



# REAL TIME AND VIDEO SEGMENTATION USING MACHINE LEARNING

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**Abstract:** We are always amazed at how the human brain differentiates between different objects and things. This is possible because of our muscle memory. This same thing is possible in computers also. The computer can detect the image and objects and classify them into different classes by using machine learning and computer vision. Machine learning is a branch of artificial intelligence where machines learn by themselves and behave like human behavior. This Image segmentation project uses a machine-learning algorithm named Mask RCNN. This System classifies the image in a particular class and produces a mask on the same pixel area from the image, video, and the live camera also.

**Index Terms - Component, formatting, style, styling, insert.**

## I. INTRODUCTION

Image segmentation is a branch of object detection in computer vision that is done by semi-supervised machine learning. For analyzing the image in detail image segmentation is the most important image processing step. In the image, segmentation is detecting meaningful objects from images. For this various image segmentation algorithms like RCNN, Faster RCNN, Mask RCNN, YOLO, etc. are used. Which divides the image into a particular pixel and detects an object from a different class. In our project, we tried segmentation of pixel to pixel segmentation from an image, video, and real-time instance. Our main focus is on video and real-time instance segmentation by using Mask RCNN.

## II. LITERATURE REVIEW

- 1] Aniket Soni explains the visual SLAM algorithm based on multi-objective classification which is used for the representation of semantic information in the field. But it takes lots of time to train and classify.
- 2] Image Segmentation Techniques by Sujata Saini and Komal Arora. In this paper different segmentation techniques were discussed that could use in image segmentation algorithm.
- 3] A Survey by Shervin Minaee, Yuri Boykov, Fatih Porikli, Antonio Plaza which cover modern literature concerning segmentation problem and review more than 100 segmentation algorithm till 2019, grouped into 10 categories..
- 4] There are many systems and algorithms based on the conventional neural network used for image segmentation but the main focus of this system was on image and not on video and real-time segmentation.

## III. PROPOSED SYSTEM

In the proposed system, instead of only images, the main focus is on real-time Segmentation and Video segmentation is done using a machine learning algorithm called Mask RCNN where the main focus is on the classification of different objects from video and real time capture in a particular class. Also, a classified pixel of objects should generate a mask on a particular object area in a different color.

## IV. MASK RCNN

For Understanding what is Mask RCNN first we have to understand what is CNN (Convolutional Neural Network). CNN is a machine learning algorithm that can take input images assign learnable weights and biases to a different object and able to differentiate one from the other. The evolution of this algorithm is faster RCNN which uses a regional proposal network and takes the image as input to generate sets of object proposals with objectness score as output. Further evolution of Faster RCNN is Mask RCNN which not only differentiate an object from an image but also generate mask on different segmented objects. The pixel-to-pixel alignment is a key element of Mask RCNN, which is mainly missing in Fast And Faster RCNN. To predict the class and box offset, Mask RCNN also outputs a binary mask for each object.

## V. STEPS TO DEVELOP THE PROJECT

### 1. ANALYSIS:

Before starting any project is to analyze the problem statement properly, understand it and then try to implement it. We have to first know what will be our final goal and then try to achieve that goal. So in this project, we have analyzed the requirements to implement this project.

### 2. COLLECT THE DATA:

To determine what kind of data is used in the past for developing the same kind of technology as in machine learning. We have used different demo images and videos that are already available on the internet to run the test of image segmentation. We have imported pre-trained COCO models from the COCO library.

### 3. ENVIRONMENT SETUP:

Assembling and downloading different python modules and setting up the environment. Here we have used tensor flow GPU by using CUDA9. We have used different types of libraries like NumPy, Scipy, Pillow, Cython, matplotlib, scikit-image, OpenCV-python, imgaug, IPython.

### 4. CODING:

Writing code for image segmentation, video segmentation and segmentation using live camera. Verifying and validating the code for proper working.

### 5. TEST THE MODEL:

Test the model on different images and videos from the internet.

