Introduction to R Software
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Lecture – 19
Lists

Welcome to the next lecture on Introduction to R software. In the earlier lecture, we started a discussion on list and we had understood the basic concept of lists and what is the difference between a list vector and matrix. And we also discussed the aspect of modes that what are the different modes, in which the data can be stored in the memory of a computer.

Now we continue the same lecture and we try to take up certain example and then we try to understand what are the different features of list. But before that, suppose you want to have some information about list what are the commands and how to operate it, what are the different options. So, as I said earlier the best option is this try to seek help.

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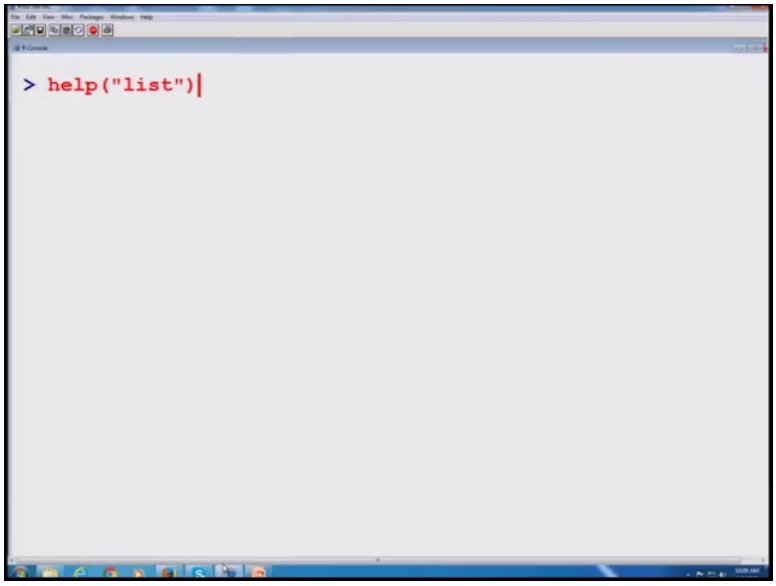

So, we can go to the R console and type here the help for the list and as soon as I enter here you can see here the control brings us to the website of the R.

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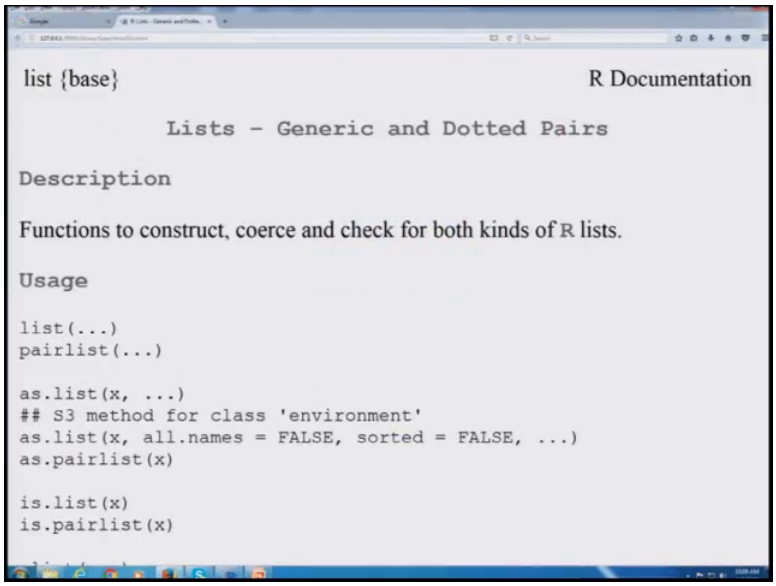

And here they have tried to give you all the information for example, list is command that is contained in the base package and here you can see here the different types of commands are there. More details can be found from here as I said earlier it is not really possible for me to read out all the things, but I would simply request you that you keep in mind these commands.

