Life_Table

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2023-09-29

Load packages

```
library(survival)
library(tidyverse)
library(ggfortify)
library(dplyr)
library(ggplot2)
library(biostat3)
library(knitr)
```

Ovarian Cancer:

- futime: survival or censoring time(day)
- fustat: censoring status(censor = 0)
- age: in years
- resid.ds: residual disease present(1=no, 2=yes)
- rx: treatment group
- ecog.ps: ECOG performance status(1 is better)

```
data("ovarian")
attach(ovarian)
```

Life-table summary stratified by rx

```
res <- summary( survfit( Surv(futime, fustat)~rx, data=ovarian))
cols <- lapply(c(2:6, 8:11) , function(x) res[x])
tbl <- do.call(data.frame, cols)
tbl
```

```
   time n.risk n.event n.censor      surv     cumhaz   std.chaz strata  type
1    59     13       1        0 0.9230769 0.07692308 0.07692308   rx=1 right
2   115     12       1        0 0.8461538 0.16025641 0.11340901   rx=1 right
3   156     11       1        0 0.7692308 0.25116550 0.14534809   rx=1 right
4   268     10       1        0 0.6923077 0.35116550 0.17642581   rx=1 right
5   329      9       1        0 0.6153846 0.46227661 0.20849879   rx=1 right
```

```
6   431      8       1        0 0.5384615 0.58727661 0.24309822   rx=1 right
7   638      5       1        2 0.4307692 0.78727661 0.31479636   rx=1 right
8   353     13       1        0 0.9230769 0.07692308 0.07692308   rx=2 right
9   365     12       1        0 0.8461538 0.16025641 0.11340901   rx=2 right
10  464      9       1        2 0.7521368 0.27136752 0.15876802   rx=2 right
11  475      8       1        0 0.6581197 0.39636752 0.20207000   rx=2 right
12  563      7       1        0 0.5641026 0.53922466 0.24746807   rx=2 right
```

Create life-table stratified by rx

```
ovarian_rx1 <- ovarian |>
  filter(rx == 1) |>
  arrange(futime)

ovarian_rx2<- ovarian |>
  filter(rx == 2)|>
  arrange(futime)

lifet1<-lifetab2(Surv(futime, fustat == 1)~1,ovarian_rx1)
lifet2<-lifetab2(Surv(futime, fustat == 1)~1,ovarian_rx2)
print(lifet1, digits = 2)
```

```
          tstart tstop nsubs nlost nrisk nevent surv     pdf  hazard se.surv
0-59           0    59    13     0  13.0      0 1.00 0.00000 0.00000   0.000
59-115        59   115    13     0  13.0      1 1.00 0.00137 0.00143   0.000
115-156      115   156    12     0  12.0      1 0.92 0.00188 0.00212   0.074
156-268      156   268    11     0  11.0      1 0.85 0.00069 0.00085   0.100
268-329      268   329    10     0  10.0      1 0.77 0.00126 0.00173   0.117
329-431      329   431     9     0   9.0      1 0.69 0.00075 0.00115   0.128
431-448      431   448     8     0   8.0      1 0.62 0.00452 0.00784   0.135
448-477      448   477     7     1   6.5      0 0.54 0.00000 0.00000   0.138
477-638      477   638     6     1   5.5      0 0.54 0.00000 0.00000   0.138
638-803      638   803     5     0   5.0      1 0.54 0.00065 0.00135   0.138
803-855      803   855     4     1   3.5      0 0.43 0.00000 0.00000   0.147
855-1040     855  1040     3     1   2.5      0 0.43 0.00000 0.00000   0.147
1040-1106   1040  1106     2     1   1.5      0 0.43 0.00000 0.00000   0.147
1106-Inf    1106   Inf     1     1   0.5      0 0.43      NA      NA   0.147
           se.pdf se.hazard
0-59          NaN       NaN
59-115    0.00132   0.00143
115-156   0.00180   0.00212
156-268   0.00066   0.00085
268-329   0.00121   0.00172
329-431   0.00072   0.00115
431-448   0.00435   0.00783
448-477       NaN       NaN
477-638       NaN       NaN
638-803   0.00061   0.00134
803-855       NaN       NaN
855-1040      NaN       NaN
1040-1106     NaN       NaN
```

```
1106-Inf       NA        NA
```

```
print(lifet2, digits = 2)
```

```
          tstart tstop nsubs nlost nrisk nevent surv     pdf  hazard se.surv
0-353          0   353    13     0  13.0      0 1.00 0.00000 0.00000   0.000
353-365      353   365    13     0  13.0      1 1.00 0.00641 0.00667   0.000
365-377      365   377    12     0  12.0      1 0.92 0.00641 0.00725   0.074
377-421      377   421    11     1  10.5      0 0.85 0.00000 0.00000   0.100
421-464      421   464    10     1   9.5      0 0.85 0.00000 0.00000   0.100
464-475      464   475     9     0   9.0      1 0.85 0.00855 0.01070   0.100
475-563      475   563     8     0   8.0      1 0.75 0.00107 0.00152   0.126
563-744      563   744     7     0   7.0      1 0.66 0.00052 0.00085   0.141
744-769      744   769     6     1   5.5      0 0.56 0.00000 0.00000   0.149
769-770      769   770     5     1   4.5      0 0.56 0.00000 0.00000   0.149
770-1129     770  1129     4     1   3.5      0 0.56 0.00000 0.00000   0.149
1129-1206   1129  1206     3     1   2.5      0 0.56 0.00000 0.00000   0.149
1206-1227   1206  1227     2     1   1.5      0 0.56 0.00000 0.00000   0.149
1227-Inf    1227   Inf     1     1   0.5      0 0.56      NA      NA   0.149
           se.pdf se.hazard
0-353         NaN       NaN
353-365   0.00616   0.00666
365-377   0.00616   0.00724
377-421       NaN       NaN
421-464       NaN       NaN
464-475   0.00812   0.01068
475-563   0.00102   0.00151
563-744   0.00049   0.00085
744-769       NaN       NaN
769-770       NaN       NaN
770-1129      NaN       NaN
1129-1206     NaN       NaN
1206-1227     NaN       NaN
1227-Inf       NA        NA
```

