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Image Segmentation Using Machine Learning Domain: Machine Learning

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ABSTRACT

Main aim of Image segmentation project is to extract important data from images. Using this extracted information description, interpretation and understanding of the scene can be provided by the machine. Main point of image segmentation is to modify images in to desired manner. This system allows users to take hard copy of the image using printer routines and provides option for users to store file in to disk in different formats. In other word's image processing is called as altering and analysing pictorial information of images. In our daily life we come across different type of image processing best example of image processing in our daily life is our brain sensing lot of images when we see images with eyes and processing is done is very less time. In existing system there are many techniques which are available for extracting information from images but there are no exact processing is defined. In proposed system we will come across different new techniques in image processing. You would have probably heard about object detection and image localization. When there is a single object present in an image, we use image localization technique to draw a bounding box around that object. In the case of object detection, it provides labels along with the bounding boxes;

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hence we can predict the location as well as the class to which each object belongs. Image segmentation results in more granular information about the shape of an image and thus an extension of the concept of Object Detection.

KEYWORDS: Mask R – CNN, Semantic Segmentation, Classification & Localization, Instance Segmentation, Object Detection.

INTRODUCTION

Image segmentation is a method in which a digital image is broken down into various subgroups called Image segments which helps in reducing the complexity of the image to make further processing or analysis of the image simpler. Segmentation in easy words is assigning labels to pixels. All picture elements or pixels belonging to the same category have a common label assigned to them. For example: Let's take a problem where the picture has to be provided as input for object detection. Rather than processing the whole image, the detector can be inputted with a region selected by a segmentation algorithm. This will prevent the detector from processing the whole image thereby reducing inference time. You may have heard about object recognition and object detection which places a bounding box around specific detected objects in an image. But there's another technique that can provide an exact outline of a detected object within an image. The technique is known as image segmentation.

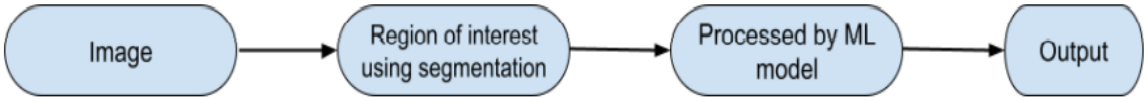

Fig.1 Process of Image Segmentation

Image segmentation is the process of individually identifying and labelling every pixel in an image, where each pixel having the same label shares certain characteristics. It can detect an object at a granular level and it can identify the shape of that object also. It is an advanced and more accurate way of detecting an object's edge and shape detection. Image segmentation divides an image into different partitions known as segments. This collection of segments are represented by a mask or a labelled image. In this way, we can process only the important segments instead of the entire image.

In computer vision literature, segmentation essentially means breaking a scene into non overlapping, compact regions where each region constitutes pixels that are bound together on the basis of some similarity or dissimilarity measure. Over the years, many different algorithms have been proposed segment an image into regions, but the definition of what is a correct or desired segmentation of an image has largely been indefinable to the computer vision community.

The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyse. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. Your proposed system will reduce the disadvantages of existing system and provide a well-defined segmentation algorithms because it will become easy to define the borders of objects. We are going to perform image segmentation using the Mask R-CNN architecture. It is an extension of the Faster R-CNN Model which is preferred for object detection tasks. The MaskRCNN returns the binary object mask in addition to class label and object bounding box. MaskRCNN is good at pixel level segmentation. Image is detected by generating the bounding box and pixels are labelled using the mask R-CNN algorithm.

LITERATURE SURVEY

For the edge-based segmentation, Fernando C. Monteiro [11] proposed a new image segmentation method comprises of edge and region-based information with the help of spectral method and morphological algorithm of watershed. Firstly,

they reduce the noise from image using bilateral filter as a pre-processing step, secondly, region merging is used to perform preliminary segmentation, region similarity is generated and then graph based region grouping is perform using Multi-class Normalized Cut method [12]. Berkley segmentation dataset is use as a dataset. They compare the technique with mean shift, multi-scale graph-based segmentation, and JSEG. It is found that proposed technique has outperformed other R. V. Patil [13] claims that if the number of clusters is estimated in accurate manner, K-means image segmentation will provide better results. They proposed a new method based on edge detection to estimate number of clusters. Phase congruency is used to detect the edges. Then these edges are used to find clusters. Threshold and Euclidean distance are used in order to make clusters. K-means is sued to find the final segmentation of image. MATLAB is used to implement the proposed technique. Experiments are performed on nine different images and results shows that number of clusters is accurate and optimal. Weihong Cui Yi Zhang [14] proposed an edge-based auto threshold select method to generate multi-scale image segmentation. Band weight and NDVI (Normalized Difference Vegetation Index) is used to calculate edge weight. MST and Edge based Threshold method is used to perform image segmentation. Experiments are performing on multi-scale resolution images, i.e., Quick-bird multispectral images. Results have shown that their method maintain the object information and keep object boundaries while segment the image. Anna Fabijańska [15] introduced a new method uses Variance Filter for edge detection in image segmentation process. Their method found the edge position using Variance Filter. Sobel Gradient filter with K-means is also used to extract the edges and compared with the proposed technique. The effect of filtering window size on determining edges is also discussed and it is found that if the 9×9 window is used to extract edges then edge is complete accurately match the shape of object in the image. In case of larger details images, a small filtering window is proffered. Results have shown that their proposed technique outperform Sobel Edge Detector.