## VI. DATA FLOW DIGRAM

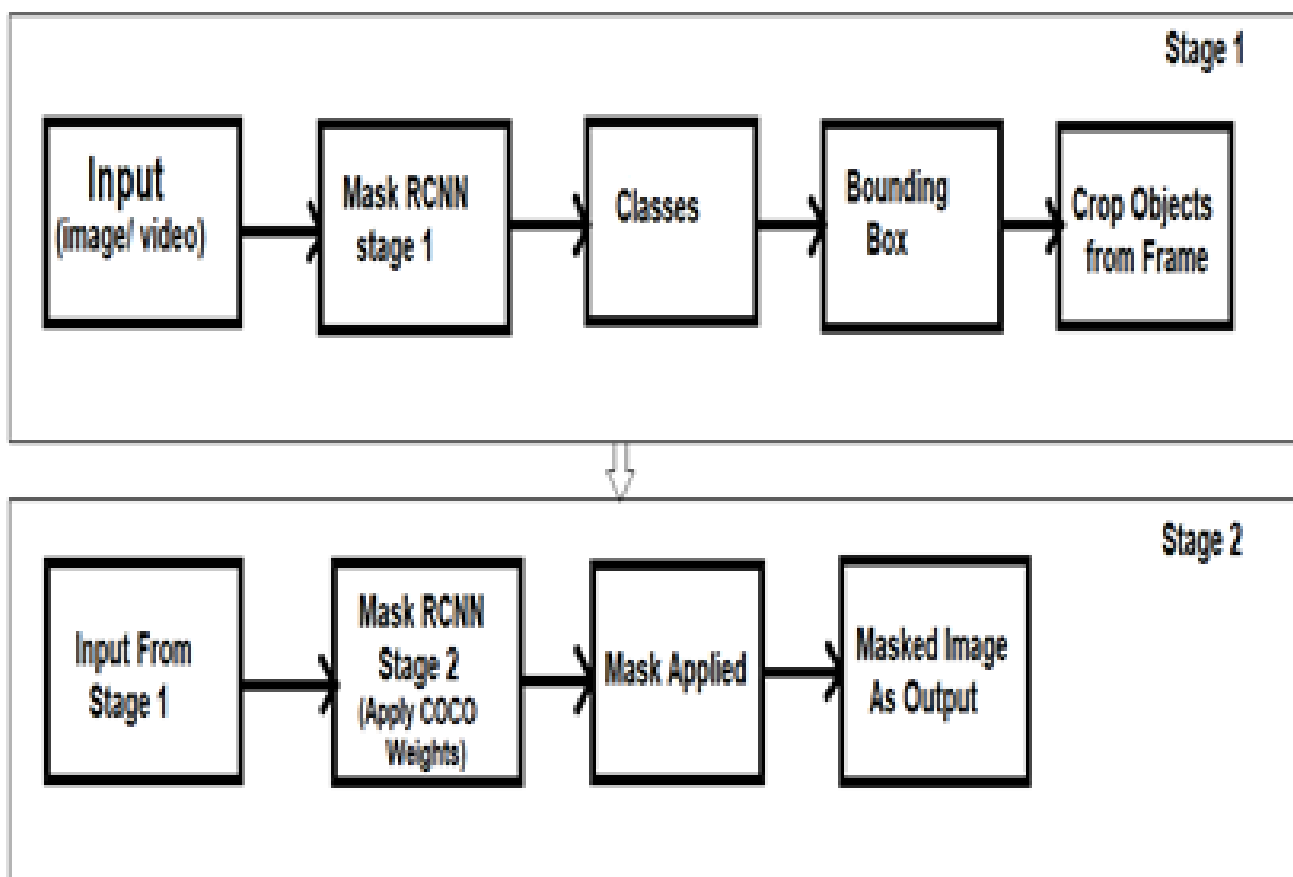


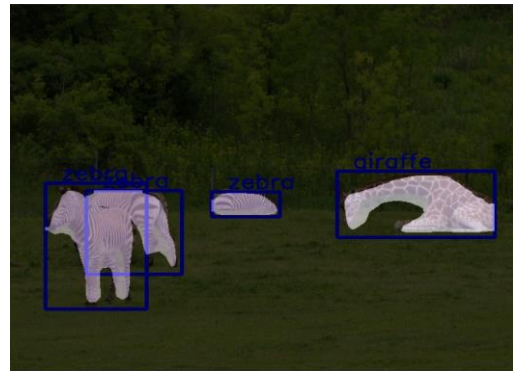
Figure 1

## VII. RESULTS

### 1. VIDEO SEGMENTATION



Before Segmentation

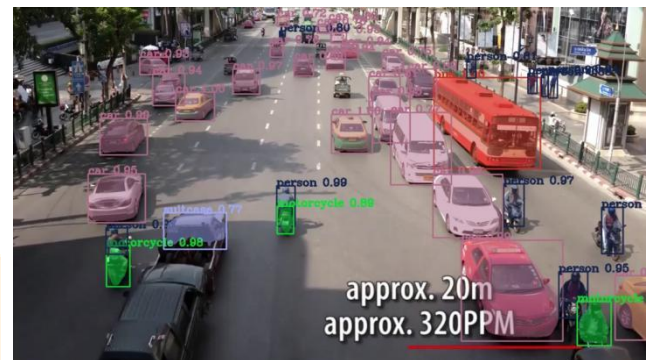


After Segmentation

### 2. IMAGE SEGMENTATION



Before Segmentation



After Segmentation

### 3. REALTIME SEGMENTATION



## VIII. ACKNOWLEDGMENT

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