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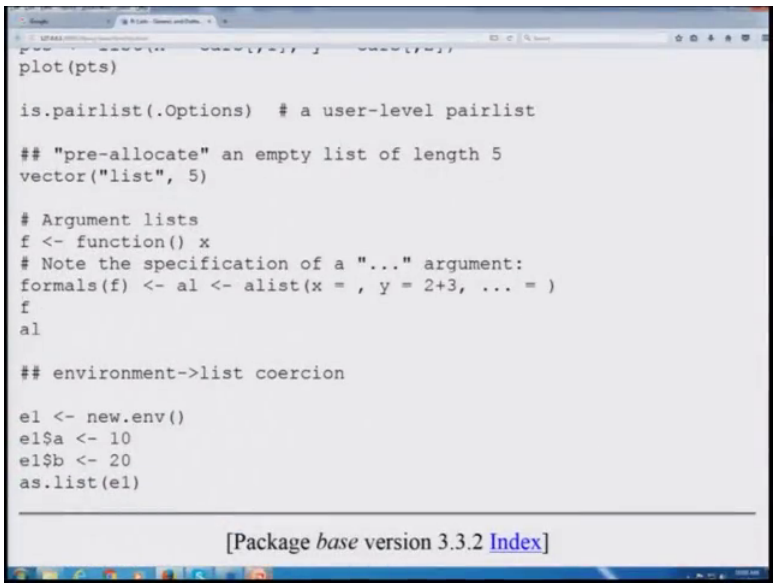

And whenever you need it; you can simply go to this site, try to spend here some time and can understand it. Now, we continue with our lecture and we will let us try to take some example to understand more about list command.

So, here if you try to see I have constructed here two matrices; one I am denoting by here x 1 and see another by here x 2. And these are simply your here 2 by 2 matrix number of rows here in both the cases are two number of columns are here 2. And all the data has been arranged by rows and the only difference is that in the matrix x 1; I am trying to take a sequence of 1 to 4 and in the matrix x 2; I am trying to take a sequence of 5 to 8.

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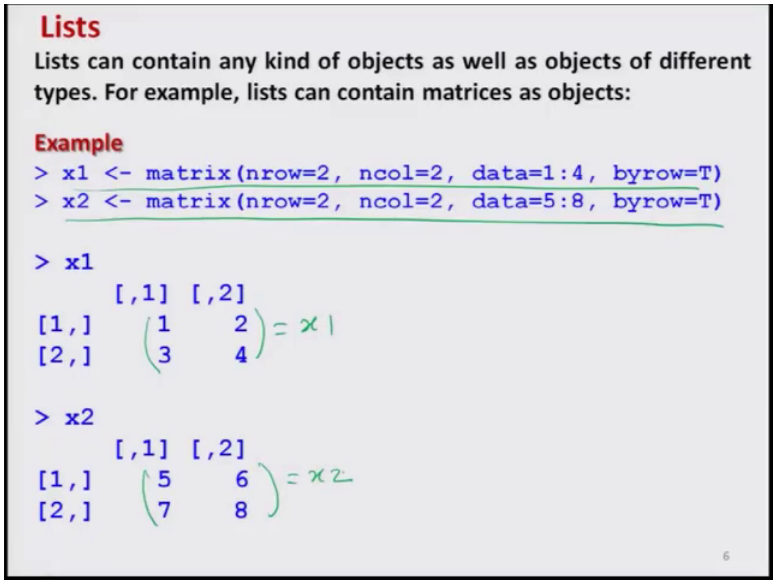

So, in the matrix x1; you can see this is here like this, x1 matrix and x2; matrix will look like this. This is your here x2 matrix and in case if I try to find out the addition of x1 and x2 I get here this thing. What I am trying to show you here is that; in case if I try to create two matrices which I have got all the numbers. Then for example, it is possible to have a mathematical operator over them. For example, I have used the addition of x1 and x2 and we can see here the outcome. Just for the sake of illustration; let us try to do it here in the R console and try to see what happens.

