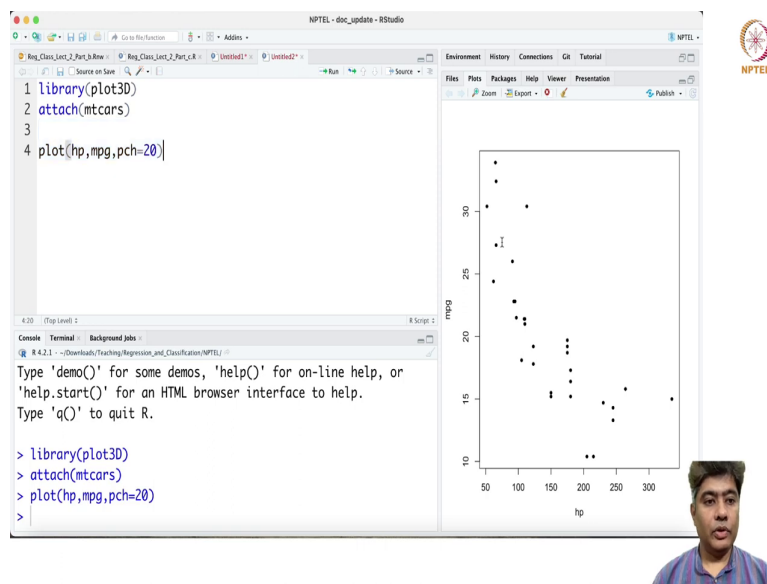


Predictive Analytics - Regression and Classification
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Lecture - 09
Hand-on with R Part -3

Welcome back to the lecture 2 of Regression Classification course, I am going to discuss now or I am going to demonstrate how three dimension histogram looks like.

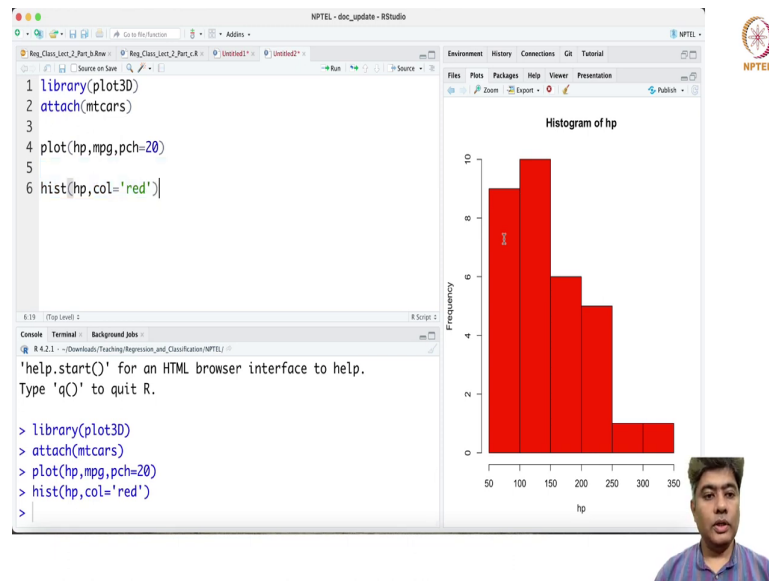
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So, we are going to consider the 3D plot, plot3D and then we are going to consider the empty curves data set and now if you draw the scatter plots of say horsepower versus miles per gallon and pch equal to 20. So, on the x axis we are drawing the horsepower, on the y axis we are drawing the miles per gallon.

