PROJECT R-CODE:

#Data

data<-read.csv(file.choose())

Pat<-data$patient.no

Age<-data$Age

TLC<-data$TLC

SGOT<-data$SGOT

PC<-data$Platlets.Count

BP<-data$BP

#Membership function

mf <- function(x, a, b, c) {

p1 <- (x - a) / (b - a)

p2 <- (c - x) / (c - b)

p3 <- p1

p <- pmax(0, pmin(p1, p2, p3))

return(p)

}

Ac<-mf(Age,2,9,16)

Ay<-mf(Age,15,30,45)

Ao<-mf(Age,44,65,90)

Tl<-mf(TLC,3500,3750,4000)

Tm<-mf(TLC,3900,7450,11000)

Th<-mf(TLC,10000,12500,15000)

Sl<-mf(SGOT,10,25,40)

Sm<-mf(SGOT,35,42,50)

Sh<-mf(SGOT,45,50,55)

Pl<-mf(PC,3500,80000,150000)

Pm<-mf(PC,140000,295000,450000)

Ph<-mf(PC,440000,455000,470000)

Bl<-mf(BP,120,127,134)

Bm<-mf(BP,127,144,161)

Bh<-mf(BP,154,163,172)

val<-function(x){

mx<-max(x)

cl1<-which.max(x)

smx<-max(x[x!=mx])

cl2<-which.max(x[x!=mx])

if(smx!=0){

df<-cbind(mx,cl1,smx,cl2)

} else{

df<-cbind(mx,cl1,smx,NA)

}

df<-cbind(df)

}

vl<-function(x){

mx<-max(x)

cl1<-which.max(x)

smx<-max(x[x!=mx])

cl2<-which.max(x[x!=mx])

if(cl2==cl1){cl2=ifelse(cl1==1,2,ifelse(cl1==2,1,3))}

if(smx!=0){

df<-cbind(mx,cl1,smx,cl2)

} else{

df<-cbind(mx,cl1,smx,NA)

}

df<-cbind(df)

}

a<-t(apply(cbind(Ac,Ay,Ao),1,FUN = val))

a[,4]<-ifelse(is.na(a[,4])&a[,2]==1,2,ifelse(is.na(a[,4])&a[,2]==2,1,ifelse(is.na(a[,4])&a[,2]==3,2,NA)))

t<-t(apply(cbind(Tl,Tm,Th),1,FUN = vl))

t[,4]<-ifelse(is.na(t[,4])&t[,2]==1,2,1)

s<-t(apply(cbind(Sl,Sm,Sh),1,FUN = vl))

s[,4]<-ifelse(is.na(s[,4])&s[,2]==3,2,3)

p<-t(apply(cbind(Pl,Pm,Ph),1,FUN = vl))

p[,4]<-ifelse(is.na(p[,4])&p[,2]==1,2,1)

b<-t(apply(cbind(Bl,Bm,Bh),1,FUN = vl))

b[,4]<-ifelse(is.na(b[,4])&b[,2]==1,2,1)

A<-data.frame(A=Pat,B=a[,1],C=a[,2],D=a[,3],E=a[,4])

T<-data.frame(A=Pat,B=t[,1],C=t[,2],D=t[,3],E=t[,4])

S<-data.frame(A=Pat,B=s[,1],C=s[,2],D=s[,3],E=s[,4])

P<-data.frame(A=Pat,B=p[,1],C=p[,2],D=p[,3],E=p[,4])

B<-data.frame(A=Pat,B=b[,1],C=b[,2],D=b[,3],E=b[,4])

#subsetting

library(sets)

ac<-subset(A,C == 1 | E == 1)

ay<-subset(A,C == 2 | E == 2)

ao<-subset(A,C == 3 | E == 3)

tl<-subset(T,C == 1 | E == 1)

tm<-subset(T,C == 2 | E == 2)

th<-subset(T,C == 3 | E == 3)

sl<-subset(S,C == 1 | E == 1)

sm<-subset(S,C == 2 | E == 2)

sh<-subset(S,C == 3 | E == 3)

pl<-subset(P,C == 1 | E == 1)

pm<-subset(P,C == 2 | E == 2)

ph<-subset(P,C == 3 | E == 3)

bl<-subset(B,C == 1 | E == 1)

bm<-subset(B,C == 2 | E == 2)

bh<-subset(B,C == 3 | E == 3)