So, you can see here this is my here x1 matrix and this is my here x2 matrix and when I am trying to add them x1 plus x2 giving me this outcome. So, you can see here up to now there is no problem. And in the next slide this is the screenshot of this outcome.

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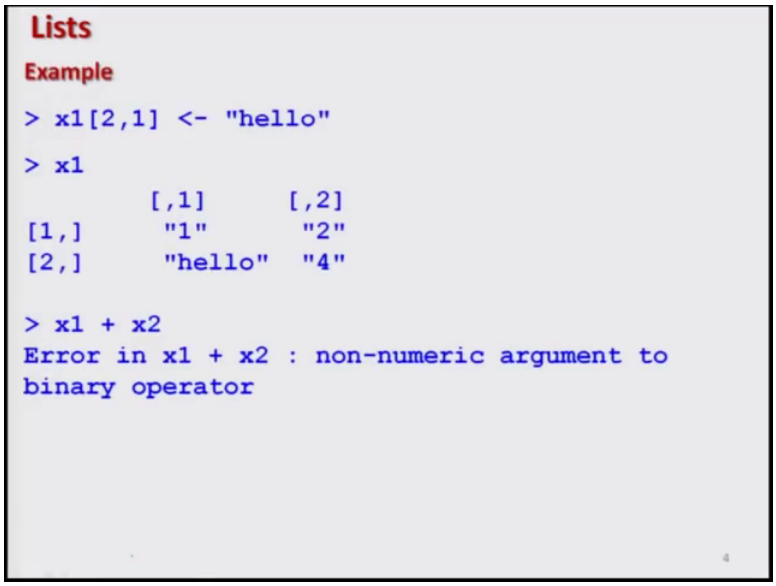

So, now what we try to do that; I try to replace one of the element of x1 matrix by some character and I replace it by say x 2 1 element as by the character hello. As soon as I do it my x1 matrix will become like this; let us try to do it and see what happens. One thing what you have to keep in mind here that here x1 plus x2 was well defined.

So, I simply try to keep it here so, that you can see it here and x1 is my this thing and now I am trying to replace here; the two one element by hello and now, if you try to see here your x1 becomes here like this.

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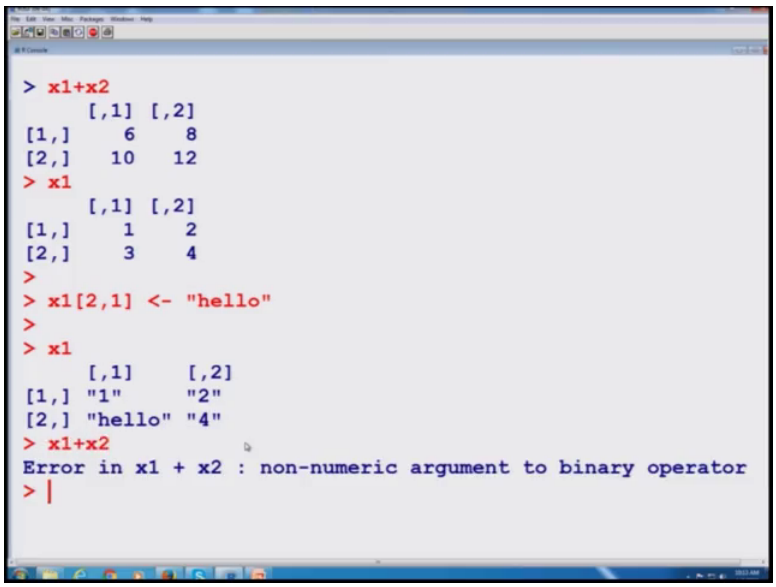

And remember that I have not text x2; so, this has all the number 5, 6, 7, 8; now if I try to find out the sum of x1 and x2; it says there is an error; the argument is non numeric. So, now you can see that in some situation you need here a matrix or arrangement of data that can contain all sorts of information; whether the information is in the form of character or number. Now in the next slide I have given the screenshot of whatever we have obtained.