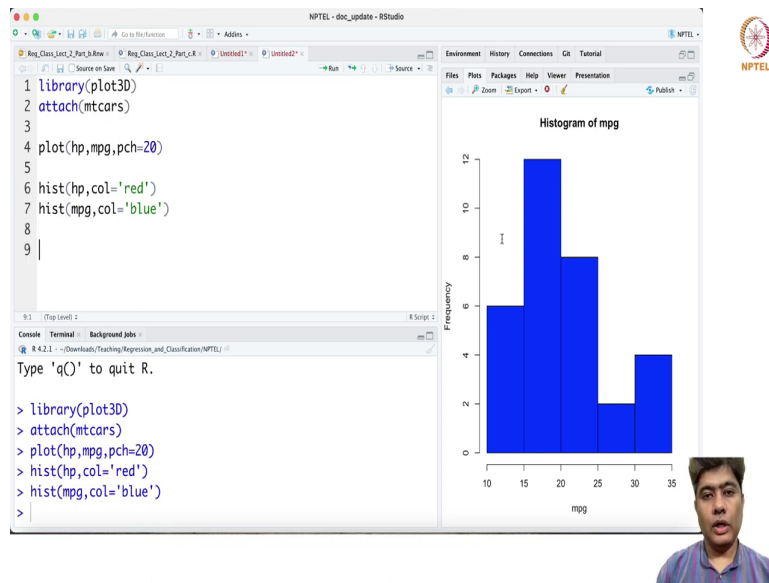
And we would like to draw histogram for horsepower we had like to draw histogram for the miles per gallon. And then we want to draw a joint histogram which will be a 3D histogram for horsepower and miles per gallon together.

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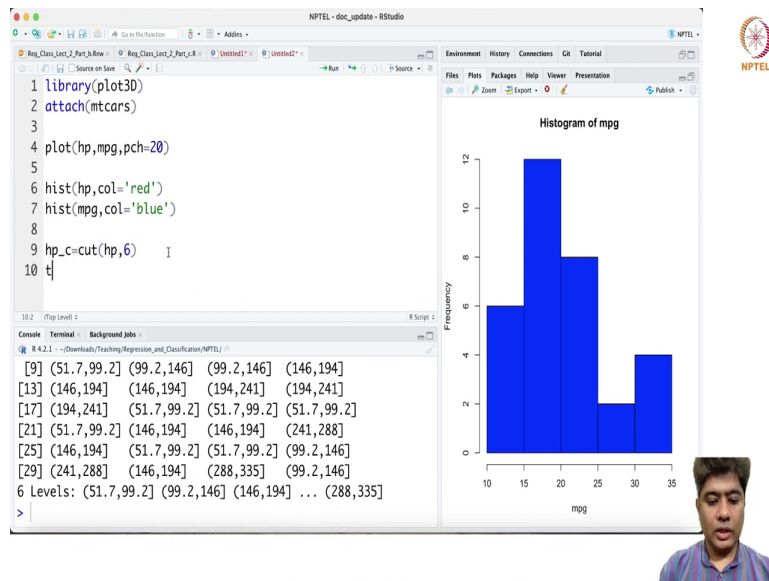
So, drawing a histogram for horsepower is pretty straightforward, if you just say hist; so, it will draw a histogram for the horsepower.

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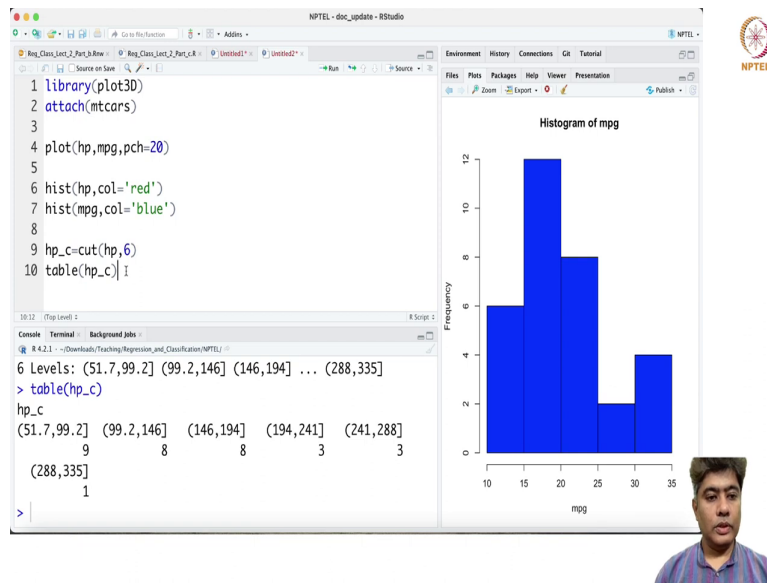
Similarly, you can draw a histogram for miles per gallon you can choose maybe a slightly different color maybe blue and so, this is miles per gallon. Now, what I am going to do I am going to first draw a joint table.

