Introduction to Statistical Hypothesis Testing
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Lecture – 04
R Tutorial 1

Hello friends. Welcome to the first tutorial R programming. In this tutorial, we will review some basic concepts of R like, scalar operations, vector operations, and matrix operations. First of all we will start at this point I will presume that everybody of you install R and R (Refer Time: 00:25) on their laptops or desktops. First we will start learning how to assign and value to a variable. So, assigning a value to variable it can be done in two ways.

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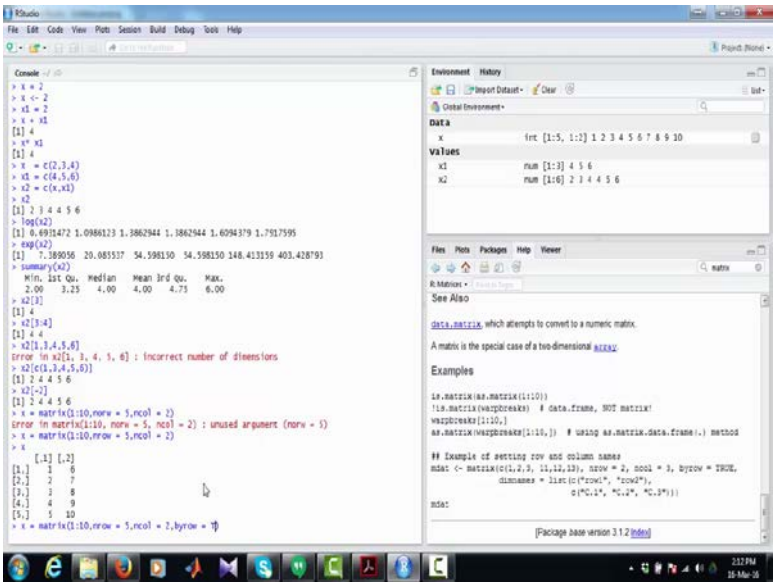

In one way, if using normal equal to operator or else using left hand operator. Now I was (Refer Time: 00:53) x and x 1, x a value 2 and x 1 variable value 2. Now, let me add this two variables for you, x plus x 1. Normally you can divide or multiply anything, it is a normal. You star of the better, you can multiply, you can slash or back slash or better you can divide and you can easy minus (Refer Time: 01:17) you can subtract or mistakes. So this super scalar operations.

Coming to vectors, so there is a subtle difference between vectors and matrices in R; in most of the softwares you can see the vectors are created as single column matrices, but in ours it is not the case, or vectors are different and matrices are different. Suppose, you have a vector 2, 3, 4, and you want to assign that 1 to a variable x. So, you can do this by c, c is the nothing but concatenation. Means, now you are concatenating 2, 3, 4 and you are storing index, we can see here x 2, 3, 4. So, it is (Refer Time: 02:01) will store all the values variables which you are assigning, all the variables which you are storing is there. X is 2, 3, 4. Now I will take another vector 4, 5, 6.

Suppose, now we have want to consonant this x and x 1 vectors and store in the variable x 2, x and x y, now it concatenate both elements in x and elements in x 1 are it stored in a value x 2. Normal what are the operations you will be doing on scalar like, logarithm exponential or else operations you can do on vectors, but one thing I had remember all these operations will do only at element wise. Suppose you want to calculate exponential of the vector. So it will calculate each element exponential it will return that thing, and you want to know more about this vector then you can summary of this vector.

So, you see (Refer Time: 03:07) come at it will later or first median, mean, median or content, first content, second content or this values you can see the first content minimum values 2 and maximize is 6. And first content, median, mean or this value if you look later. Suppose you want to extract these specific elements of this vector, so this was this can be done using square basis bracket, and by giving the corresponding index to themselves. Suppose you want to extract third element form this vector x 2 of 3, as you can see it is a third element and fourth element is four and four, so you (Refer Time: 03:48) third element. Suppose you want to extract 3 to 4.

In some operations you do not want to extract a particular element you want to extract remaining elements. So this can be done in two ways; one way is to give all the index x corresponding except that element. Suppose you do not want second element to be retrieved, so you can drop entire second element. This in or we can do it simply in simple terms. If you give negative index to that correspond main to put minus in front of that correspond elements which you do not want to retry. Now see the result is same it has not retrieve second element. So, this is the simplest way of doing in R. Like that you can

do it in R scalar operation anything.

