

## **IMAGE PROCESSING: ENHANCE YOUR IMAGES 02**

Hello all, welcome to programming screen cast of image processing let us explore some cool ideas in image processing through this screen cast before taking you to the programming part let me show you the images using which we are going to do image processing. This is the first image as you could see it looks like some mirror image all that we can make out from this image is just that some news paper clipping some photos have been pasted on the wall and what is written in the newspaper? It's not so clear, this being mirror image it's not so clear for person to understand what is being written here so let us apply some image processing technique, transform this image into a form that all can understand and let us try to see what is there. This is our first image for image processing that we are going to do now, next image is this, this image has been taken from a crime location as said in lectures then this whole exercise of image processing is ended helping find out the truth, this thing is image of bullet shot, a few bullet shots can be seen but there are many feature in this image which are not clear to us we will apply some image enhancement techniques image processing techniques some enhancement technique will enhance this image so that we shall understand about the minute features present in this image, who knows maybe that may serve as evidence let see ok not we start off with the programming component the first shown is the image of the mirror image that needs to be flipped so we can understand what is the written in those news paper clipping that has been pasted on to the wall let us see that so that exercise we are doing now the technique we are going to apply is flipping in some term it is flipping the image that is our first image processing task we are going to do, for doing this we need to download the necessary package let us do that we need the image package for pil library let me import that from pil import image, done importing alright i had shown you this image, this image is obtained dot png the name is obtain dot png lets open this image, it is done by this way image equals to image dot open here you are suppose to give the file path my image file is in the same directory as that of my python script so i am just giving the file name in case your image file is in different path you need to specify the entire path please note that the correct path has to be specified else if you just specify the name the file would be searched in the default directory where your script is running please note this point. File name is obtained dot png run with it we have opened this images this part is opening the image we are done with it images in general computers processes them in terms of matrices so that image is opened the corresponding matrix format is taken and capture by this object img the matrix format is capture here and flipping the image is the terminology that we are using here to actually convert the mirror image into actual image we are using the terminology for the thing that is easy on our minds but the technical terminology that they uses transposing as i said that images are generally transferred in terms of matrices so matrices i hope al would have come across them in your high school level mathematics in matrices there is some special operation called transposing that is nothing but your making your all rows as columns and columns as rows that is what you call it as transposing. So transposing operations your are going to apply to this matrix which will actually give you back your actual image from your mirror image that is what we are going to apply now. How

will we do that? Let's see. this is our matrix object of the transposed image so let me call this transpose img this is nothing but image img dot transpose this is the pre defined function transpose of this is the pre defined parameter image dot flip left right this is the pre defined parameter what this line does is? It takes the matrix that is captured by img of object transposes that matrix and this new matrix is stored in transpose img object that object captures the new matrix so now we have got the actual image in the matrix representation that is understandable by the computers but now what we need to do is? We need to convert it into a form that is understandable by humans, let's do that. The next step is we have to convert it into a human understandable format and save it to a file, to a file in a human understandable format that is the next step we need to do alright so this is done like this transposed image, you take the matrix object which you need to actually save it into human readable format to take this object and call save function on it this is also a pre defined function and it takes an argument here same like how you had done in open you are supposed to specify the path where you want your output file to be saved, here i want the file to be saved in the same directory so i just giving the desired file name. In case you want it to be saved in the different path please do specify the entire path correctly and give the desired file name let me give the desired file name. I will call this corrected because that was a mirror image which was not very clear to us this has been corrected so that it is clear to us now corrected dot png corrected dot png is the file format i want the same as input file format its fine with me so i have given that in case you need may be you can try changing the file format as you required jpg or dmp whatever you can give that ok so now where everything is done just print a message this is for us to understand that the output file is ready just say that done flipping, done flipping ok everything is done let me run this file i have given command as well for each line of the code so in case you think that you need to understand the code please do pause the video, read through that understand the code then you may proceed with running of the file, let me run this file. Ok i got the output as done flipping let me check the output file i had named it as corrected dot png let me check it corrected dot png yeah i got this yeah this is the file see now it is clear from us to understand what is being written some news paper clipping doctor accused of killing wife something like this yeah some news paper clippings have been there so now i can understand what is being written here unlike the previous image which was not clear to us you can observe side by side this is not very clear this image is not very clear to us where as after applying the transposing operation we got an image that is very clear for us to understand what is being conveyed here so this is how transposing operation has helped us understand something which is which was previously not clear and now that clear with the help of coding computing well among two operations that i have said one operation is done let us go with the second operation i don't want this thing so let me command it i am done with the first operation so let me command that now the second operation is nothing but image enhancement there are many image enhancement techniques available we are going to use one special technique called as histogram equalisation specifically adaptive histogram equalisation we call it as clahe this is just the technical name all that you can take is that is an image enhancement technique we are going to use it so that i had shown you that image previously, yeah this is the image there are some features in this image which are not very clear to us that could be taken clearance we apply this technique enhance this image so that the portions that are not clearly visible will be clearly visible who