So, now how do you see over here? That we have replaced a number by a character and then I have a different type of data structure. And this data structure of say x2; that contains some number as well as a character say called as hello. So, let us now try to understand more about this list by going through with the same example. So, here I come back here again and I try to redefine my matrix all with the numbers.

So, first we try to a concentrate on the list that is created only by numbers and then we will try to proceed further. So, again here I have taken the same matrix here once again that we had considered initially. So, this is my here matrix x1 and this is my here matrix x2; I am trying to repeat this sentence again because you should not get confused that I am trying to take x1; which has an element with hello.

So, both x1 and x2 have only the numbers. Now I try to create here a list; as we understood in the earlier lecture what is the list? We are trying to compile different type of information together; for example, we compile the information of the marks obtained in different subjects by a student. How much he has got in mathematics? How much he has got in English? How much he has got in Social Sciences? And so, on . So, now I am trying to create a list of these two matrices. So, this can be done here by this command; I simply have to write down here list which is the basic command and inside this bracket; I have to write down the two matrices separated by a comma.

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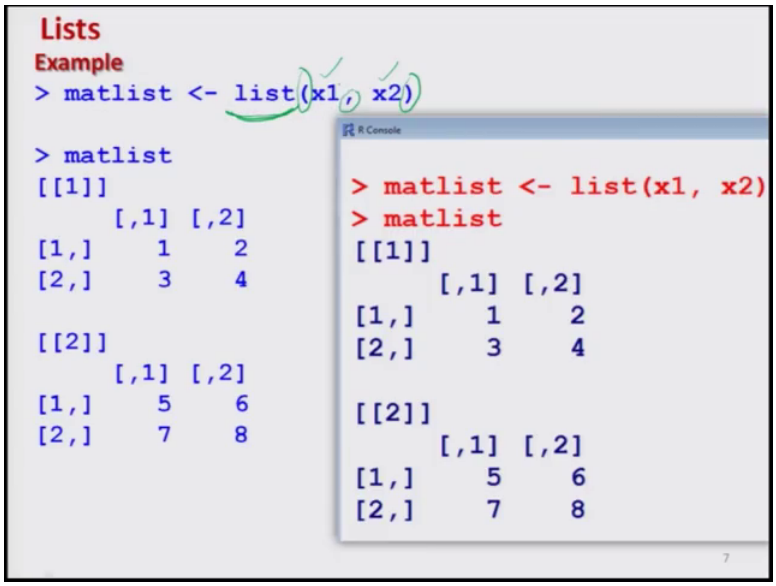

And similarly if you have more then you can just continue by separating them by comma and I try to e store the outcome here in a new variable see here matlist; I am trying to do it. So, that I can call my this value later on also. As soon as you see the outcome here, this will look like this and here is the screenshot. But before that let us try to see what happens over here in the R console.

So, let me try to have here the same matrices that you who can see; I can use the arrow keys and I can go back and you can see here; this is my here x1 and this is my here x2 and now I am trying to create my list using this command; list x1 comma x2 inside the bracket. So, I try to do it here matlist; so, I simply try to clear the screen so, that you can see the entire 1.

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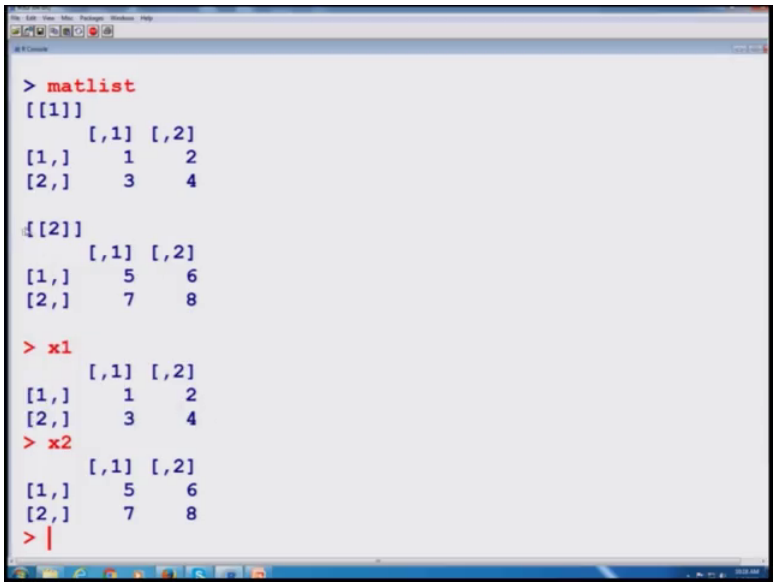