PROPOSED SYSTEM CONFIGURATION

Implementation includes all those activities that take place to covert from old system to new system. The old system consists of manual operations, which is operated in a very difficult manner from the proposed system. A proper implementation is essential to provide a reliable system to meet the requirements of the organization. How does image segmentation work? Image segmentation divides an image into different partitions known as segments. This collection of segments are represented by a mask or a labeled image. In this way, we can process only the important segments instead of the entire image. Types of image segmentation: Mainly three types of image segmentation are there. 1. Semantic segmentation: Semantic segmentation associates every pixel of an image with its corresponding classes with the same color. 2. Instance segmentation: Instant segmentation segments each individual object instance in an image and puts a mask with different colors. 3. Panoptic segmentation: But there is another type of image segmentation that is a combination of semantic and instance segmentation called Panoptic segmentation. Panoptic segmentation classifies all the pixels of an image. It segments individual object instances as well as background regions in an image

So many different types of segmentation techniques are there. Some of the common techniques are: 1. Thresholding method: Thresholding finds peak values based on the histogram of the image to segment similar pixels. 2. Edge Based Segmentation: Edge-based segmentation detects the boundary discontinuity of an object in an image to determine the shape of the object. And it helps to segment multiple objects in that image. 3. Region-based segmentation: Region-based segmentation partitions an image into regions that are similar according to a certain set of criteria. This technique involves an algorithm that makes segments by dividing an image into components that have similar pixel characteristics. 4. Cluster-based image segmentation: Cluster-based algorithms are used to group closer the data points that are similar to each other. It segments the image by a set of grouped data points. 5. Deep learning-based image segmentation: In this approach convolutional neural networks are used to segment each object instance in an image. MASK-RCNN is a popular algorithm for DNN based image segmentation.

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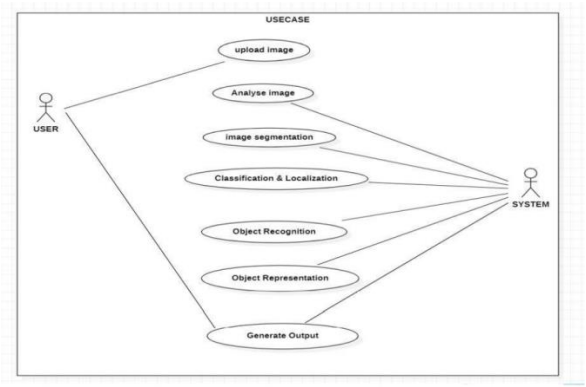
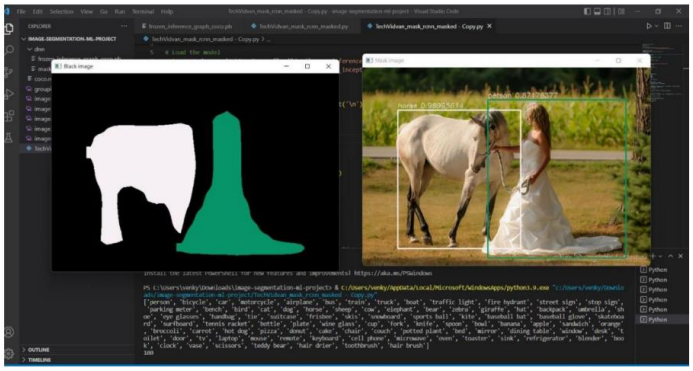
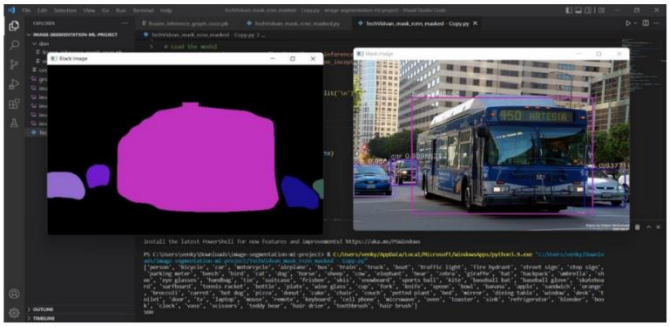