Now, let us move on to matrix operations. In matrix operations, you can construct matrix by using matrix command. Thus, index all the things you can sight help, you can go to help and you can search for whatever command you want. Sorry, matrix it has listed with matrix or the things command. Now you can see what the hell, and syntax for these and what the options, various options, and then detailed description of all the things. And at last some example how to construct a matrix. Let consist a matrix of the elements 1 to 10.

Now, we has specified elements and now we have do give number of rows, it can take number of columns. Now, I am mentioning number of rows is 5 and the number of columns is 2, I am sorry (Refer Time: 05:37) it is nrow. So now, you can see x is 1, 2, 3. So first it has assigned all the values to column wise. Now if you suppose want to fill up the first row 1, 2 and 3, 4. Now you had to give by row equal to, by default a row option is there in logarithm matrix that will be falls.

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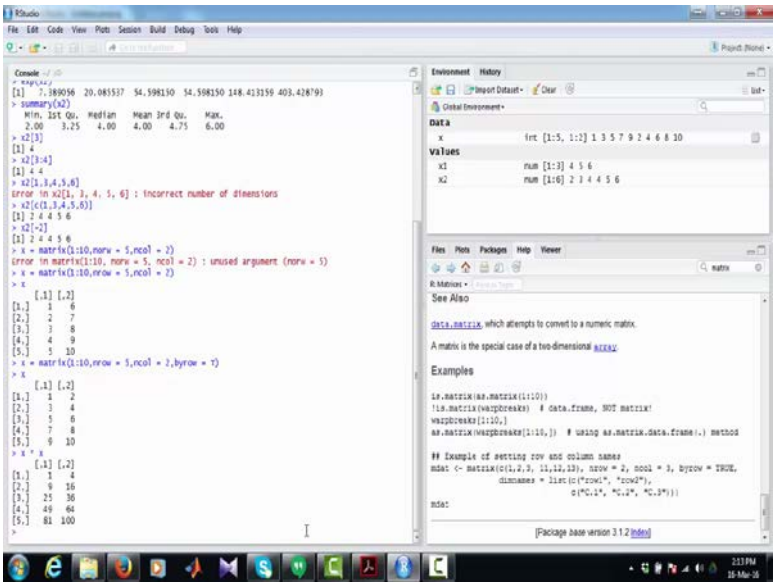

So, you had to (Refer Time: 06:02) it true this can be done by using by row equal to apply. Now, you can see 1, 2, 3 distinct, may all the operations which are turn on scalars

vectors you can do one matrix is also, except one thing matrix confiscation. This matrix confiscation is somewhat different. As you know matrix there two types of confiscation; one is what is element wise confiscation, or normal matrix confiscation. If you want to do element wise confiscation, you can give normal star over (Refer Time: 06:43) will do only element wise confiscation.

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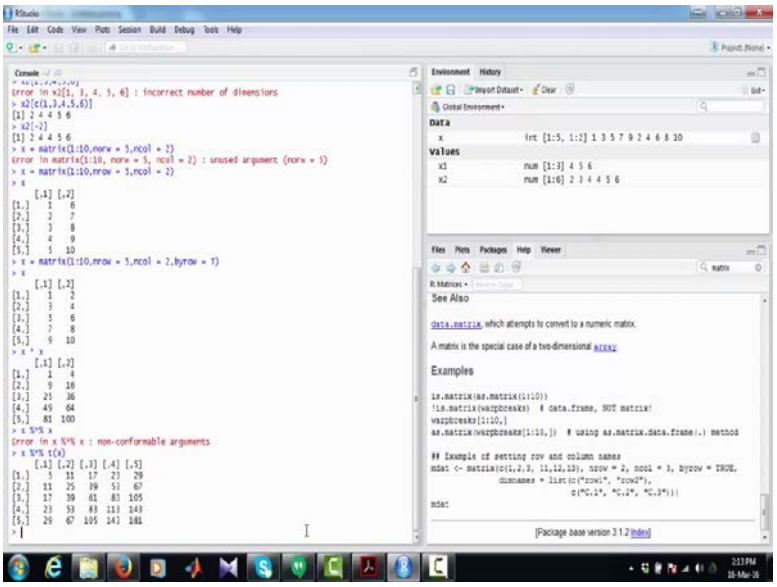

Suppose you want to use matrix confiscation then you want to enclose this star operator in a percentage simple. Sorry, because matrix confiscation like we had in use transpose. Because, t is nothing but a transpose operator, t of somewhere matrix equilibrium compute a transpose equilibrium in the transpose of the thing. Now what I did? I took a 5 by 2 matrix and I transpose multiple with the transpose means 5 by 2 and 2 by 5. I should get a 5 by 5 as an answer.