Now, if I try to see what is the outcome is stored in matlist, you can see here this outcome. If you try to observe here; what is this? And what is here this? Which I have just highlighted; can you identify what was your x1? And what was your x2? Try to concentrate on the part which I am highlighting, do you think that this part and this part x1; which I have just highlighted are the same.

And similarly now I am highlighting this part please try to concentrate and try to see what is happening with this here x2. Do not you think this x2 is the same as this one? Yes they are actually the same. So, you can see here that with this part is simply your here x1 and this part here is simply your here x2.

So, now, I have created a list in which I have given the information about x1 and x2 together. Now, I come to another aspect; suppose I have got a list and I want to extract the information on a particular element, a particular address. For example, in this mat list I have here two values; one for the matrix x1 and say another for the matrix x2. Suppose my objective is that that I want to know what is the first element in the list mat list and what is the second element in the mat list.

One thing which you have to keep in mind that the variable name need not contain the word list; I have taken the list so that you can understand it and you can keep in your mind that we are trying to deal with the list; otherwise there is no rule to have a list in the variable name.

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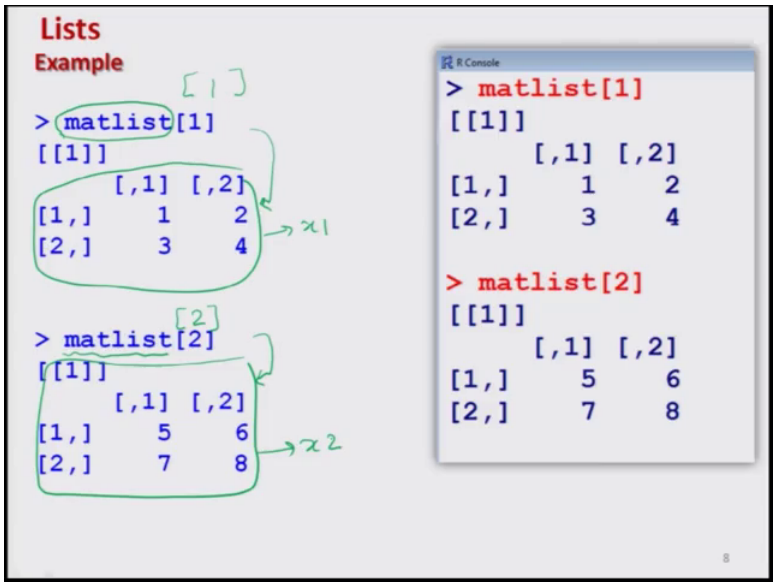

So, now, in order to find out the first element of the mat list; we have to write like this. First I have to write down the variable name; that is a list we have given a name mat list. Then inside the square bracket, I have written here the first element and then as you as soon as you enter here you get this outcome. So, you can see here that this outcome is nothing but your here x1. And similarly; in case if I want to have the second element in the list; again I have to write down the variable name matlist and inside the square bracket; I have to write down here the two and as soon as you enter it, you get here this type of outcome which is nothing but your matrix x2.

Now, there can be another question that if you want to extract a particular element of the x1 matrix or a particular element of the x2 matrix; then that can also be done that we will see later on, but firstly, let us try to operate this thing in the R console.

