p8105_hw1_wz2507

Wurongyan Zhang

9/15/2019

##problem 1

```
#create dataframe
set.seed(500)
df = tibble(
  nsamp = rnorm(8),
  nsamp_pos = nsamp > 0,
  vec_char = c("a","b","c","d","e","f","g","h"),
  vec_fac = factor(c("1","1","1","2","2","2","3","3"))
)

#take the mean of each varaible
mean_nsamp = mean(pull(df, nsamp))
#mean_nsamp
mean_nsamp_pos = mean(pull(df, nsamp_pos))
#mean_nsamp_pos
mean_vec_char = mean(pull(df, vec_char))

#mean_vec_char
mean_vec_fac = mean(pull(df, vec_fac))
#mean_vec_fac
```

Numerical variables and logical variables can take the mean but character and factor variables could not take the mean. However, logical variable can take the mean because the levels are converted from "true or false" to "1 or 0"'s.

```
#try to use as.numeric to convert variables
num_logic = as.numeric(pull(df,nsamp_pos))
num_char = as.numeric(pull(df,vec_char))
num_fac = as.numeric(pull(df,vec_fac))
mean(num_logic)
mean(num_char)
#this results in "NA"
mean(num_fac)
```

Logical vector changed from "True" or "False" to "1" and "0". Character vector changed from character to "NA"'s. Factor vector changed to numbers. The mean of the logical variable did not change, character variables still could not take the mean, and the mean of factor variable can be taken. Factor and logical variable can be divided into different levels and can be presented as numbers after the command as.numeric, so both of them can take the mean after transformed them into numerics. However, character variables cannot be presented as numbers so it could not take the mean.

```
#multiplication after conversion
(pull(df, nsamp))*as.numeric(pull(df,nsamp_pos))
(pull(df, nsamp))*as.factor(pull(df,nsamp_pos))
#this command still present NA's
(as.numeric(as.factor(pull(df,nsamp_pos))))*(pull(df, nsamp))
```

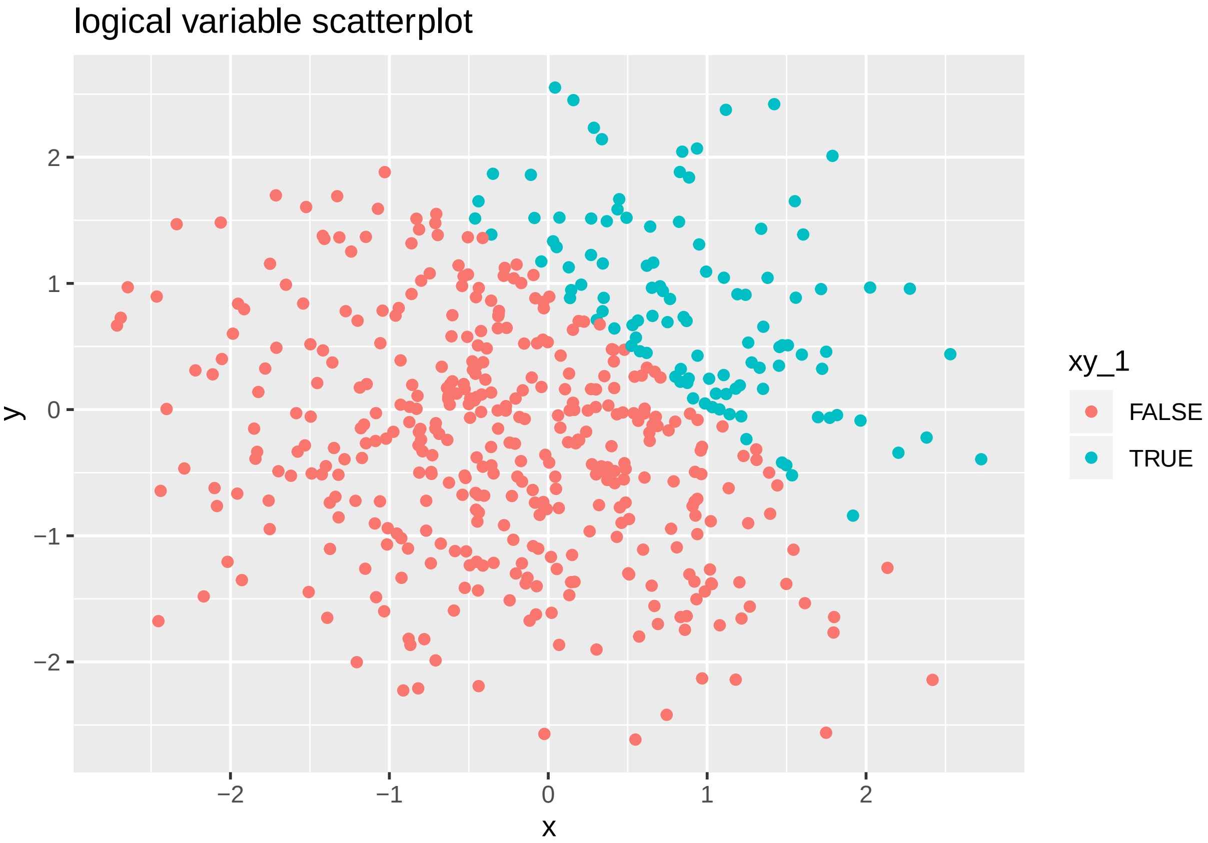
Factor variables could not multiply like nueric variables so if we factorize logical variable, the multiplication would not work. However, if we use the numeric levels of logical variable, the multiplication would work.