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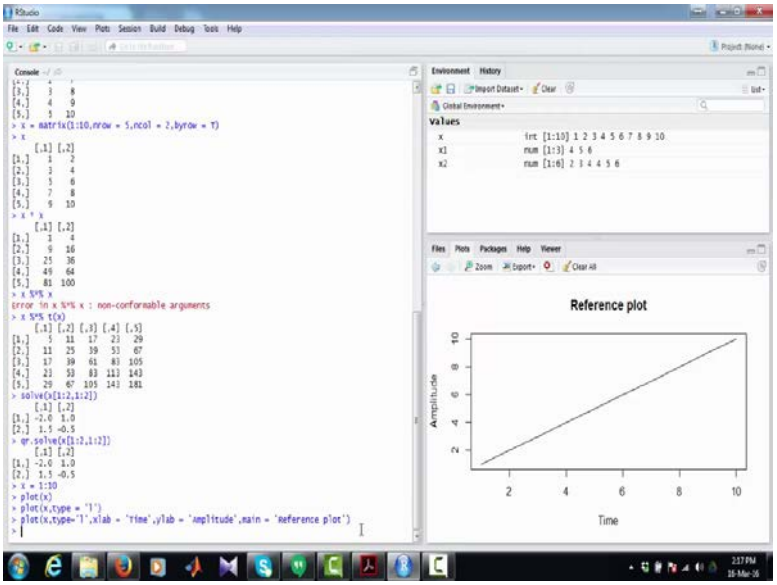

Now, next is how to compute matrix inverse. Matrix inverse can be compute by using solve command. Solve was, I am sorry because x is a 2 by 5 right so I want to extract to only, so this is the solve command. So, x of 1 to 2 1 to 2 is nothing but I am extracting first two rows and first two column, is extracting indices also as a like way there itself vector, but vector has only one row. But in matrix you have row and column so we have to give both row and column dimensions. So, 1 to 2 1 to 2 into left right the diamond and it will extract in the corresponding 2 by 2 matrix is (Refer Time: 08:02) inverse and by computing inverse we can use another combined also is (Refer Time: 08:08). You want now sum of sum 1 2.

So, the basic difference when you solve on (Refer Time: 08:21) service that you (Refer Time: 08:22) it ensures numerical stability while computing inverse that is all, remaining things is same. Now let us go the plots. How to plot? And suppose you want to (Refer Time: 08:41) so (Refer Time: 08:42) what effects. By default plot command will plot as a scatter plot, it will plot only the points it would not plot any right. Suppose you want to have lines then you can specify as I want to line plot. Here you can give some (Refer Time: 09:03) for this also as referred as plot.

So, you can see this and you can change this point of this access also. And one more

thing, you can recall the previously executed commands by using up arrow, we pick another previously executed command it will be (Refer Time: 09:33). So, for that to change the found access you can see how the found access has changed.

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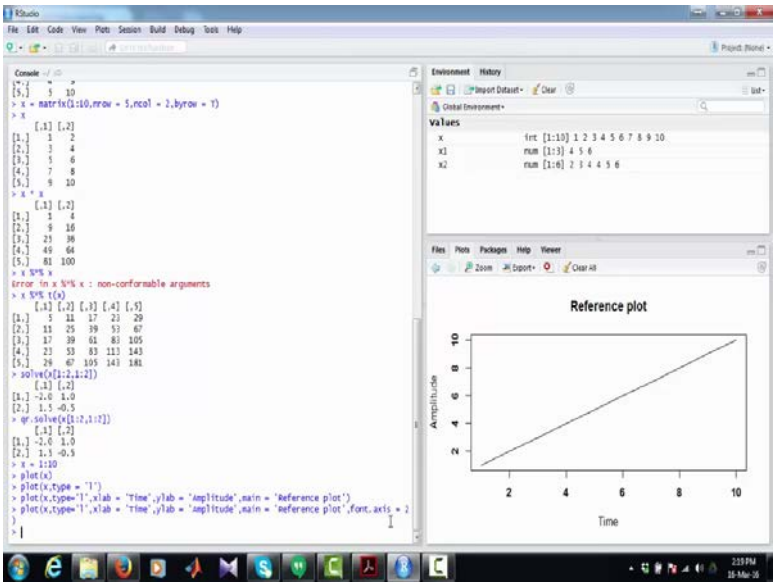

So like that it will play around these plots in R. So this is the end of the first tutorial R.

Then next tutorial earlier we will discuss about some properties (Refer Time: 09:49) function which (Refer Time: 09:51) with mean, covariance of a distinct.

Thank you.