Computer Vision Assignment № 1

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Part 1: Dancing Alone

In this part, it is required to combine the cat pictures with green screen with the provided background image of screenshot of famous GTA Vice City game Malibu Club. The initial codes for reading from file using OpenCV and converting images to a video using MoviePy is provided. Using these code blocks and with extra file reading operations the initial dancing cat video is obtained.

Part 2: Dancing with Myself

For the second part, it is required to copy the cat to the right side of the screen. By using the codes for removing the green pixels, and preparing the video, and flipping the image across the y-axis (horizontally) using function *numpy.fliprl()*, the video can be obtained.

Part 3

Dancing with my shadow

In this sub part, it is required to modify the cat on the right hand-side. It is required to make the image darker. By decreasing the pixels values of the cat by a threshold, we obtain the same image darker. For this assignment, I have chosen the threshold to be 100.
To obtain the pixel values of the cat, I have used the previous provided code block. Using the RGB pixel values, by decreasing 100 for each image, the new darker image of the cat is obtained.

Dancing with my friend

In this sub-part, it is required to match the histogram of the cat with a random target image. I have chosen the background image for this. Extracting the histograms, and turning them to CDFs we can proceed to find the Look Up Table for histogram matching. Later combining the modified image with the original cat image, and preparing the images for videos, the video is obtained.

Part 4: Disco Dancing

In this part, we required to modify both cats, combine them and prepare the video. For the cat on the left side, first I calculated the histogram of the cat at the each frame, create a randomized array with shape of $(256, 3)$ values between $[0, 1)$. After multiplying the randomized array and CDF of the cat histogram element-wise and match perturbed CDF and cat's original CDF, I obtained the cat on the left.
For the right cat, it is required to calculate the cat's own histogram, randomly perturb the target image's histogram and match them. I have chosen the background image as target image and multiplied the random array with the target image's histogram and matched the new target histogram and cat's original histogram.