DATA COMPRESSION 04

Hi people, so in last video we saw the basics of numpy library and how we can do different operations on matrices and arrays using the python library of numpy. Now in this video i will show you a simple a very naive method to compress an image and how easy to do with the numpy libraries and image libraries now the idea is to motivate you people to see the compression and to understand how exactly image compression another kind all other compression happens and this is the very naive way of compressing so this the compression which i am going to show you in this video today will be lossy compression lossy means we are going to lose some data but still things will be image will be visible and you will be able to see the details of the image but you will definitely use some data though so that's why this kind of compression lose data after compressing is known as lossy compression. Where as in there are some compression techniques where you don't lose any data but the size is reduced those kind of compression are known as loss less compression so in this video we will show a very very basic method which you will appreciate and you will see how we can compress an image, so in last video as you have seen that we have told you that image is nothing but bunch of numbers in representing in matrix so whenever you load an image in python or any programming language its nothing it's just an matrix with some rows and columns so whatever is the height of image or width of image each point of image is pixel, pixel is nothing but value from zero to two fifty five if it is an rgb in rgb scale that it will be a three dimensional matrix but let us assume that we are using some images where the image is a grey scale it means only one matrix and each cell i mean each cell of the matrix will have the values from zero to two fifty five, zero to two fifty five means that if it is close to zero it means it is close to black, and if it is close to two fifty five means it is close to white, in this way you can represent an image in an grey scale, grey scale means there won't be any colour will be like black and white image but mostly everything you can visualise through it. So let's see this will take an grey scale image grey scale image and then will try to compress it so i have an image here you can see you search it on Google also lena so it's a grey scale image grey scale you can see it is a black and white image so whatever if you see if you load it in computer and through python any python library that's a pil and see this, this is nothing but just a matrix and so the size of the image is five one two cross five one two it means there are five one two row and five one two columns so it means five one two cross five one two pixels are there and what are those pixels? It's nothing it's just value from zero to two fifty five so that's why it si a grey scale image. Ok so what we are going to do? We are going to compress this image now, you all know that zero to two fifty five means it is a value zero to two fifty five means it is value between zero to two to the power of eight exactly two to the power of eight is two fifty six exactly it is a value from zero to two to the power of eight minus one ok so what we are going to do is we are going to map this values of zero to two fifty five to just zero to eight that's it that's our compression. So what does it mean exactly? So whatever values you are getting, you will somehow map it eight bit so zero to two fifty five means the values are of eight bit if you do the math then you will understand that eight bit means that you need eight bits to represent a value from zero to two fifty five ok just use your pen and paper you will understand what i am saying you need eight bit integer or whatever you are using to represent value from zero to two fifty five but you want to represent value from zero

