DATA COMPRESSION 03

So we saw some basic functionality on num pad in this video we will see some more of these and after that we will start the next tutorial. So let's see this let me import it again import the numpy library again so i will write import import numpy as np so ok so let me create an array so np is equal to what was the command np dot array and then i will give the list which is let say one comma two. Now i want to i want to know the data type of this data type of this list or this another numbers what is it? I will just print i will just print as x dot dtype that's it if you run see int thirty two that is thirty two bit int ok suppose i change the array as let's say this as one point o and this is two point o and now if you run this you see a float sixty four bit so this is a floating point value that's why data type is showing is float sixty four great. Suppose you want to be force it to be something else you saw that it was showing int thirty two ok and if i want it to be it t be a sixty four suppose i want more values there which i know can be represented in sixty four bit only i need more numbers more numbers means more digits i mean more binary value i need so i can represent a big number. Suppose i want sixty four bit number to be represented so i need to force my data type to be a sixty four bit so what will i do i will create an array np dot array ok i will give the sorry i will give the list which i say one comma two and i will force it as dtype is equal to np dot int sixty four ok ok and now if i type print x dot dtype you see now it showing sixty four now it is allocated sixty four bit to represent these values, now you can if number which is as big as which can only be represented by sixty four bit binary numbers then you can represent it to before that you would have try to represented to would have been showing some overflow value or some other value. So you can force the number to represent in sixty four bit or even thirty two bit. Great now the best part of numpy is that why we use in post video that i told you that the main reason of using numpy is mostly to do some operations with array and matrix mostly matrix so matrix operations are very very easy in numpy and in most of the machine learning ai based technologies mostly it is matrix operations only. If you see an image it is basically nothing bunch of pixels represented in a matrix form so suppose you see a you see an image of let say five one two cross five one two and the height is five one two and the width is five one two if you read the image in a computer you see a matrix of actually you see a matrix three dimension matrix actually n cross p whatever so three dimensional matrix will be there and each with the size of one two cross five one two why three dimensional matrix because it contains rgb values red green and blue. And each cell of the matrix will contain a value which is between zero to two fifty five representing what range of red it is, what range of blue it is and what range of green it is then mixing all this three you get particular pixel value and then image is displayed in computer, this is the in general way of representing an image or in simple form see a grey scale image grey scale image means zero to two fifty five each pixel will have only value from zero to two fifty five, zero means black and two fifty five means white s whatever number if you are getting will be between black and white only. So there will be only one matrix one matrix you can imagine of let say five one two cross five one two and each cell will contain value from zero to two fifty five only so it's a matrix of the computer sees it as a matrix only and if you know matrix operations easily you can do a lot of things with that with that image that's what image processing people do they see it is in matrix and then they do lot of things with that then enhancement another processing is very

feasible with images so let me do a little bit of math with this numpy library so that we get comfortable with the array operations and matrix operations. Ok let's see this i have imported numpy i will create one array let's say x as np dot array ok and let's say two dimensional list will be there so first is one comma two and second is again three comma four ok and i want it to be float so i will just force it using float not float no dot float that is sixty four bit and another array sorry another array of np dot again two dimensional array so first row is let's say five comma six and second row is let's say seven comma eight and again i am forcing it to be float just like that no reason for this just doing it. Float sixty four sixty four bit awesome. Let me see the error first here ok sorry ok so this is awesome let me just run it and i will do all the operations here on my console so its gets easy for me to follow let's see this. I will just bring x plus y x plus y let me see what it does, is it correct can you see whether the x plus y ok or not? If you see that it has done the element by element addition so the if you see the first matrix the two dimensional the first row was one two and the second row was three four. Thus the second matrix the first row was five six and second row was seven eight if you do the element by element addition element by element means what first row first column that is one comma one is one here and for the second matrix one comma one is five, five plus one gets is six so first element is six, since it is float six point is coming, if i just print x then see y ok same goes for the second element which is which is what eight six plus two is eight and third element is ten seven plus three and the twelve great or you can do what you can just print here what np dot add you can just pass x comma y which is which are matrices will show this in image z. Now let me do some other operations let me subtract this two matrices subtraction means element by element subtraction so what will you write one thing i can write is just print x minus y and it will give me the is it correct? Five minus one is x minus y minus four six minus two four oh my god see minus four minus four it gives the subtraction in minus four minus four great or i can just np dot rather than writing add i can just subtract x comma y and it will give me the same result. What else can you think any arithmetic operations next is of course multiplication so i can just write print x multiplied by y and it will give me the element by element multiplication five into one is five, six into two is twelve, seven into three is twenty one, eight four is thirty two. So eight four is thirty two so i am getting or i can write print again np dot multiply sorry multiply x comma y same result or i can even divide the arrays matrices that is x divide by y will give me x divide by y, you can check the result so this is very easy these i am just showing the basic operations you can do lot of other stuffs in using numpy library so suppose if i want to print np dot sqrt which is square root of let's say x only, it will give the square root of all the elements one is one this is what four sorry two square root of two is one point four one, then square root of three, square root of four or same thing i can do it for y also it will give me the element value, there are lot of things you can do with this. So this is just to show one thing is that in programming assignments somewhere we ask how to i think in week three or week four maybe i don't remember, where you have to print the transpose of the matrix nothing else you just have to transport it and print it it's very easy in numpy so let me just delete this part i don't want this float value to be hanging on this whole integer to make it very clear let me just run it and see my x ok one two three four is there, now if i want to print the transpose of this matrix x is very easy in numpy i will just print x dot capital t one three four two that's it you can see one three will become first column will come first row one three two four so if it is small matrix

three cross three or even four cross four it is very easy to do this with the way you have been doing right now suppose the matrix size is lets say thousand cross thousand literally very time consuming to write the code actually see even in this numpy library in the library behind the code same thing is going on what we are doing it not like it is magic just doing it, the same amount of time it take to do it but it is easy for us to call this and do some operations that's it nothing else the time actually the same. So, to just reduce the time of the programmer this kind of libraries are build and that's why python is very popular because actually the time program takes is way higher than other programming languages let's say c and c plus plus so python takes more than one and a half let's say one point if a program takes x amount of time, python will take definitely one point five x or may be more than that amount of time because python is just for the programmers to make for programmers to make their life simple that's it and c is to mostly most of the systems are designed in c plus plus so that they are very efficient and they run very fast. Python is for basically to for the mostly the researchers are doing using python to to do their research and see how their things are working. That's it. So these libraries are to make the to make our life very easy and i very less amount of time we can code. Ok there are lot of things let's say if i want to sum all the elements of this matrix i will just write let me write here print np dot sum and sum of what sum of x it will just print and show me ten four plus two plus three is ten yeah or if i just want to print the sum of first row the sum of first row is just if i want to print the sum of first row i will just np dot sum of tutorial came up x comma x is i will put zero means its sum of all the sorry sum of first column ok so this is the first column this is the second column so column wise it will show first column is three plus one which is four and second column is four plus two which is six so column wise it will give you the result or if i put it x is one then it will show you the row wise so one plus first row is one two so one plus two is three, second row is three four, three plus four is seven so there are lot of other operations which you can do with numpy. I just wanted to give you the how matrix are illustrated in numpy and how we can do lot of operations using numpy on matrixes. So we will be using little bit of numpy library in our next video so this is the very quick tutorial for numpy, you can go through the documents of numpy just goggle it, and many people have written a lot of tutorial on numpy you can just check it, it is very easy to understand and even if you face any problem with the numpy you can just post it on the discussion form. In next video will do something using this numpy on images, Thank you.