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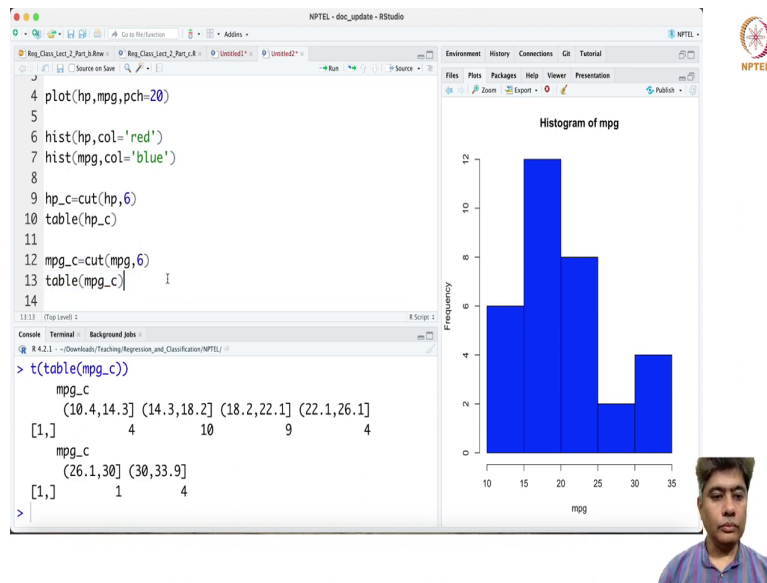
So, first you have to do a cut say cut hp it maybe 6; so, now, it will give me all the variables values which are between these different cuts.

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And if I just do a table of hp c, this will give me the frequency distribution of horsepower between the variables.

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The screenshot shows the RStudio interface with the following R code in the script editor:

```
4 plot(hp,mpg,pch=20)
5
6 hist(hp,col='red')
7 hist(mpg,col='blue')
8
9 hp_c=cut(hp,6)
10 table(hp_c)
11
12 mpg_c=cut(mpg,6)
13 table(mpg_c)
14
```

The console output shows the result of `t(table(mpg_c))`:

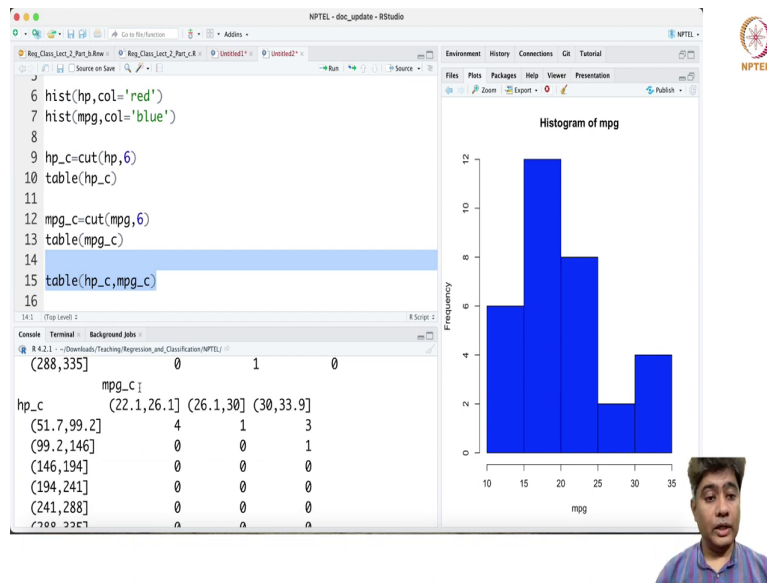
```
> t(table(mpg_c))
mpg_c
(10.4,14.3] (14.3,18.2] (18.2,22.1] (22.1,26.1]
[1,]      4         10          9          4
mpg_c
(26.1,30] (30,33.9]
[1,]      1          4
```

The histogram, titled "Histogram of mpg", shows the frequency distribution of miles per gallon. The x-axis is labeled "mpg" and ranges from 10 to 35. The y-axis is labeled "Frequency" and ranges from 0 to 12. The histogram consists of six blue bars representing bins of width 4. The frequencies for the bins are 4, 10, 9, 4, 1, and 4.