to eight you just need three bit. So what we are going to do? We are going to map this zero to two fifty five values of the of this matrix of this image to eight bit image to three bit image which means zero to right value that's it that will be our compression definitely we are going to lose some data you will not be able to see the image very clearly but something if you are intension is to do something else with the image or just to see the lines of the image you can compress the images and you can do the analysis in other way you let's see your motive is not to see the image clearly but to do some other kind of analysis and you need very less size image then you can compress such image in an eight bit image to three bit image you can do your analysis so that's what we are going to do so its that i am just using the three bit image you can compress it to a five bit also eight bit you can compress it to five bit or any number kind of thing so let's see this. So i am going to import numpy library import numpy ok and then i will take the image library of image function of pil library so from pil import image great ok i will just load my image which is you can see its lena dot jpg so i have imported the image function this is not image it is actually image function open and then i will then jpg awesome i will just load this image in a new variable lets say pixel map im dot load let me just run it so see it ok yes running if you just type here im dot in my console im dot show show me the image great so everything is perfect here till now ok just as i told you i just want to see this images as the matrix so just using my numpy library i will import this image as an array ok so numpy dot as array is a function too just load this image i will again image dot open and i will pass the image lena dot jpg ok let me just run this let me just see this I. So you can see this is just a matrix so there are i mean dot dot dot it means these columns are missing they are not showing the column so you can see there are some numbers bunch of numbers one thirty five, one thirty seven, one thirty eight so it is like these numbers are between zero to two fifty five any number can be according to the pixel brightness and the colour pixels are there ok so what our motive is? Our motive is to note down this numbers this numbers are taking for example one thirty seven you need eight bit you need eight bit to represent these numbers ok suppose this one thirty seven somehow i map it to let say six ok then i need just three bits to represent six i don't need eight bit so for those such way i will be able to for each pixel i will take only three bit rather than eight bit so my overall size of the image will be reduced that's my motive and so let me see this if i select it and see it is written forty one forty two point one kb or if i go to the properties you can see forty two point one kb so forty two point one kilo bites is used in this image. I am going to reduce the size of the image ok awesome let me just remove this line i just wanted to see this line as a matrix this image as a matrix ok i will create one more object of this image same size so that i can whatever mutations whatever things i am going to do on this image i will save it in save those changes in another image so i can see that how that image will be the compressed image and i can relate the size of that new image. I will create a new image of same size so let me write it as img is equal to image dot new and i will take the im dot mode, im dote mode means what kind of im is this object of my original image of other jpg im dot mode means what kind of image, is it a colour image? Or is it a grey scale image? So this im dot mode will send me the type of image, first arguments is the type of image and the second argument is the size of image so i am using im dot size i can pass the size of my original image so i want to create the new image object with same type of image type of means i want grey scale image new grey scale image and of same size so this is a new image blank image kind of see it as a blank

image which doesn't have we have not define the pixel kind of pixel it has. What values exactly it has we haven't defined so we are going to defined it according to our mapping ok so yeah this is this is what i wanted to do and i want to note this image and let's say i wrote it their pixel map so pixel new i will write here and img for load ok so my new dummy image has been created now i told you what i am going to do is let me just command some the following lines and i will write what i want to do. Ok so what i want to do from now, i told you that the pixels here are taking eight bit exactly so i want to map this eight bit into three bit so how to do this? Eight means there are two to the power of eight it can contains up to two to the power of eight values it means zero to two fifty five it can have if i want to map it into three bit means it should contain values from zero to eight because two to the power of three is eight only so how am i going to map it? Just divide it if you divide two to the power of eight by two to the power of three you will get two to the power of five ok, it means what is two to the power of five? Two to the power of five is thirty two it means ever thirty for every thirty two gap i will have one number it means if i get a number from zero to thirty one which is a gap of thirty two exactly i will just put zero there if i am getting thirty two to let's say sixty three i will just put one because i am mapping for one bucket of numbers from zero to thirty one so where in this matrix where ever i am getting a number which is between zero to let's say this is twenty, twenty one, twenty four, twenty one, twenty two, twenty six which these all numbers are between zero to thirty one so i will just put zero here other than putting zero to thirty one i will just put zero here because zero will take only i can represent zero in a very three bit value but these are taking more than three bits twenty eight twenty six so i will just put zero so i can reduce the space ok and same way if i am getting lets say a values between thirty two to sixty three if not here or let's say sixty four to ninety five so let's see all these values are between sixty four to ninety five i will just put two here because two will take only two only three bit number i can represent three bit i can represent to but these values are i am taking with i am representing with eight bit number so that's how i am going to do so let me write it here in the comment section ok. so that you see what exactly i am doing so i will write here what i am going to map so zero to thirty one will be mapped as zero zero, thirty two to sixty three will be mapped as one and let me just delete this so that its everything will visible here sixty four to ninety five you just i am just making a gap of thirty two only is to ok ninety six to one twenty seven will be three, one twenty eight to one fifty nine will be four, one sixty to one ninety one will be five, one ninety two to two two three will be six and two two four to two fifty five will be seven ok great ok this is what exactly i am going to do this see this and according to this i am going to create my new image.