Лабораторная работа №3 «Знакомство с языком R и средой R-Studio»

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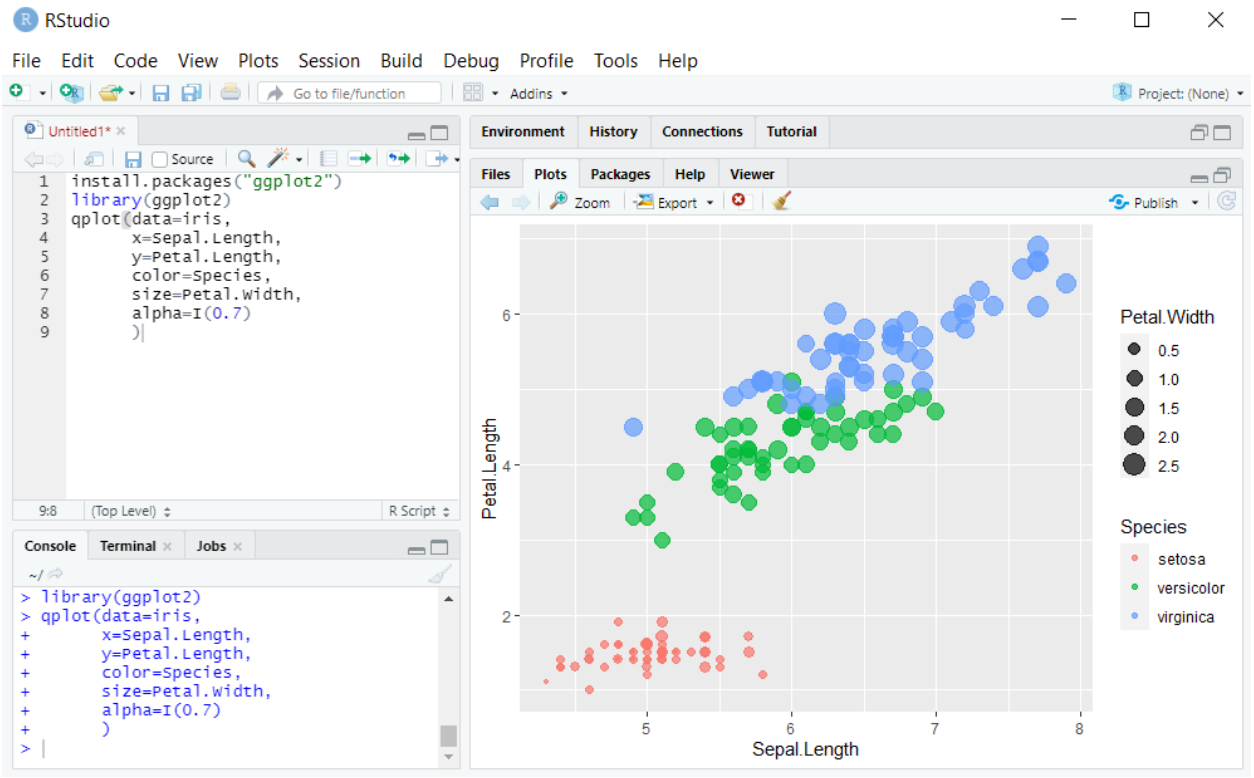
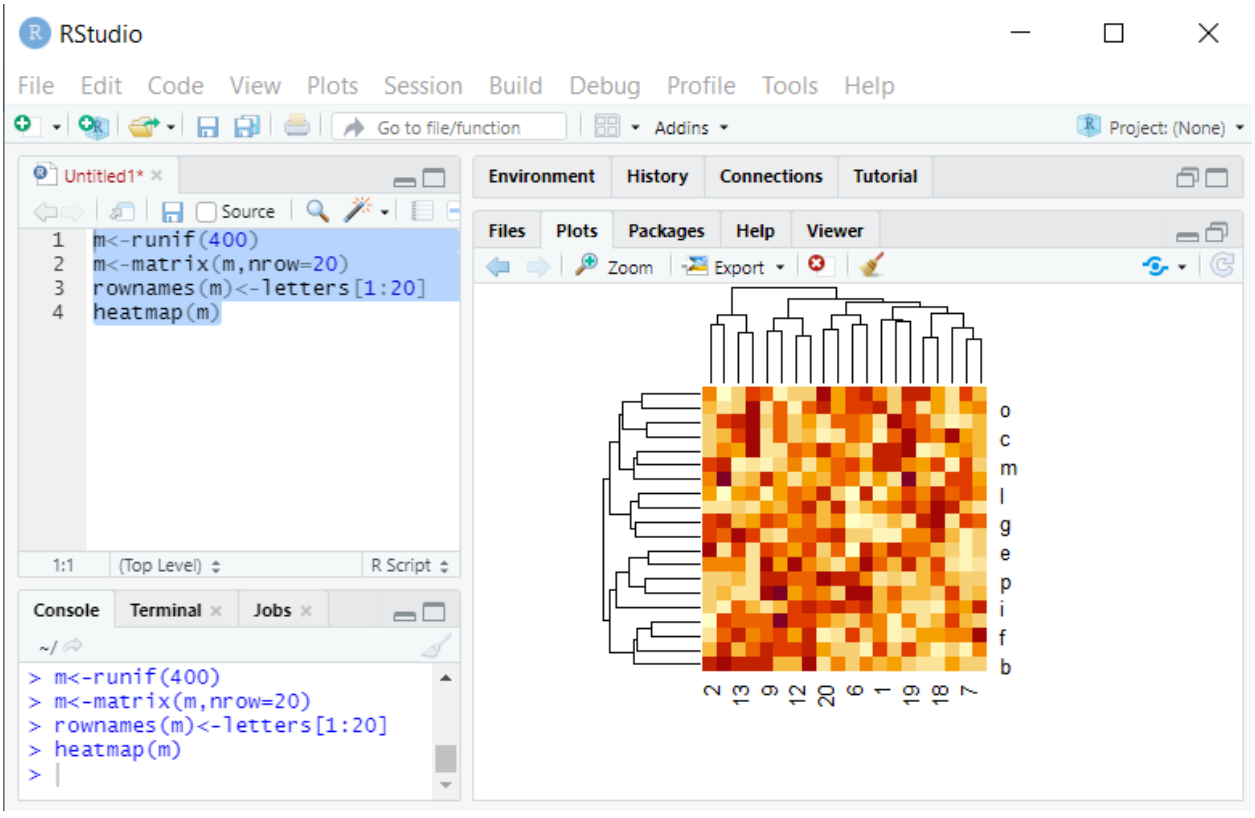
Синтаксис

```
> "HelloWorld"
[1] "HelloWorld"
> date()
[1] "Sat Nov 21 18:23:13 2020"
> 2:10 #vector
[1]  2  3  4  5  6  7  8  9 10
> as.matrix(1:5)
     [,1]
[1,]    1
[2,]    2
[3,]    3
[4,]    4
[5,]    5
> seq(from=0,to=5,by=0.3)
 [1] 0.0 0.3 0.6 0.9 1.2 1.5 1.8 2.1 2.4 2.7 3.0 3.3 3.6
[14] 3.9 4.2 4.5 4.8
> order(1:5, decreasing=TRUE)
[1] 5 4 3 2 1
> rev(0:4)
[1] 4 3 2 1 0
> i<-sample(6)
> i
[1] 4 2 6 5 1 3
> j<-order(i)
> list(i,j)
[[1]]
[1] 4 2 6 5 1 3

[[2]]
[1] 5 2 6 1 4 3

> j
[1] 5 2 6 1 4 3
> i[order(i)]
[1] 1 2 3 4 5 6
> i[j]
[1] 1 2 3 4 5 6
> x<-"Hello"
> y<-"World"
> z<-c(x,y)
> x
[1] "Hello"
> y
[1] "World"
> z
[1] "Hello" "World"
> print(z)
[1] "Hello" "World"
```