#Parameters

#AGE

Ac.25<-rbind(subset(ac,B>=0.25 & C ==1),subset(ac,D>=0.25 & E==1))$A

Ac.5<-rbind(subset(ac,B>=0.5 & C ==1),subset(ac,D>=0.5 & E==1))$A

Ac.75<-rbind(subset(ac,B>=0.75 & C ==1),subset(ac,D>=0.75 & E==1))$A

Ay.2<-rbind(subset(ay,B>=0.2 & C ==2),subset(ay,D>=0.2 & E==2))$A

Ay.4<-rbind(subset(ay,B>=0.4 & C ==2),subset(ay,D>=0.4 & E==2))$A

Ay.6<-rbind(subset(ay,B>=0.6 & C ==2),subset(ay,D>=0.6 & E==2))$A

Ay.8<-rbind(subset(ay,B>=0.8 & C ==2),subset(ay,D>=0.8 & E==2))$A

Ao.2<-rbind(subset(ao,B>=0.2 & C ==3),subset(ao,D>=0.2 & E==3))$A

Ao.4<-rbind(subset(ao,B>=0.4 & C ==3),subset(ao,D>=0.4 & E==3))$A

Ao.6<-rbind(subset(ao,B>=0.6 & C ==3),subset(ao,D>=0.6 & E==3))$A

Ao.8<-rbind(subset(ao,B>=0.8 & C ==3),subset(ao,D>=0.8 & E==3))$A

#TLC

Tl.2<-rbind(subset(tl,B>=0.2 & C ==1),subset(tl,D>=0.2 & E==1))$A

Tl.4<-rbind(subset(tl,B>=0.4 & C ==1),subset(tl,D>=0.4 & E==1))$A

Tl.6<-rbind(subset(tl,B>=0.6 & C ==1),subset(tl,D>=0.6 & E==1))$A

Tl.8<-rbind(subset(tl,B>=0.8 & C ==1),subset(tl,D>=0.8 & E==1))$A

Tm.2<-rbind(subset(tm,B>=0.2 & C ==2),subset(tm,D>=0.2 & E==2))$A

Tm.4<-rbind(subset(tm,B>=0.4 & C ==2),subset(tm,D>=0.4 & E==2))$A

Th.2<-rbind(subset(th,B>=0.2 & C ==3),subset(th,D>=0.2 & E==3))$A

#SGOT

Sl.25<-rbind(subset(sl,B>=0.25 & C ==1),subset(sl,D>=0.25 & E==1))$A

Sl.5<-rbind(subset(sl,B>=0.5 & C ==1),subset(sl,D>=0.5 & E==1))$A

Sm.25<-rbind(subset(sm,B>=0.25 & C ==2),subset(sm,D>=0.25 & E==2))$A

Sm.5<-rbind(subset(sm,B>=0.5 & C ==2),subset(sm,D>=0.5 & E==2))$A

Sm.75<-rbind(subset(sm,B>=0.75 & C ==2),subset(sm,D>=0.75 & E==2))$A

Sh.2<-rbind(subset(sh,B>=0.2 & C ==3),subset(sh,D>=0.2 & E==3))$A

Sh.4<-rbind(subset(sh,B>=0.4 & C ==3),subset(sh,D>=0.4 & E==3))$A

Sh.6<-rbind(subset(sh,B>=0.6 & C ==3),subset(sh,D>=0.6 & E==3))$A

#PC

Pl.25<-rbind(subset(pl,B>=0.2 & C ==1),subset(pl,D>=0.2 & E==1))$A

Pl.5<-rbind(subset(pl,B>=0.5 & C ==1),subset(pl,D>=0.5 & E==1))$A

Pl.75<-rbind(subset(pl,B>=0.75 & C ==1),subset(pl,D>=0.75 & E==1))$A

Pm.25<-rbind(subset(pm,B>=0.25 & C ==2),subset(pm,D>=0.25 & E==2))$A

#BP

Bl.25<-rbind(subset(bl,B>=0.25 & C ==1),subset(bl,D>=0.25 & E==1))$A

Bl.5<-rbind(subset(bl,B>=0.5 & C ==1),subset(bl,D>=0.5 & E==1))$A

Bl.75<-rbind(subset(bl,B>=0.75 & C ==1),subset(bl,D>=0.75 & E==1))$A

Bm.25<-rbind(subset(bm,B>=0.25 & C ==2),subset(bm,D>=0.25 & E==2))$A

Bm.5<-rbind(subset(bm,B>=0.5 & C ==2),subset(bm,D>=0.5 & E==2))$A

#Rule

rule<-function(a,b,c,d,e){

intersect(intersect(intersect(intersect(a,b),c),d),e)

}

rule1<-rule(Ao.4,Tl.4,Sh.6,Pl.75,Bl.25)

rule2<-rule(Ac.25,Tl.2,Sh.2,Pl.25,Bl.25)

rule3<-rule(Ay.6,Tl.2,Sh.2,Pl.25,Bl.25)

rule4<-rule(Ao.6,Tl.2,Sh.2,Pl.25,Bl.25)

rule5<-rule(Ac.25,Tl.2,Sm.25,Pl.25,Bl.25)

rule6<-rule(Ao.6,Tl.2,Sh.2,Pl.25,Bl.25)

rule7<-rule(Ao.2,Tl.2,Sh.6,Pl.25,Bl.25)

rule8<-rule(Ao.6,Tl.2,Sh.6,Pl.5,Bl.25)

rule9<-rule(Ao.2,Tl.2,Sm.25,Pl.25,Bl.25)

rule10<-rule(Ay.2,Tl.2,Sh.2,Pl.25,Bl.25)

rule11<-rule(Ao.2,Tl.2,Sh.2,Pl.25,Bl.5)

rule12<-rule(Ac.25,Tl.2,Sm.5,Pl.25,Bl.5)

rule13<-rule(Ao.4,Tl.2,Sh.2,Pl.25,Bl.75)

rule14<-rule(Ao.2,Tl.8,Sh.2,Pl.25,Bl.25)

rule15<-rule(Ay.6,Tl.2,Sh.2,Pl.25,Bl.25)

rule16<-rule(Ay.2,Tl.2,Sh.6,Pl.25,Bl.25)

rule17<-rule(Ac.5,Tl.2,Sh.2,Pl.25,Bl.25)

rule1

rule2

rule3

rule4

rule5

rule6

rule7

rule8

rule9

rule10

rule11

rule12

rule13

rule14

rule15

rule16

rule17