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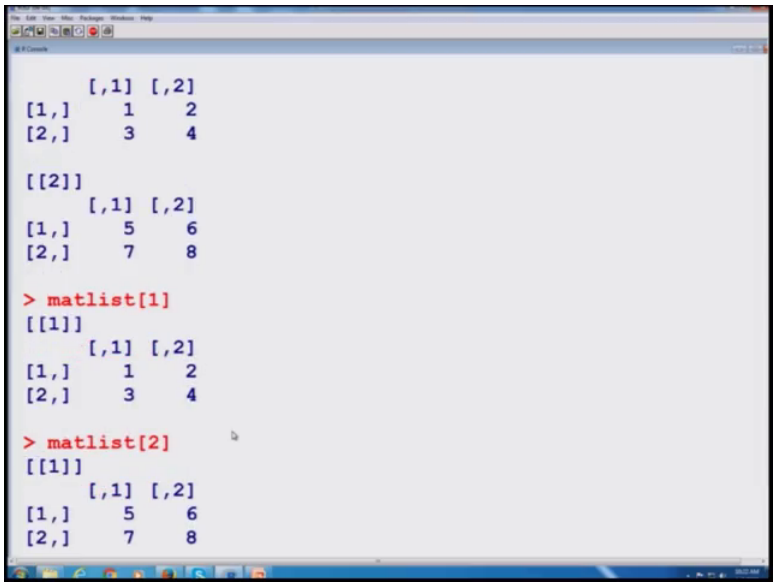

So, you can see here; so, this is your here mat list and now I want to extract the first element of matlist; this is your x1 and similarly in case if I try to find out here the second element; this is here the matrix x2.

So, this is how you can also extract the information on a particular element in a matrix and I will also have given here the screenshot of the same operation.

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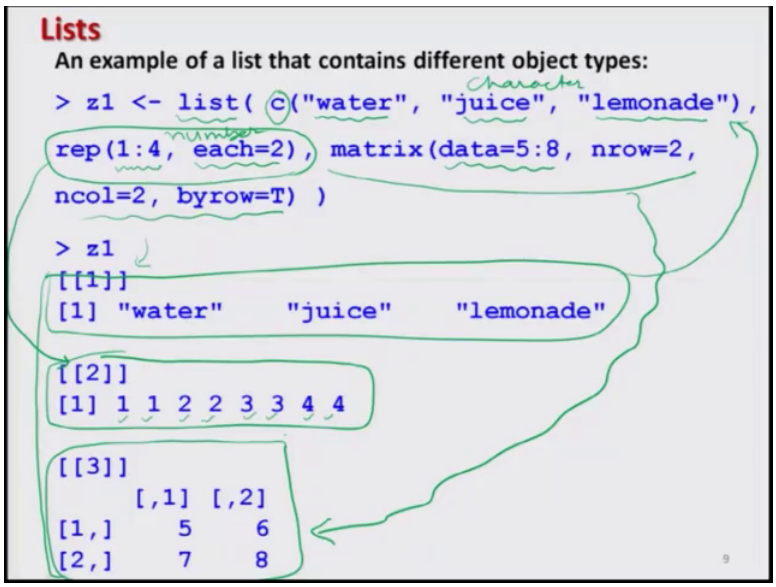

Now, I try to take up another example little bit more complicated; complicated in the sense that it contains different types of modes. So, I try to create here the list; this is the

command and inside the brackets, I have to specify all the elements of the list. First of all I am trying to take a vector of characteristic strings; I am trying to take here 3 litres water, juice and lemonade and I try to combine them with the operator c.

So, this is a hera character; now I try to create another element by the data set from 1 to 4; that means, this is data set 1, 2, 3, 4 and each of the data set is repeated two times. So, this is going to be a number; so, here this is character and here this is number. And then I try to take the same matrix x2 that we have taken earlier; that I try to create a 2 by 2 matrix with the data set 5, 6, 7, 8; with the values are arranged in rows.

So, now, you can see here that this list is containing three types of objects. One is character number and then n matrix. Now, if I try to create this list and if I try to obtain how does this z 1 list looks like; you see here now I have not written z 1 list just to give you an idea that this variable name need not to have R name list in their names.