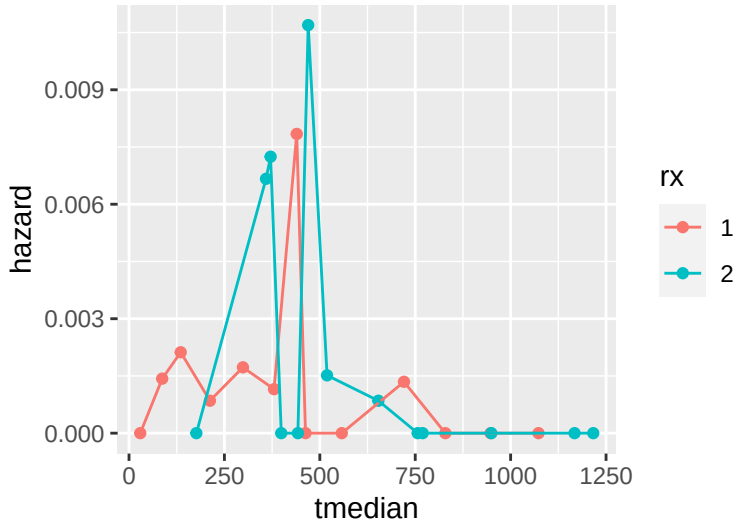
Plot hazard function by rx based on life-table estimate

```
hazard1<-lifet1 |>
  dplyr::select(tstart, tstop, hazard) |>
  mutate(tmedian = (tstart+tstop)/2, rx ="1")

hazard2<-lifet2 |>
  dplyr::select(tstart, tstop, hazard) |>
  mutate(tmedian = (tstart+tstop)/2, rx ="2")

hazard <- rbind(hazard1,hazard2)
```

```
ggplot(hazard, aes(x = tmedian, y = hazard, color = rx)) +
  geom_point()+
  geom_line()
```



Plot K-M survival function by rx

```
ovarian.survfit <-
  survfit(Surv(futime, fustat)~rx,data= ovarian)

ovarian.survfit |>
  autoplot() +
  ylab("S(t)") +
  xlab("Time")
```