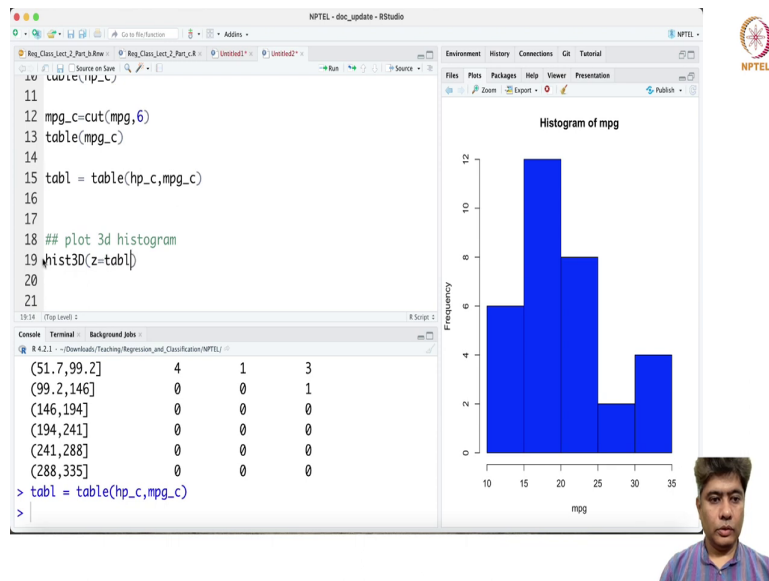
Now, similarly we can do a miles per gallon cut `cut(mpg,6)` and again if we do a label of cut. So, this will give us our my frequency table of miles per gallon; so, if you just transpose it.

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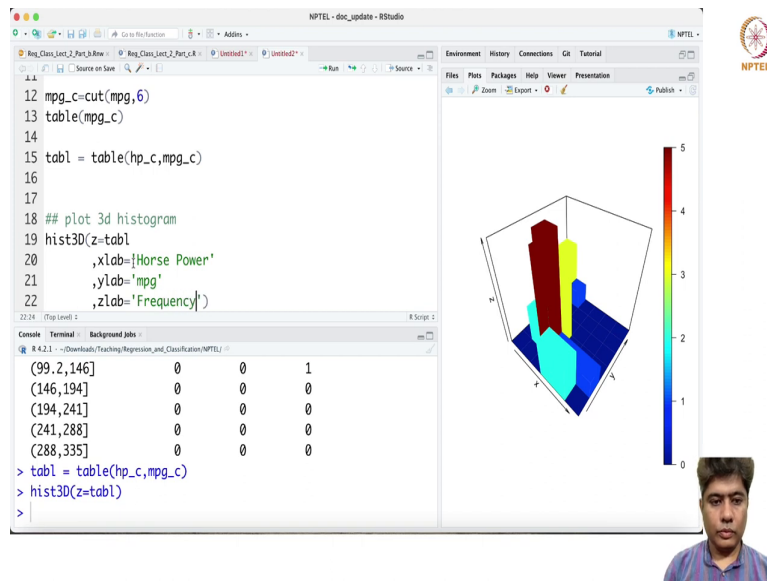
Now, we can joint create a joint table of horsepower versus miles per gallon. So, this gives us a joint table of horsepower versus miles per gallon.