knows this is a image taken from this is the image of bullet shot this is taken from the crime location there maybe some features which may be evidences which open up new facts anything can be possible right! Let's explore alright. For doing this we need to import our package cv2, cv2 is the package we need we have imported and now i need to same like that i need to read the image, image img equals to cv2 dot image read is the parameter i am supposed to give similar to the previous one suppose to give the file path here, since my image file path is there in the same directory i am just giving the file name in case your image file is in a different place you need to specify the path completely file name was crime dot png let me read this image, so image has been read so we are suppose to now apply the technique CLAHE image enhancement using clahe that is contrast limited adaptive histogram equalisation it is clahe in case you are interested to learn more about it there are so many good articles available online which reveal you everything right from the math underlying in the concept everything's beautifully explained you can see it, here our aim is to arrival the mystery so we are not getting it into the technical part of it this can be looked up on any time its there are lot of resources available straight forward you can do it so let us apply the technique to our rescue to unravel new facts who knows anything may unravel let's see. i have to first prepare for applying clahe technique, preparation for clahe this is the step that has to be done this is the equalisation technique histogram equalisation technique this is an enhancement technique to enhance the image some preparatory thing has to be done that is what i ma doing now, i am creating an object that will how the properties of enhancement cv2 dot create clahe this is the preparatory face we are done with it now this enhancement technique works well if the images is in the black and white format all that we need is to unravel the facts so let us convert it to black and white formats get to know if there are some new facts and based on that if needed we can even convert it back to colour and we can do it that is our need basis we can do it anytime so let us convert it to nothing but a gray scale image so convert it into gray scale image this is the gray scale image we have to convert the image into the gray scale value so that this enhancement technique shall be really really effectively applied which converted gray image is equal to cv2 dot cvtcolour of to pass this image object then colour underscore BGR2GRAY this has been converted into a gray scale image cvt sorry cv this all these are pre defined functionality in cv2 package so just observe everything has been pre defined so it is with very few lines of code anyone can enhance any image unravel any facts from it this is so simple now a day's ok we are done with making it into a gray scale image now let is ok we shall apply the enhancement process apply enhancement that is the next step we have to do enhanced image is clahe dot apply of gray scale image we are suppose to give the gray scale image to the CLAHE algorithm gray scale image has been passed and after enhancement all these as i have said image processing all this would be delt in terms of matrices img is an matrix corresponding to your original image that has been converted to gray scale and the corresponding matrix is captured by gray Img and that has been applied and some transformation would occur so the image is enhanced and this particular matrix is captured by e and h image that is enhanced image this is the short form i am using it this is captured by this particular object so having said that enhancement is done it is in a format that is understandable by computers now the next step is to make it human understandable let's do that and the output has to be saved in a file save it to a file this is the next step we are supposed to do will do that cv2 dot im right image right here u s

always we are supposed to give the path of the file but i want the output file also to be written on to the same directory so i am just giving the desired name, in case you want it in a different path please do specify the complete path i would like to call this as enhance dot png i am ok with the same format in case you want to change the format you can try for changing that too and this image must be an image corresponding to this particular matrix this particular matrix enhanced image the enhanced one from matrix representation which is understandable by computers to representation that is understandable by humans as to be written so we have to pass this as well and this particular file be named as enhanced dot png that is the command we are done with it so once everything is saved to notify us let us print done enhancing i would recommend that please pause the video here take a look at the code i have written with comments please do look at the code understand this once you have understood this completely lets go with running of the code ok now let's run the code yeah so it is done, done enhancing it shows so let us search for this file enhanced dot png enhanced dot png let us open this ok this is the given file which was not very clear now just observe this is enhanced version of the image the cracks on the wall starting from that every minute detail can be observed it seems some marking is over here even that could be observed alright now we have enhanced this image few more details that are not clearly visible in that original image are now revealed after this enhancement we shall analyse this and this may open up new facts that were earlier un realised thank you for watching this screen cast have a nice day.