##problem 2

```
#create the data frame
set.seed(500)
df2 = tibble(
  x = rnorm(500),
  y = rnorm(500),
  xy_1 = x + y > 1,
  xy_num = as.numeric(xy_1),
  xy_fac = as.factor(xy_1)
)
```

The size of the data set is 500 and 5. The mean of the data set is -0.0455615, median is -0.0385267, standard deviation is 1.0165813 . The proportion of the cases for which x+y>1 is 0.22.

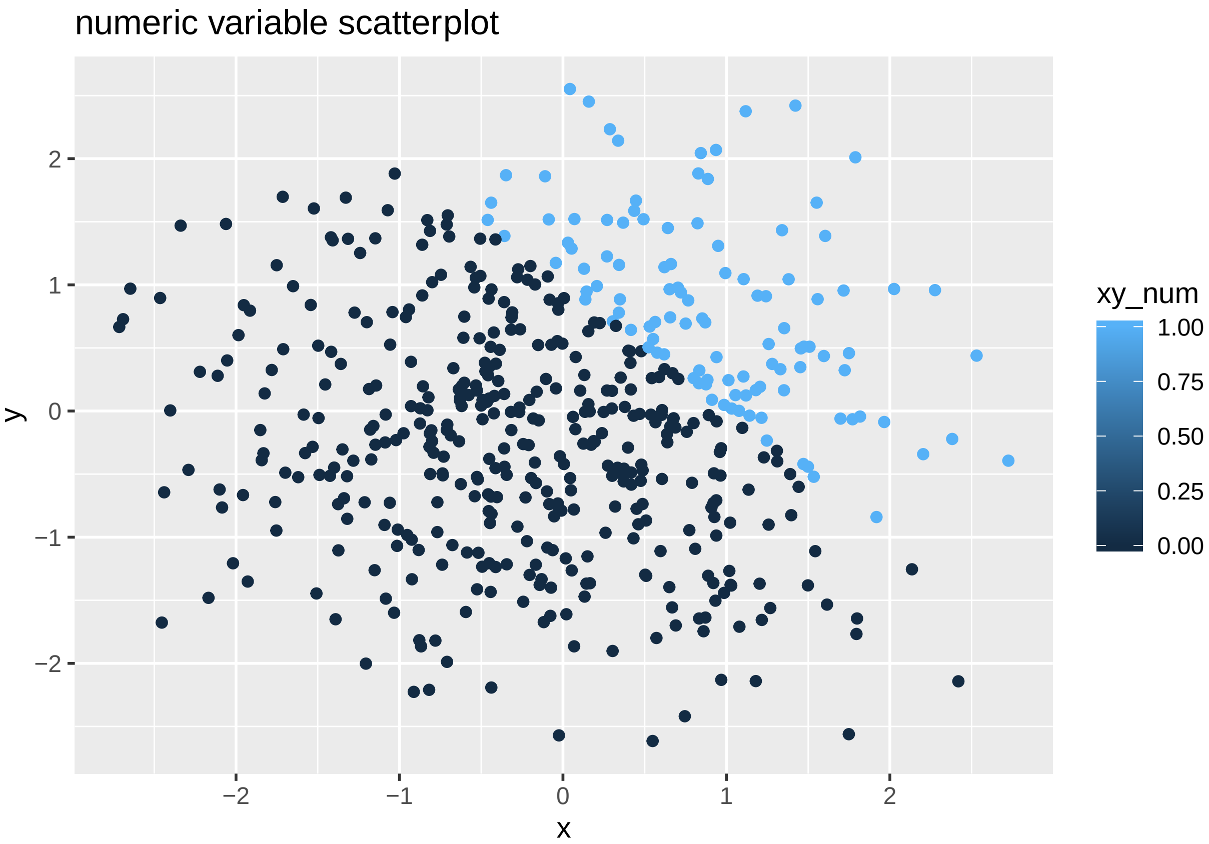
```
#create the gg plot
library(ggplot2)

ggplot(data=df2, aes(x = x, y = y, color = xy_1)) + geom_point() + labs(title = "logical variable scatte
```



