
IMAGE GENERATION USING K-MEANS CLUSTERING METHOD

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ABSTRACT Creation of images from another resource or other images which including text, pixels, and layout is very difficult work in the field of computer vision, furthermore, taking images from different aspects and sides is a very hard task and a very expensive process, however, using artificial intelligence and deep learning creating images from other images become less expensive and very possible, for this significant the dedication on this filed has been evolved heavily lately to reach the ultimate image generation strategies with great success. the generation of the images depends mainly on the adapted algorithm used and the type of data used, secondary factors that matters to image generation are the presentation of an existing image and the dataset that is generated from . the importance of image generation came to solve future problems like image domain transfer and image translation which is the the process of mapping an into a different representation of itself , moreover image generation came to solve the problems of detecting fake and real images using the GAN (Generative Adversarial Networks) which contains a discriminator network and a generator network.

INDEX TERMS

GAN : Generative Adversarial Networks

cGAN : conditional GAN

AutoML : the click to optimize the image model

COCO : he Microsoft Common Objects in Context dataset in which contain over that 2 million images in 80 different classes

IS : (inception score) it is a method to evaluate the output data

FID : (Fréchet Inception Distance) it is a matrices for evaluating data

I. INTRODUCTION

Most popular motives to generate an picture from another photo : pick out the colors and depth which increase the visible attraction of an image such as historic photo; they help to make a scientific illustration more attractive.[1]Additionally, choice of the suitable feature(s) is the key starting factor to constructing photo processing and machine imaginative and prescient systems. In many ways, the success or failure of an algorithm depends notably on an correctly designed characteristic choice and representation. In the pc imaginative and prescient community, we can typically classify aspects as low level, intermediate stage and excessive level. Low degree deals with pixel level aspects such as nearby structure and measurement and pixel neighborhood records (e.g., mean, preferred deviation, and Euclidian distance). High level deals with summary ideas (such as kinds and semantic meaning of image's objects), and intermediate stage offers with something in between. In pixel level, RGB channels of the image are used, traditionally, as the function vector.

Instead, it requires an gorgeous definition of “similarity” to measure the relationship between source of property picture and goal image. In this case, RGB channel by myself might also comprise information of colour to in shape between the photos as one may additionally desire to process a target image giving a supply picture with absolutely exclusive colors. Although quite a number photograph processing principles are in frequent use in the pc graphics[2], an application of image generation the usage of K-means clustering algorithm is especially a latest area of research.

II. IMPORTANCE OF IMAGE GENERATION

The importance of image generation are summarized in those main points:

- Image generation overcome the expenses to image creation which was so costly in the past
- Image generation helped in the evolve of neural network discrimination detectors

- This filed assets scientist to manipulate image features like colours pixels greys and layouts very easily
- Image generation helped in having a better user experience by providing automated generation captions .
- The importance of image generation helped in adjusting images cations and sides very easily which was very expensive before.
- This filed had contributed for the thrive of image analyses which helped human to understand images interpretations
- Image generation helped in developing image translation in which contributed to change images from one domain aspect to another viewing domain aspect

III. METHODS AND DATA

There are going to be multilabel stages and methods used in the papers of image generation and that is because of the limitation found in each method used , to illustrate , almost all the methods and techniques used for image generation can do a specific task this leaded that to reache the best result many methods should be used so all of the gabs in each method can be covers using other methods.

A. METHOD AND LIMITATIONS

Methods	Limitation
VON	The shapes and images produced with a lower resolution
FIGR	Limited to binary generation of small icons
cINN	Used for image colouring only
SIGAN	The models generate images with a boor resolution

B. DATASETS USED

Dataset	Usages
CIFAR-10 dataset	It contains more that 60K 32*32 images which colours divided in 10 classes
COCO-stuff dataset	it is s dataset for understanding sense like object deduction ,semantic segmentation and image captioning
MNIST database	A very large dataset for training images processing systems images

C. DATA EVALUATION

Evaluation Method	Usages
MSE	Mean square error
Inception score	It is an evaluation matrices used to compute the GAN model output
Fréchet Inception Distance	It is a matrices for assess and measure the quality of the generated images using the chosen model

IV. PROPOSED IMAGES GENERATION TECHNIQUE

In this research, K-means clustering technique has been used to generate goal photograph from source one by using k colorings from the source. K-means clusters the pixels in photo into exact number of clusters (colors) are unsupervised studying mechanism such that the distance between clusters is minimized. Result of this step is that we get clusters with their centers, pixels contained in them and distance of each pixel from the middle of the contained cluster.