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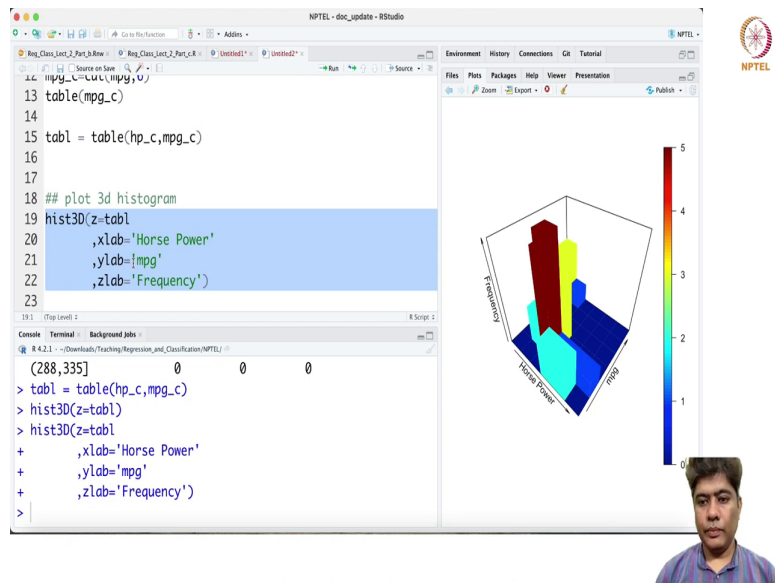
And let us call the tabl plot 3d histogram no plot 3d histogram is hist3D z equal to we have to just select table features.

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So, this is our 3D histogram, but we have to say which is what; so, we have to say xlab equal to Horse Power ylab is miles per gallon and zlab is equal to frequency ok.

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The screenshot displays the RStudio interface. The script editor on the left contains the following R code:

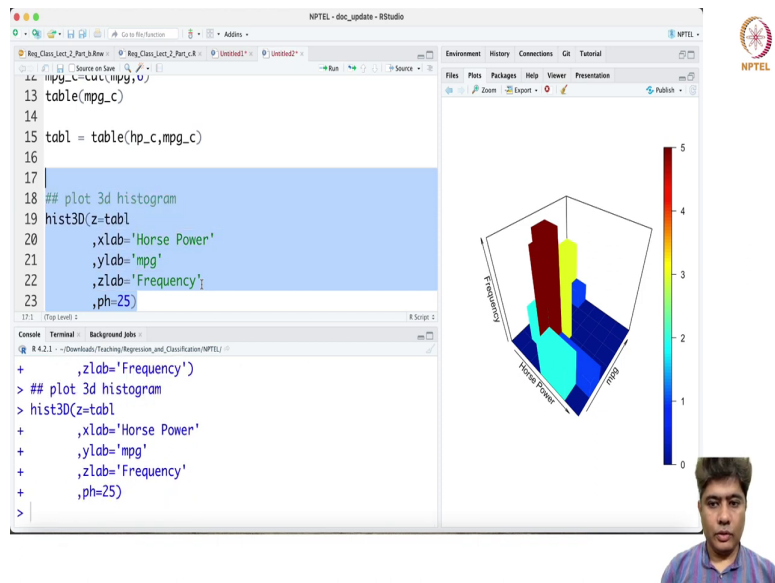
```
13 table(mpg_c)
14
15 tabl = table(hp_c,mpg_c)
16
17
18 ## plot 3d histogram
19 hist3D(z=tabl
20       ,xlab='Horse Power'
21       ,ylab='mpg'
22       ,zlab='Frequency')
23
```

The console on the bottom left shows the execution of the code:

```
(288,335]
> tabl = table(hp_c,mpg_c)
> hist3D(z=tabl)
> hist3D(z=tabl
+       ,xlab='Horse Power'
+       ,ylab='mpg'
+       ,zlab='Frequency')
>
```

The environment pane on the right shows a 3D bar plot. The x-axis is labeled 'Horse Power', the y-axis is labeled 'mpg', and the z-axis is labeled 'Frequency'. The plot shows several bars of varying heights, with a color scale on the right ranging from 0 to 5. The NPTEL logo is visible in the top right corner of the RStudio window.