So, you will get here this type of outcome. So, you can see here that this part; this is nothing but the first element in your this here see; water juice and lemonade. This second part; this thing repeated 1 to 4 and each is being repeated two times.

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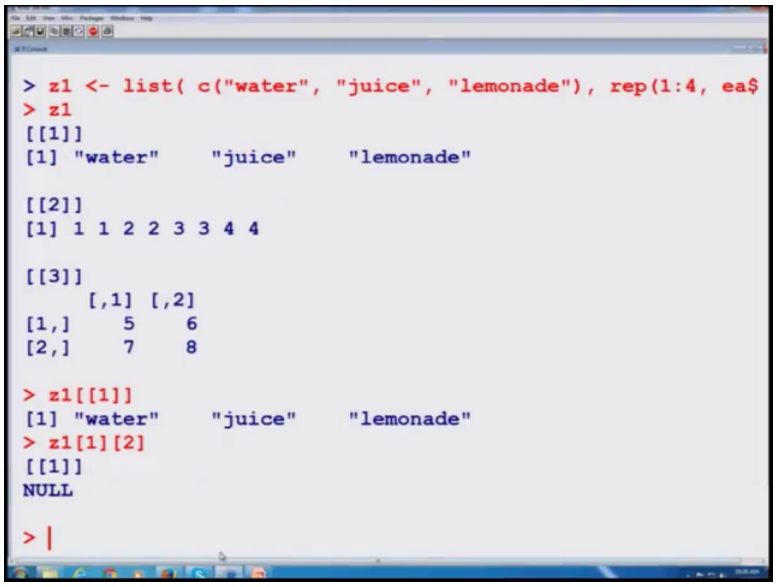

So, you can see here 1, 1 two times; 2, 2 two times; 3, 3 two times and 4, 4 two times and the third element is here; the matrix which is coming over here. Let us try to do it over

the R console and try to see whether this thing really happens or not. So, you can see here; I have created that list and this list look like this one.

And then I have given the screenshot; this part we will not be clear to you because it is written in very small part but anyway you have seen it in the R console what I had done and this is the outcome.

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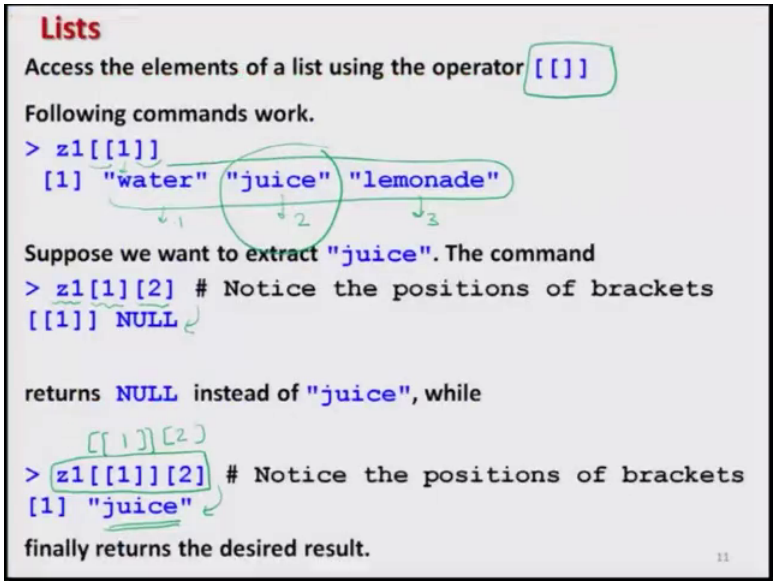

Now, I try to do the same thing that I am trying to obtain a particular element of the list and that I would like to have its position also. So, one can access the elements of a list using the operator; this one. Note that here we are using two square brackets; please try to have a note and try to observe the difference between the use of a single pair of bracket and double pair of bracket.