Работа с графиками



Хитмап



Функции

```
> fx<-function(x) x*x
> f<-function(a,b) fx(a)+fx(b)
> f(3,4)
[1] 25
```

Типизация

```
> x<-7
> is.integer(x)
[1] FALSE
> x<-as.integer(7)
> is.integer(x)
[1] TRUE
```

Сравнение чисел с плавающей точкой

```
> 0.33==3*0.11
[1] TRUE
> 0.45==3*0.15
[1] FALSE
> round(0.45,digits=2)==round(3*0.15,2)
[1] TRUE
```

Работа с векторами

```
> x<-vector(length=10)
> x
 [1] FALSE FALSE FALSE FALSE FALSE
 [6] FALSE FALSE FALSE FALSE FALSE
> is.vector(x)
[1] TRUE
> x<-c(7,8,10,15)
> x+c(-6,-8)
[1] 1 0 4 7
> x+c(-1,-2)
[1]  6  6  9 13
> x+c(-2,-1)
[1]  5  7  8 14
```

Работа с массивами

```
> x=c(1,2,3,4,5,6)
> x
[1] 1 2 3 4 5 6
> x.a=array(x,dim=c(2,3))
> x.a
     [,1] [,2] [,3]
[1,]    1    3    5
[2,]    2    4    6
> dim(x.a)
[1] 2 3
> is.vector(x.a)
[1] FALSE
> is.array(x.a)
[1] TRUE
> typeof(x.a)
[1] "double"
> str(x.a)
 num [1:2, 1:3] 1 2 3 4 5 6
> attributes(x.a)
$dim
[1] 2 3
```

```
> x.a
     [,1] [,2] [,3]
[1,]    1    3    5
[2,]    2    4    6
> x.a[1,3]
[1] 5
> x.a[2,]
[1] 2 4 6
> which(x.a<=4)
[1] 1 2 3 4
> rowSums(x.a)
[1]  9 12
> x.b=array(c(-1,-2,-3,-4,-1,-2),dim=c(2,3))
> x.c=x.a+x.b
> x.c
     [,1] [,2] [,3]
[1,]    0    0    4
[2,]    0    0    4
>
```

Работа с матрицами

```
> m=matrix(c(20,10,13,1),nrow=2)
> m
     [,1] [,2]
[1,]   20   13
[2,]   10    1
> is.array(m)
[1] TRUE
> is.matrix(m)
[1] TRUE
> six.fives=matrix(rep(5,6),ncol=3)
> six.fives
     [,1] [,2] [,3]
[1,]    5    5    5
[2,]    5    5    5
> m %*% six.fives
     [,1] [,2] [,3]
[1,]  165  165  165
[2,]   55   55   55
```

Имена строк/столбцов матриц

```
> rownames(m)<-c("трудодни","сталь")
> colnames(m)=c("cars","trucks")
> m
         cars trucks
трудодни   20     13
сталь      10      1
> output=c(20,10)
> names(output)=c("trucks","cars")
> available=c(1600,70)
> names(available)=c("трудодни","сталь")
> m %*% output[colnames(m)]
         [,1]
трудодни  460
сталь     120
> apply(m,1,mean)
трудодни    сталь
    16.5      5.5
> m
         cars trucks
трудодни   20     13
сталь      10      1
> apply(m,2,mean)
  cars trucks
    15      7
```

Работа со списками

```
> lst=list("exp",8,TRUE)
> names(lst)=c("family","mean","is.symmetric")
> lst
$family
[1] "exp"

$mean
[1] 8

$is.symmetric
[1] TRUE

> lst$family
[1] "exp"
```

Работа со структурами данных (датафреймами)

```
> a.matrix=matrix(c(35,8,10,4),nrow=2)
> colnames(a.matrix)=c("v1","v2")
> a.matrix
     v1 v2
[1,] 35 10
[2,]  8  4
> a.matrix$v1
Ошибка в a.matrix$v1 :$ operator is invalid for atomic vectors
> a.data.frame=data.frame(a.matrix,logicals=c(TRUE,FALSE))
> a.data.frame
  v1 v2 logicals
1 35 10     TRUE
2  8  4    FALSE
> a.data.frame$v1
[1] 35  8
> a.data.frame[,"v1"]
[1] 35  8
> a.data.frame[1,]
  v1 v2 logicals
1 35 10     TRUE
> colMeans(a.data.frame)
      v1       v2 logicals
    21.5      7.0      0.5
> rbind(a.data.frame,list(v1=-3,v2=-5,logicals=TRUE))
  v1 v2 logicals
1 35 10     TRUE
2  8  4    FALSE
3 -3 -5     TRUE
> rbind(a.data.frame,c(3,4,6))
  v1 v2 logicals
1 35 10        1
2  8  4        0
3  3  4        6
>
```