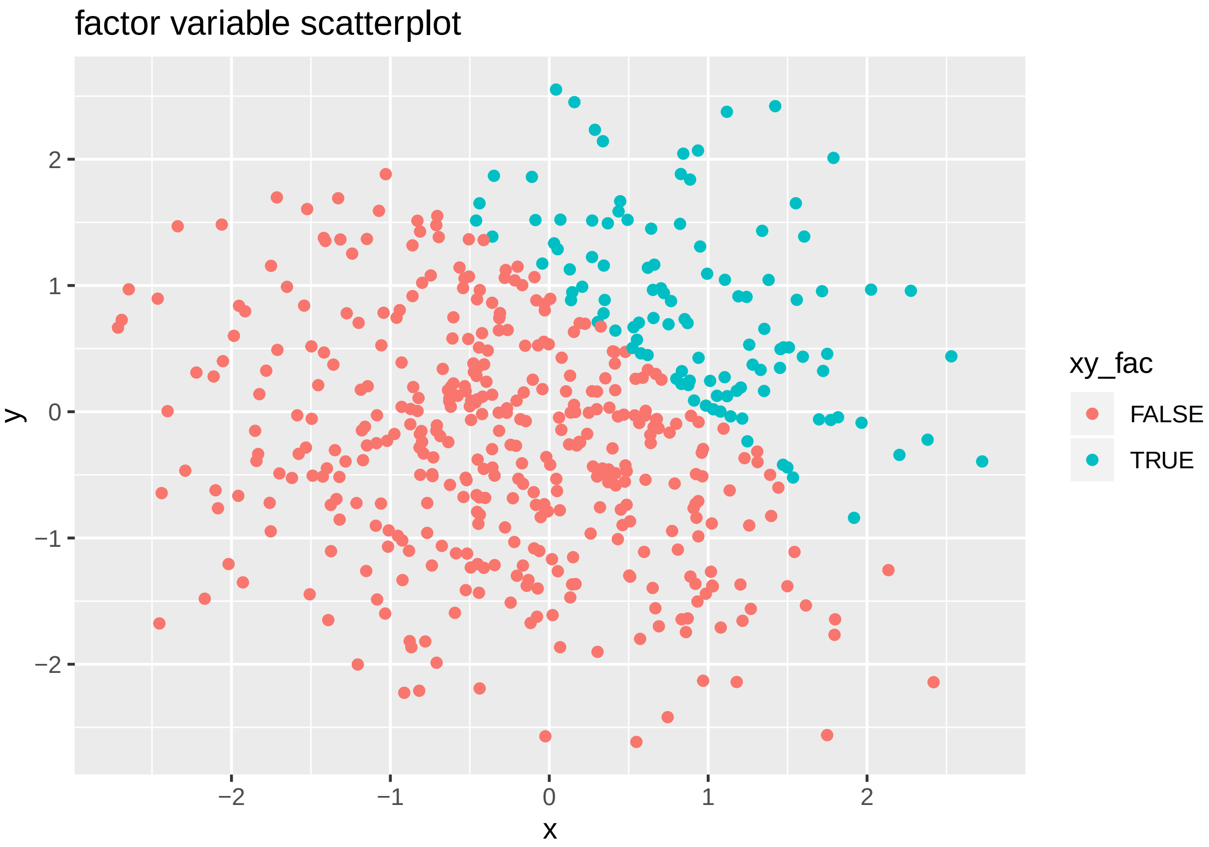
```
#save the plot
ggsave("plot for x+y>1.pdf")
```

```
## Saving 6.5 x 4.5 in image
```

```
ggplot(data=df2, aes(x = x, y = y, color = xy_num)) + geom_point()+ labs(title = "numeric variable scat
```



```
ggplot(data=df2, aes(x = x, y = y, color = xy_fac)) + geom_point()+ labs(title = "factor variable scatt
```



The color scale of logical vector is just “True” and “False”. For the color scale after numeric the logical vector, it turned into a continuum of color scale with a range of number from 0 to 1. However, the color scale of factoring the variable is same as logical vector’s but for color only depends on true or false while logical vector depends on whether x+y>1 or not.