Now, when I try to see here z 1; with this double brackets, if I try to write here the first; then it gives me the outcome like as this which is the first element in the z 1 list. Now, here I would try to take a different example and would try to show you what really happens if you try to make this type of mistake. So, if you try to see; this is my at the position of 1 water, juice is at position number 2 and lemonade is at position number 3.

Suppose, I want to have the information on juice; which is at the second position; what I try to do here I would try to write down here z 1; the name of the list. Inside the bracket; I write the first element and then I try to write in another bracket the position number 2.

And we believe that this is going to give us the information about juice; but as soon as you enter here you get here null.

And we do not get here juice, in case if you really want to have the information on juice you have to write it inside this double bracket. Then first you have to write down here these two brackets in which you need to is specify the address of the element in the list which is here 1; followed by another single bracket in which you have to specify the position of the element; inside the first element in that list; which is here 2; that is juice.

And if you try to enter here; now here on the R console you then you get here the answer here to be the juice. Let us try to do this thing on the R console and try to see what really happens. So, you can see here if I try to do it here because it is giving me here water, juice and lemonade and when I am trying to take up here the first option.

This is actually not correct but it is important for us to see what happens; you can see here this is giving me null. It is doing something else and it is not the same what we expected.

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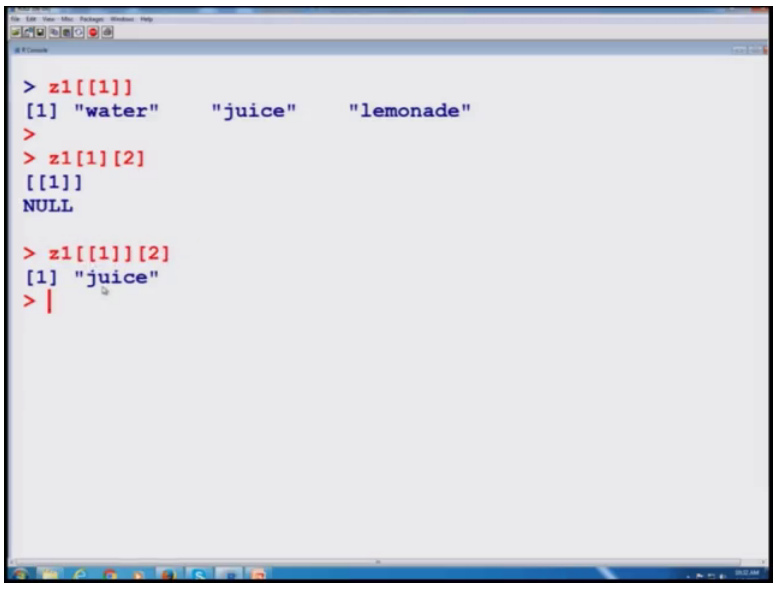

So, now I try to excess the juice element over here; you can see here when I am trying to write down this command is z 1; inside double bracket 1 that may; it is trying to give us the list of elements in the first position, inside the list vector. When I am trying to excess the information about here juice; I assume that this can be done by the variable z 1; first

element in list and then the second position inside the list, but it is not giving me the required outcome; it is giving me as the null.

But on the other hand; if I try to use here the double brackets here and here and try to repeat the same command here. So, then I am getting the same outcome juice which we desired. So, this is the use of bracket which you have to keep in mind; whenever you are dealing with list whereas; this is not the case when we are trying to use the operator c; that is combined operator. So, that is pretty important point which you have to keep in mind. So, in the next slide; I am trying to give you here the same output of the screenshot.

So, now with this list I have tried to give you an idea that how to create a list; I have taken here some examples one example which is trying to show that only the data of one type is used and in another example; I have taken different types of datasets and then I have combined it through the list command. So, we have learnt two things how to create a list? And how to access a particular element in the list and also we have noticed that if you want to have a particular value inside the element of a list; then how to get it done by using the double bracket sign.

So, I would say try to take some more example, try to create a different example yourself in combination with numbers, matrix or say character in matrix and so, on and try to practice the list command till then goodbye.