R: plot and function

Most examples are from

https://www.youtube.com/watch?v=_V8eKsto3Ug

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R help documents

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https://www.benjaminbell.co.uk/2018/03/quick-guide-to-annotating-plots-in-r.html

Summary

- Why R?
- https://www.r-project.org/, Rstudio
- Cran and R packages, install and load
- Variables
- Language Structure

Draw figures-plot

plot

?plot

library(datasets)

head(iris)

?iris

plot(iris$Species)

Plot(iris$Petal.Length)

iris$Petal.Length

plot(iris$Petal.Length, iris$Petal.Width, col =“red”, pch=19, main=“Iris:Petal Length VS Petal Width”, xlab=“Petal Length”, ylab=“Petal Width”)

plot(cos, 0, 2*pi)

plot(exp,1,5)

plot(dnorm,-3,3)

Bar chart

```
library(datasets)
?mtcars
head(mtcars)
barplot(mtcars$cyl)
cylinders<-table(mtcars$cyl)
barplot(cylinders)
```

histogram

```
library(datasets)
?iris
head(iris)
hist(irs$Sepal.Length)
par(mfrow=c(3,1))
hist(iris$Petal.Width [iris$Species=="versicolor"], xlim =c(0,3), breaks=9, main ="Petal Width For Versicolor", xlable="", col="purple")
hist(iris$Petal.Width [iris$Species=="setosa"], xlim =c(0,3), breaks=9, main ="Petal Width For setosa", xlable="", col="purple")
hist(iris$Petal.Width [iris$Species=="virginica"], xlim =c(0,3), breaks=9, main ="Petal Width For virginica", xlable="", col="purple")
dev.off()
```

Overlay plots

```
library(datasets)
?lynx
head(lynx)
hist(lynx)
hist(lynx,breaks=14, freq =FALSE, col="red", main=paste("Histogram of Lynx", "Trapping, 1821-1934"), xlab="#lynx trapped")
curve(dnorm(x, mean=mean(lynx), sd=sd(lynx)), col=“purple”, lwd=2, add=TRUE)
```

Annotate Plot 1 https://www.benjaminbell.co.uk/2018/03/quick-guide-to-annotating-plots-in-r.html

```
# Generate random data
  set.seed(421)
  x <- runif(50, min=1, max=100)
  y <- rnorm(50)
  # Create data frame and add random row names
  df <- data.frame(x, y)
  rownames(df) <- c(letters[1:26], LETTERS[1:24])
  # Plot
  par(mar=c(5, 5, 5, 5)) # Make large margins
  plot(df)

  text(x=50, y=-1.5, labels="1st label")
  text(x=df$x[1:5], y=df$y[1:5], labels=rownames(df[1:5,]), pos=4, col="red")
  text(x=df$x[c(10, 20, 30)], y=df$y[c(10, 20, 30)], labels=c("Point 10", "Point 20", "Point 30"), pos=4, col="blue")
  mtext(c("Lower", "Higher"), side=1, line=3, at=c(10, 80), col=c("blue", "red"))
  mtext("Another label", side=4, line=1, at=2, col="green2") # Rotated y axis label
  mtext("Another \nlabel", side=4, line=1, at=-1, col="green2", las=1) # Horizontal label
  identify(x=df, label=rownames(df), col="red")

  # Get coordinates
  a1 <- locator(2)
  a2 <- locator(2)
  a3 <- locator(2)
```

Annotate Plot 2 https://www.benjaminbell.co.uk/2018/03/quick-guide-to-annotating-plots-in-r.html

```
a3 <- locator(2)
   # Create a matrix of the coordinates
   co.x <- cbind(a1$x, a2$x, a3$x)
   co.y <- cbind(a1$y, a2$y, a3$y)

   # Get coordinates
   p1 <- locator(8)
   p2 <- locator(12)
   # Draw polygons
   polygon(p1, border="green", lwd=2)
   polygon(p2, border="blue", lwd=2)# Add polygons
polygon(p1, border="green", lwd=2)
polygon(p2, border="blue", lwd=2)
# Label polygons
text(x=c(18, 62), y=c(-0.7, -0.9), labels=c("Green Group", "Blue Group"), col=c("green2", "blue2"))
# Add arrows
arrows(x0=co.x[1,], y0=co.y[1,], x1=co.x[2,], y1=co.y[2,], col=c("red2", "green2", "blue2"), lwd=2, xpd=TRUE)
# Label arrows
text(x=co.x[1,], y=co.y[1,], labels=c("Red Arrow", "Green Arrow", "Blue \nArrow"), col=c("red2", "green2", "blue2"), pos=c(3, 3, 4), xpd=TRUE)
# Add margin text
mtext(c("Lower", "Higher"), side=1, line=3, at=c(10, 80), col=c("blue", "red"))
# Margin arrows
arrows(x0=c(40, 60), y0=-2.65, x1=c(20, 72), y1=-2.65, col=c("blue", "red"), length=0.15, lwd=3, xpd=TRUE)
```

Summary statistics

- library(datasets)
- ?iris
- summary(irs$Species)
- summary(iris$Sepal.Length)
- summary(iris)

Select cases

- library(datasets)
- hist(iris$Petal.Length)
- summary(irs$Petal.Length)
- summary(iris$Species)
- hist(iris$Petal.Width [iris$Species==“versicolor”])
- hist(iris$Petal.Width [iris$Petal.Length<2], main=“Petal Length<2”)
- hist(iris$Petal.Width [iris$Petal.Length<2 & iris$Species==“versicolor”], main=“Short versicolor”)

Select cases cont’

- i.setosa<-iris[iris$Species==“setosa”,]
- head(i.setosa)

function

```
addition<-function(a,b)
{ c<-a+b
return(c)
}
```

Run a R script

- source('c:/Users/Shawn Li/Downloads/temp.R')