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The screenshot shows the RStudio interface. The script editor on the left contains the following R code:

```
13 table(mpg_c)
14
15 tabl = table(hp_c,mpg_c)
16
17
18 ## plot 3d histogram
19 hist3D(z=tabl
20       ,xlab='Horse Power'
21       ,ylab='mpg'
22       ,zlab='Frequency')
23       ,ph=25)
```

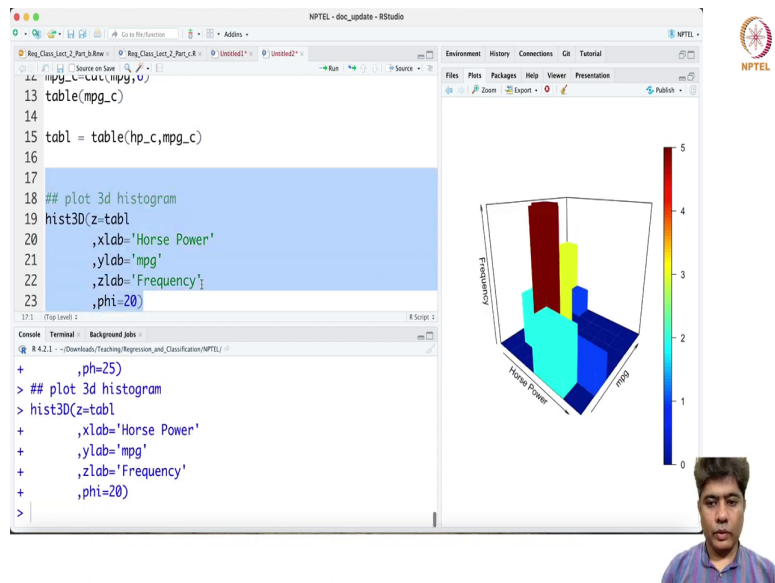
The console on the bottom left shows the execution of the code:

```
> ## plot 3d histogram
> hist3D(z=tabl
+       ,xlab='Horse Power'
+       ,ylab='mpg'
+       ,zlab='Frequency'
+       ,ph=25)
>
```

The plot window on the right displays a 3D histogram. The x-axis is labeled 'Horse Power', the y-axis is labeled 'mpg', and the z-axis is labeled 'Frequency'. The histogram bars are colored according to a frequency scale from 0 to 5, with a color bar on the right side of the plot. The NPTEL logo is visible in the top right corner of the RStudio window.

So, then you can choose ph to be 25 maybe then it will create a bit of a 5.

(Refer Slide Time: 06:24)



The screenshot shows the RStudio interface with a script editor on the left and a 3D histogram plot on the right. The script editor contains the following code:

```
13 table(mpg_c)
14
15 tabl = table(hp_c,mpg_c)
16
17
18 ## plot 3d histogram
19 hist3D(z=tabl
20       ,xlab='Horse Power'
21       ,ylab='mpg'
22       ,zlab='Frequency')
23
```

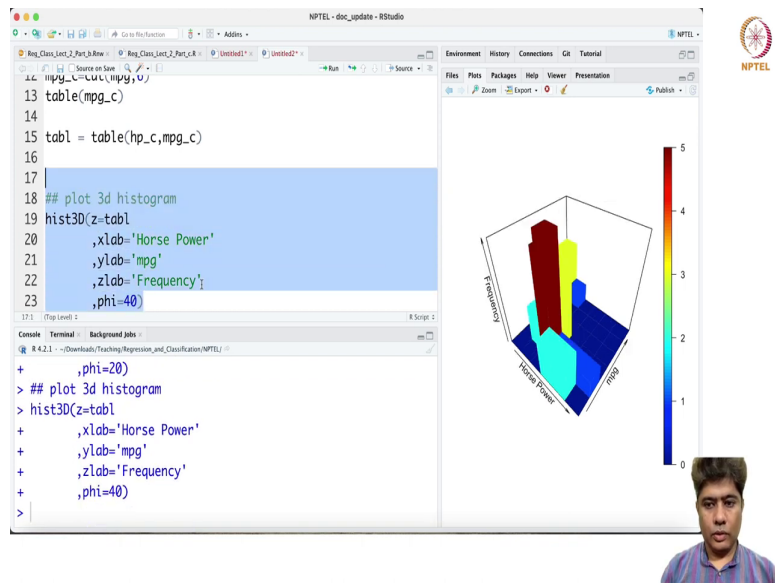
The console window shows the execution of the code:

```
17.1 | Top Level |
+      ,ph=25)
> ## plot 3d histogram
> hist3D(z=tabl
+       ,xlab='Horse Power'
+       ,ylab='mpg'
+       ,zlab='Frequency'
+       ,phi=20)
>
```

