

Computer Lab 9: Survival Data

1. Log-rank and Wilcoxon tests

Patient	Time	Cens	Treat	Age	LBR
1	281	1	0	46	3.2
2	604	0	0	57	3.1
3	457	1	0	56	2.2
4	384	1	0	65	3.9
5	341	0	0	73	2.8
6	842	1	0	64	2.4
7	1514	1	1	69	2.4
8	182	0	1	62	2.4
9	1121	1	1	71	2.5
10	1411	0	1	69	2.3
11	814	1	1	77	3.8
12	1071	1	1	58	3.1

Test the treatment effect using both Log-rank test and Wilcoxon test at $\alpha = 0.05$.

[code:]

```
time=c(281,604,457,384,341,842,1514,182,1121,1411,814,1071)
status=c(1,0,1,1,0,1,1,0,1,0,1,1)
treat=c(0,0,0,0,0,0,1,1,1,1,1,1)
age=c(46,57,56,65,73,64,69,62,71,69,77,58)
lbr=c(3.2,3.1,2.2,3.9,2.8,2.4,2.4,2.4,2.5,2.3,3.8,3.1)
data=data.frame(time,status,treat,age,lbr)
wilcoxon=survdiff(Surv(time, status) ~ treat, data=data,rho=1 )
logrank=survdiff(Surv(time, status) ~ treat, data=data,rho=0)
wilcoxon
logrank
```

[Example: Leukemia](#)

For the data set “leukemia” in Splus, test the group effect using both Log-rank test and Wilcoxon test at $\alpha = 0.07$.

[code:]

```
wilcoxon=survdiff(Surv(time, status) ~ group, data=leukemia,rho=1 )
```

```
logrank=survdiff(Surv(time, status) ~ group, data=leukemia,rho=0)
wilcoxon
logrank
```

2. Proportional hazards models

For the data in the table, fit the following proportional hazards models

$\lambda(t) = \lambda_0(t) \cdot \exp(\eta)$ and comment on the results,

- $\eta = \beta \cdot Treat$
- $\eta = \beta_1 \cdot Age + \beta_2 \cdot LBR$
- $\eta = \beta_1 \cdot Age + \beta_2 \cdot LBR + \beta_3 \cdot (Age \cdot LBR)$

[code:]

```
time=c(281,604,457,384,341,842,1514,182,1121,1411,814,1071)
status=c(1,0,1,1,0,1,1,0,1,0,1,1)
treat=c(0,0,0,0,0,0,1,1,1,1,1,1)
age=c(46,57,56,65,73,64,69,62,71,69,77,58)
lbr=c(3.2,3.1,2.2,3.9,2.8,2.4,2.4,2.4,2.5,2.3,3.8,3.1)
data=data.frame(time,status,treat,age,lbr)
```

```
fit.1=coxph(Surv(time, status) ~ treat, data=data)
fit.2=coxph(Surv(time, status) ~ age+lbr, data=data)
fit.3=coxph(Surv(time, status) ~ age+lbr+age*lbr, data=data)
summary(fit.1)
summary(fit.2)
summary(fit.3)
# The plots of survival estimates
plot(survfit(fit.1), xlab="Survival in Days")
plot(survfit(fit.2), xlab="Survival in Days")
plot(survfit(fit.3), xlab="Survival in Days")
```

Example: Leukemia

For the data set "leukemia" in Splus, Test the group effect using proportional hazards models at $\alpha = 0.05$.

[code:]

```
ph.fit=coxph(Surv(time, status) ~ group, data=leukemia)
ph.fit
```