 54.0 2 1 1 1
86 0 0 0 0 0 0 0 0 0 0 59.0 1 3 1 0

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alive1 = (alive.f[,1:9] != 0)
obs.num = apply(alive1,1,sum)
n = length(alive1[,1])
alive2 = as.vector(t(alive.f[,1:9]))
alive2 = alive2[alive2!=0]

p1=3 #number of covariates
alive.rec=matrix(NA,nrow=sum(obs.num+1),ncol=(4+p1))
alive.rec[,1]=rep(seq(1,n,1),(obs.num+1))
alive.rec[,2][duplicated(alive.rec[,1])==F]=0
alive.rec[,2][duplicated(alive.rec[,1])==T]=alive2
alive.rec[,3][-cumsum(obs.num+1)]=alive2
alive.rec[,3][cumsum(obs.num+1)]=alive.f[,10]
alive.rec[,4]=1
alive.rec[,4][cumsum(obs.num+1)]=0
alive.rec[,5]=rep(alive.f[,11],(obs.num+1)) ##number
alive.rec[,6]=rep(alive.f[,12],(obs.num+1)) ##size
alive.rec[,7]=rep(alive.f[,13],(obs.num+1)) ##trt
alive.rec[alive.rec[,3]==alive.rec[,2],3] = alive.rec[alive.rec[,3]==alive.rec[,2],3] + 0.5

###coxph for running the model
alive.rec.cox=coxph(Surv(alive.rec[,2],alive.rec[,3],alive.rec[,4])~alive.rec[,5]+alive.rec[,
6]+alive.rec[,7]+cluster(alive.rec[,1]))

> alive.rec.cox
Call:
coxph(formula = Surv(alive.rec[, 2], alive.rec[, 3], alive.rec[,
4]) ~ alive.rec[, 5] + alive.rec[, 6] + alive.rec[, 7] +
cluster(alive.rec[, 1]))

               coef exp(coef) se(coef) robust se      z      p
alive.rec[, 5] 0.2042    1.226  0.0434   0.0656  3.113 0.0019
alive.rec[, 6] -0.0410    0.960  0.0648   0.0776 -0.528 0.6000
alive.rec[, 7] -0.5292    0.589  0.1869   0.2695 -1.964 0.0500

Likelihood ratio test=26.8 on 3 df, p=6.56e-06 n= 218

```