The 3D histogram plot displays the frequency distribution of Horse Power (x-axis) and mpg (y-axis). The z-axis represents Frequency, ranging from 0 to 5. The plot shows several bars of varying heights, with the highest bar reaching a frequency of 5. The plot is titled 'Frequency' and has axes labeled 'Horse Power' and 'mpg'. A color scale on the right indicates the frequency values, ranging from 0 (blue) to 5 (red).

Or sorry ph equal to 25 20.

(Refer Slide Time: 06:34)



The screenshot shows the RStudio interface. The script editor on the left contains the following code:

```
13 table(mpg_c)
14
15 tabl = table(hp_c,mpg_c)
16
17
18 ## plot 3d histogram
19 hist3D(z=tabl
20       ,xlab='Horse Power'
21       ,ylab='mpg'
22       ,zlab='Frequency';
23       ,phi=40)
```

The console on the bottom left shows the execution of the code:

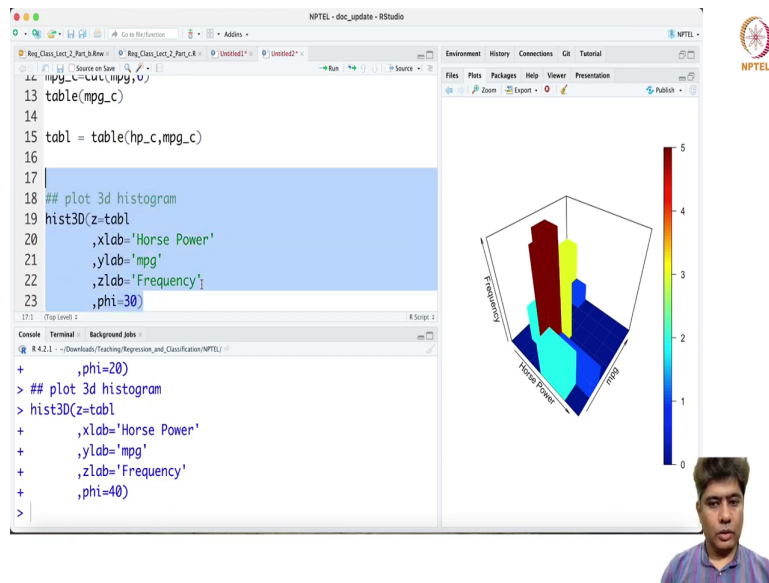
```
+ ,phi=20)
> ## plot 3d histogram
> hist3D(z=tabl
+       ,xlab='Horse Power'
+       ,ylab='mpg'
+       ,zlab='Frequency'
+       ,phi=40)
>
```

The plot window on the right displays a 3D histogram with 'Horse Power' on the x-axis, 'mpg' on the y-axis, and 'Frequency' on the z-axis. A color scale on the right indicates frequency values from 0 to 5. The histogram shows several bars of varying heights, with the highest bar reaching a frequency of 5. The plot is viewed from an angle of 40 degrees (phi=40).

NPTEL

And if you choose maybe 40 30.

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So, this gives you a idea about the joint distribution of miles per gallon and horsepower. So, that is how we are going to draw the you get a sense of what is the joint distribution of two variables. And now we are going back to theory about how to what is the regression line from a joint distribution.