

introduction

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Ovarian Cancer Survival Analysis

```
library(survival)
data(ovarian)
head(ovarian)
```

```
##   futime fustat    age resid.ds rx ecog.ps
## 1     59      1 72.3315        2  1      1
## 2    115      1 74.4932        2  1      1
## 3    156      1 66.4658        2  1      2
## 4    421      0 53.3644        2  2      1
## 5    431      1 50.3397        2  1      1
## 6    448      0 56.4301        1  1      2
```

```
S1 <- Surv(ovarian$futime, ovarian$fustat)
ovarian.surv<- survfit(S1~1, ovarian)
summary(ovarian.surv)
```

```
## Call: survfit(formula = S1 ~ 1, data = ovarian)
##
##   time n.risk n.event survival std.err lower 95% CI upper 95% CI
##    59      26       1    0.962  0.0377    0.890    1.000
##   115      25       1    0.923  0.0523    0.826    1.000
##   156      24       1    0.885  0.0627    0.770    1.000
##   268      23       1    0.846  0.0708    0.718    0.997
##   329      22       1    0.808  0.0773    0.670    0.974
##   353      21       1    0.769  0.0826    0.623    0.949
##   365      20       1    0.731  0.0870    0.579    0.923
##   431      17       1    0.688  0.0919    0.529    0.894
##   464      15       1    0.642  0.0965    0.478    0.862
##   475      14       1    0.596  0.0999    0.429    0.828
##   563      12       1    0.546  0.1032    0.377    0.791
##   638      11       1    0.497  0.1051    0.328    0.752
```

```
plot(ovarian.surv,xlab="t",ylab=expression(hat(S)*"(t)"), lty=2:3)
```

```
##Exponential
# $h(t) = l$ ,  $S(t) = \exp(-lt)$ 
# $l = \exp(-(intercept))$ 
ovarian.exp<-survreg(S1~1 , ovarian, dist='exponential')
summary(ovarian.exp)
```

```
##
## Call:
```

```
## survreg(formula = S1 ~ 1, data = ovarian, dist = "exponential")
##           Value Std. Error      z      p
## (Intercept)  7.17         0.289 24.8 3.72e-136
##
## Scale fixed at 1
##
## Exponential distribution
## Loglik(model)= -98   Loglik(intercept only)= -98
## Number of Newton-Raphson Iterations: 4
## n= 26
```

```
intercept <- coefficients(ovarian.exp)[['(Intercept)']]
lambda <- exp(-intercept)
T_survival <- seq(0, 1210, by=0.1)
lines(T_survival, 1-pexp(T_survival, lambda), xlab="t", ylab=expression(hat(S)*"(t)"), col='blue')

##Weibull
#h(t) = a*y*t^(y-1), S(t) = exp(-at^y)
#a = exp(-(intercept)y)
#y = 1/scale
ovarian.wei<-survreg(S1~1 , ovarian, dist='weibull',scale=0)
summary(ovarian.wei)
```

```
##
## Call:
## survreg(formula = S1 ~ 1, data = ovarian, dist = "weibull", scale = 0)
##           Value Std. Error      z      p
## (Intercept)  7.111         0.293 24.292 2.36e-130
## Log(scale)   -0.103         0.254 -0.405 6.86e-01
##
## Scale= 0.902
##
## Weibull distribution
## Loglik(model)= -98   Loglik(intercept only)= -98
## Number of Newton-Raphson Iterations: 5
## n= 26
```

```
intercept <- coefficients(ovarian.wei)[['(Intercept)']]
scale <- ovarian.wei$scale
gamma <- 1/scale
T_survival <- seq(0, 1210, by=0.1)
lines(T_survival, 1-pweibull(T_survival, gamma, exp(intercept)), xlab="t", ylab=expression(hat(S)*"(t)"), col='blue')
legend(0, 0.4, legend=c("No Dist", "Exponential", "Weibull"), lty = c(1,1,1), col = c('black', 'blue', 'blue'))
```

