**5.5 R 语言应用**

离散型分布

**# 陈文贤 着 《大话统计学》 清华大学出版社 2022年**

if(!require(distr)){install.packages("distr")} ; library(distr)

B <- Binom(size=20, prob=0.3) ; plot(B, col="blue") # 二项分布

N <- Norm(mean=10, sd=2) ; plot(N, col="red") # 正态分布

# 超几何分布 H <- Hyper(m=2, n=5, k=3) ; 几何分布 G <- Geom(prob=0.5) ;

# 泊松分布P <- Pois(lambda=1) ; 负二项分布NB <- Nbinom(prob=0.5, size=2) ;

# 连续均匀分布U <- Unif(Min=0, Max=5) ; 指数分布E <- Exp(rate=1) ;

# t分布T <- Td(df=5) ; 卡方分布C <- Chisq(df=5) ; F分布F <- Fd(df1=2, df2=3) ;

# X~B(20,0.8)

dbinom(17,20,0.8) # P(X=17)

pbinom(17,20,0.8) # P(X≤17)

pbinom(17,20,0.8, lower.tail = TRUE) # P(X≤17)

pbinom(17,20,0.8, lower.tail = FALSE) # P(X>17)

pbinom(16,20,0.8, lower.tail = FALSE) # P(X>16)

qbinom(0.05,20,0.8) # F-1(0.05) , P(X<=13)=0.05

# Y~N(16,17.889)

pnorm(17,16,1.7889) # P(Y≤17)

pnorm(18,16,1.7889) - pnorm(14,16,1.7889) # P(Y≤18) - P(Y≤14)

pnorm(17.5,16,1.7889) - pnorm(16.5,16,1.7889) # P(Y≤17.5) - P(Y≤16.5)

pnorm(17,16,1.7889, lower.tail = FALSE) # P(Y>17) = P(X ≥17)

pnorm(16.5,16,1.7889, lower.tail = FALSE) # P(Y>16.5)

pnorm(1) # P(Z < 1)

qnorm(0.05) # Z(0.05) , P(Z<-1.65)=0.05

pnorm(600,500,100)

qnorm(0.8,500,100)

# Y~ChiSq(10)

pchisq(10,18, lower.tail = FALSE)

qchisq(0.05,10)

qchisq(0.05,10, lower.tail = FALSE)

# Y~t(10)

pt(2,10)

pt(2,10, lower.tail = FALSE)

qt(0.05,10, lower.tail = FALSE)

qt(0.025,10, lower.tail = FALSE)

# QQ Plot

if(!require(car)){install.packages("car")} ; library(car)

if(!require(DescTools)){install.packages("DescTools")} ; library(DescTools)

x = read.csv("C:/大话统计学 网络资源/StatData/Chap2\_1.csv",header=F)

qqnorm(x[,1], main = 'Q-Q plot') ; qqline(x[,1], col = 3, lwd = 2)

DescTools::PlotQQ(x[,1])

car::qqPlot(x[,1],main="QQ Plot",col="red")

# Y~t(5) 绘图

par(mfrow=c(1,1))

if(!require(graphics)){install.packages("graphics")} ; library(graphics)

curve(dt(x,5), xlim = c(-3.5, 3.5), ylab = "Density", main = "t Density Function")

curve(dt(x, df = 30), from = -3, to = 3, lwd = 3, ylab = "y", main = " t 分布 pdf")

curve(dt(x, df = 1), -3, 3, add = TRUE, col= "red")

curve(dt(x, df = 2), -3, 3, add = TRUE , col= "navy")

curve(dt(x, df = 3), -3, 3, add = TRUE , col= "tan4")

curve(dt(x, df = 5), -3, 3, add = TRUE , col= "slateblue")

curve(dt(x, df = 10), -3, 3, add = TRUE , col= "orangered")

if(!require(fitdistrplus)){install.packages("fitdistrplus")} ; library(fitdistrplus)

if(!require(MASS)){install.packages("MASS")} ; library(MASS)

x = read.csv("C:/大话统计学 网络资源/StatData/Chap2\_1.csv",header=F) ; str(x)

# 读入 Chap2\_1.csv

x1 <- x[,1] ; str(x1)

fitdist(x1, "norm")

fitdist(x1, "exp")

descdist(x1)

fitdistr(x1, densfun="normal") # 正态分布拟合 均值和标准偏差

library(MASS)

my\_data <- rnorm(250, mean=10, sd=2)

fit <- fitdistr(my\_data, densfun="normal") # 正态分布拟合 均值和标准偏差

fit