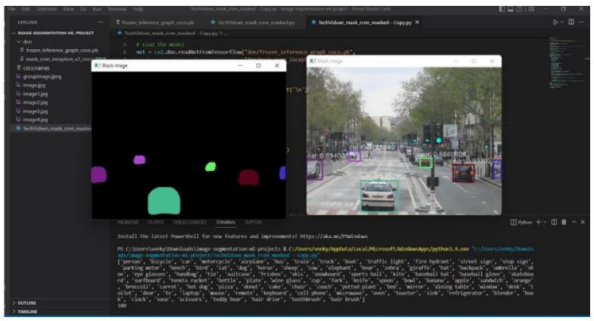
Fig.2 Use Case Diagram



Screenshot 1 Detection of horse and person



Screenshot.2 Detection of bus and cars



Screenshot. 3 Detection of cars and traffic signals

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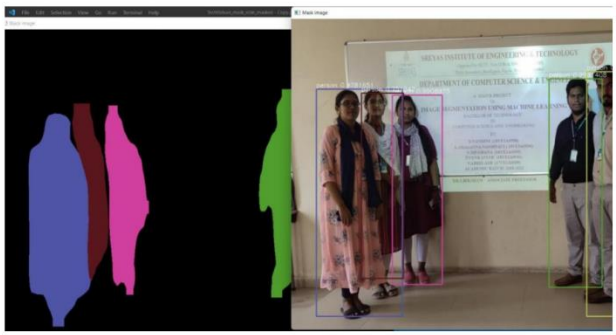
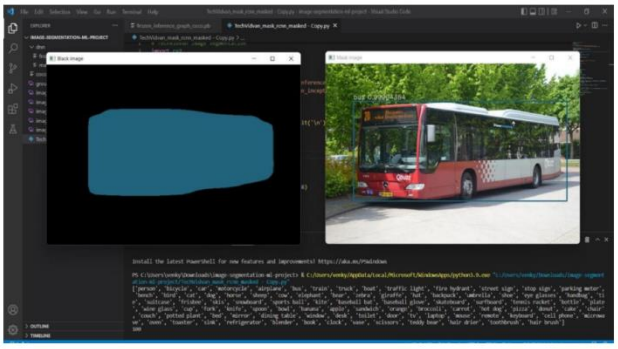
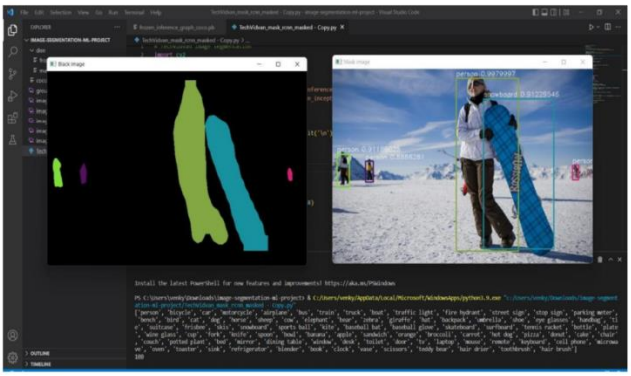


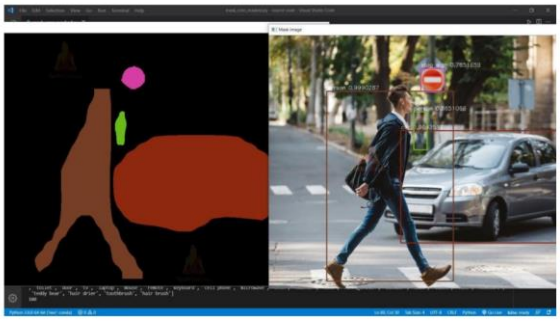
Screenshot 4 Detection of personS



Screenshot 5 Detection of bus



Screenshot 6 Detection of persons and board



Screenshot 7 Detection of persons and car

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CONCLUSION

Image segmentation is the crucial part of the image understanding. The segmentation technique of the image could be used as per the required application or the usage as image is segmented on the basis of different features. The segmentation techniques are broadly categorized on the basis of detection of discontinuity and similarity of the image. For complex image data, such as medical images, their usefulness is quite limited. The image segmentation is useful for the representation of an image simpler into something that is more meaningful and easier to understand.

FUTURE SCOPE

The image segmentation can be used in various fields and it is very useful for the future for the development. ➢ By edge preserving smoothing we will filter the objects available in digital image so that the complex objects can also be easily detected. ➢ Improvement of pictorial information for human interpretation. ➢ This field has a lot of potential for development and implementation in new areas like space exploration etc., ➢ It is extensively used for cancer detection, improving quality of imperfect images.

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