Subject: - CIS 666 Artificial Intelligence

Project: - Project 2

Submitted By: -

Rikul Pramodbhai Joshi (2812108)

Submitted To: -

prof. Essa Almabrok

Report

Language used:-

- Python

Python Libraries Used:-

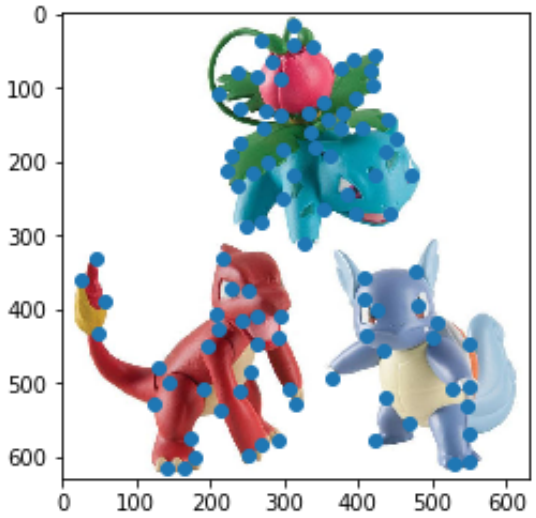
- Opencv (cv2)
- Matplotlib
- Numpy
- Pandas
- Scipy.spatial
- Sklearn.preprocessing

Methodology:-

To find data points of image used harris corner technique. Took 100 strong points of image using K means clustering technique is implemented using python.

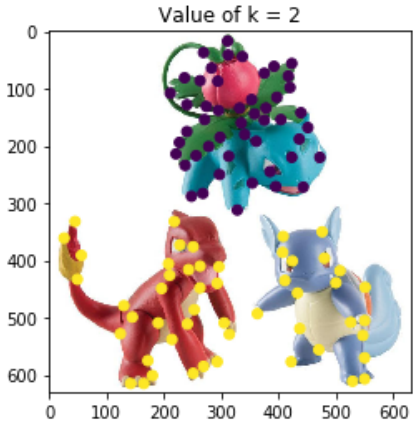
Implementation and Results:-

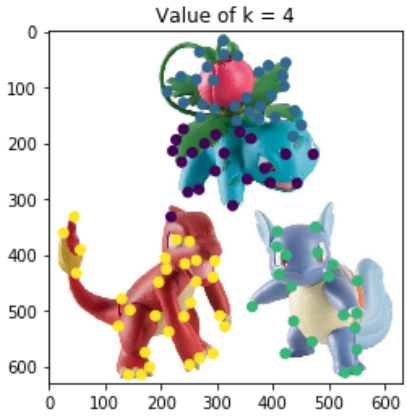
1. Used cv2 (opencv) library to read image and converted image to BGR2RGB and then converted into RGB2GRAY. After that, I used cv2.goodFeaturesToTrack() function for detecting the corners of the image using the values of points, quality and distance. To get the result used scatterplot function to get data points(corners) on image.



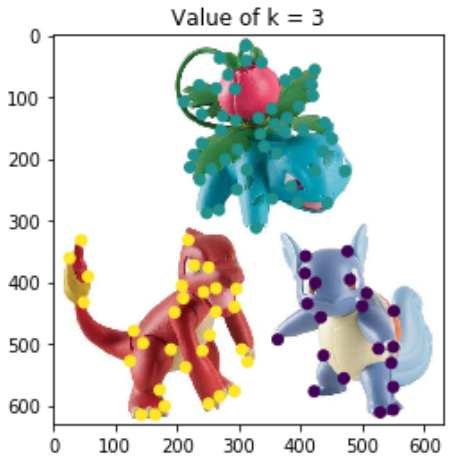
2. Create k_means_clustering() function with the 100 iterations to get better result. In function: 1. Create an array with random number of size k and store in variable(d_arr) 2. Choose random center point from the whole image and store to the

variable(centroids) 3. To find distance of each point from random generated points used distance.cdist() method using Euclidean metric and get the minimum value using np.argmin() function. 4. Used loop to get better implementation of k means algorithm on image by getting Euclidean distance and average values each time.

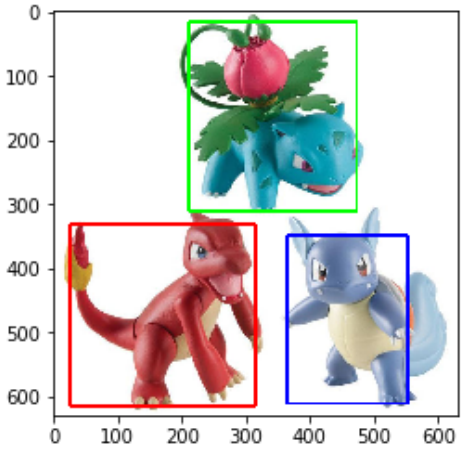




Original image with the best detected clusters:-



3. Use for loop to get points for different K values and plotting the scatter points for each value of K and visualizing different plots with original image and scatter points. For bounding box on cluster, First, I used zip() function to combine the lists P and s_point and then use loop to sort the same values and added to the different variables using .append() function. And for bounding box, used cv2.rectangle() function



Conclusion:-

By using cv2.goodFeaturesToTrack() function I get strong enough corner points of image. While applying K means clustering to the image, I get data points in different groups. Which will help to categorize the image into different object/group. cv2.reactangle() function used to show the square on the detected object on the image.

References:-

https://docs.opencv.org/master/d4/d8c/tutorial_py_shi_tomasi.html

https://jakevdp.github.io/PythonDataScienceHandbook/05.11-k-means.html

https://medium.com/machine-learning-algorithms-from-scratch/k-means-clustering-from-scratch-in-python-1675d38eee42

https://www.geeksforgeeks.org/python-opencv-cv2-rectangle-method/