A. RGB COLUOR SPACE

The name of this technics came from the name of the three main colors , red , green and blue and their intensity . those three colors can make different intensity when they are merged , when all of them merge they make the white color intensity and its reverse make the black color . to generate more colors it just required to modify the three components to be in. an equal resolutions display and pixels depth .

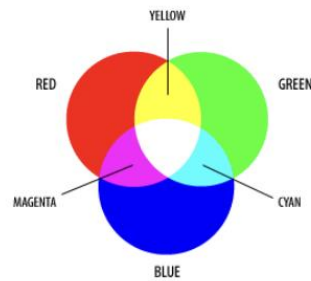


Fig (1) RGB Color Model

A. K-Means Clustering Algorithm

The K—Means clustering method is one of the most used ways to generate a target image in this field, and solving this filed problems .

Giving a set of data $X=\{x_1,x_2,x_3\dots\}$ the purpose is to divide the data x into number of k clusters to have many sets like $S=\{s_1,s_2,s_3\dots\}$ to minimize the sum of the distance function which is the MSE (Means Square Error) in each point of the cluster to the K center , mathematically that can be done using the following formula :

$$\arg \min_s \sum_{i=1}^k \sum_{x \in S_i} \|x - \mu_i\|^2$$

where μ_i is the mean of points in S_i .

The proceure to perform the k means algorithem is like this

Input :

- Source image
- Target image
- K-Colors

Output :

Target colored image

Process :

- Resizing the source image
- Initializing the K- Means based in color sample from the source image
- Repeat the process
- For each pixel calculate its nearest mean according to the following formula

$$M(i) = \text{Min}(j) \mid P(i) - k(j) \mid 2$$
- Update the values for each mean if there are pixels assigned to them according to the following formula

$$x = \sum_{i \in 1} 1(M(i) = j) P(i) \sum_{i \in 1} 1(M(i) = j)$$
- Load the target image and find the best pixels and neighboring pixels
- Transfer the source pixels to the target pixels by replacing each of the target pixels with the nearest to centroid pixels of the source image and then view the new image

V. THE EXPERIMENTAL RESULTS

Generally , there are good methods to measure the new target image and the source image similarity , one of this method is the error matrices which is the MSE (mean square error) which is a way to calculate the cumulative between the original image and the output image and it calculate the average amount of differences pixels between the original and the output image , if the MSE is small then the output image is more to be like the original image .

The MSE is calculated according to the following formula

$$MSE = \frac{1}{MN} \sum_{y=1}^M \sum_{x=1}^N [I(x,y) - I'(x,y)]^2$$

where $I(x,y)$ is the original image, $I'(x,y)$ is the generated image. All results are going to be discussed in this section .

VI. RESULTS AND DISCUSSIONS

In order to generate a new colored image form another image , the K-means algorithm is used and the MSE is implemented in the resulted image .

The clusters of the target image is already generated from a previous step . the clusters of the source image resemble the clusters from the target image based on the minimum distance and the color feature which is calculated using the RGB color space in each cluster. In this way we used the k-color method to generate the target image .

The generation of the target image is done by matching the pixels from the center of cluster , the best match of the pixels is transferred from the source image to the target image based on the closest distance of corresponding cluster. So the RGB values are copied from the source image to the target image.

VII. CONCLUSION

In this paper, we have introduced a new algorithm for image era primarily based K-means clustering algorithm. For larger values of k , the algorithm gives good consequences and takes long time , whereas, for small values of k , the inverse is right. So , the advantage of K-means algorithm is easy and pretty environment friendly and gives proper compressed photo exceptional . On the hand, this algorithm is slow, in particular when the number of colors in the supply photograph is large. In general, K-means algorithm achieves excessive coding performance comparing with different image generation algorithms. In order to obtain low computing cost and excessive photo coding performance, a couple of reduced images are generated. However, K-means has now not acquired much recognize in the color quantization, colorization and generation literature because of its excessive computational necessities and sensitivity to initialization in spite of its popular approach in conventional purpose clustering algorithm.

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