Background and Foreground Human Character Segments for Video Object Segmentation

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Abstract **— In this paper present the single human being character segmentation in video of foreground objects using genetic algorithm. The genetic algorithm is used to discover the foreground objects of single human character; this is occurred in video of moving time. Here our work is segment the single human character in video of moving or unmoving time. Then this paper segments the living things and non-living things using the k-means algorithm. And the background object is segmented in the video. This paper will also provide researchers and practitioners a comprehensive understanding of state-of-the-art of video segmentation techniques so our paper is very useful one in the today world.**

Key Words: **Genetic Algorithms, Human Character Segmentation, K-Means Algorithm, Living or Non-Living Things Segmentation, Video Object Segmentation.**

1. INTRODUCTION

Segmentation refers to the process of partitioning an image into multiple regions. The segmentation is to simplify the representation of an image into something that is more meaningful and easier to analyze. Video segmentation is different from segmentation of a single image. Video segmentation has become one of the core areas in visual signal processing research. This is typically used to locate objects and boundaries in videos. We have designed several analysis algorithms for video object detection and segmentation.

Video object segmentation is a process that involves partitioning a video frame into a set of meaningful objects or regions. Video object segmentation is the problem of automatically segmenting the objects in an unannotated video. While the unsupervised form of the problem has received relatively little attention, it is important for many potential applications including video summarization, activity recognition, and video retrieval. Regions are group of connected pixels with similar properties. Regions are used to interpret images. A region may correspond to a particular object, or different parts of an object. Instead, we propose an approach that automatically discovers a set of *key-segments* to explicitly model likely foreground regions for video object segmentation using the genetic algorithm. This is to leverage both static and dynamic cues to detect persistent object-like regions, and then estimate a complete segmentation of the video using those regions and a novel localization prior that uses their partial shape matches across the sequence. To implement this idea, we first introduce a measure that reflects a region's likelihood of belonging to a foreground object.

The objective of Video Segmentation and Its Applications is to present the latest advances in video segmentation and analysis techniques while covering the theoretical approaches, real applications and methods being developed in the computer vision and video analysis community. General-purpose image segmentation and object detection has been difficult problems in computer vision for quite a few years. Our goal is to delineate the boundaries of all moving and static objects occurring in an arbitrary video. The human face is one of the most important objects in video.

Genetic Algorithms (GAs) are adaptive heuristic search algorithm premised on the evolutionary ideas of natural selection and genetic. The basic concept of GAs is designed to simulate processes in natural system necessary for evolution, specifically those that follow the principles first laid down by Charles Darwin of survival of the fittest. As such they represent an intelligent exploitation of a random search within a defined search space to solve a problem.

K-means (MacQueen, 1967) is one of the simplest unsupervised learning algorithms that solve the well known clustering problem.

$$\mathbf{m}_i^{(t+1)} = \frac{1}{|S_i^{(t)}|} \sum_{\mathbf{x}_j \in S_i^{(t)}} \mathbf{x}_j$$

Given an initial set of k means $\mathbf{m}_1^{(1)},\ldots,\mathbf{m}_k^{(1)}$ (see below), the algorithm proceeds by alternating between two steps:

Assignment step: Assign each observation to the cluster whose mean is closest to it (i.e. partition the observations according to the Voronoi diagram generated by the means).

$$S_i^{(t)} = \{x_p : \|x_p - m_i^{(t)}\| \le \|x_p - m_j^{(t)}\| \; \forall \, 1 \le j \le k\},$$

Where each x_p is assigned to exactly one $S^{(t)}$ even if it could be is assigned to two or more of them.

Update step: Calculate the new means to be the centroids of the observations in the new clusters.

Contributions Our main contribution is the genetic algorithm is used for an automatic approach for segmenting foreground objects discovered in video of single human character accommodate the human genes and key segmenting. Then the living or non-living things are segmented in the moving or unmoving time. So, the k-mean algorithm is used to the techniques. Then the foreground and background of video object segmentation is present in this paper.

Video Object Segmentation Steps

The general steps of video object segmentations are:

- First, the original video / image data is simplified to facilitate segmentation, this can be through the low pass filter, The median filter , morphological filtering to complete;
- And then on the video / image data for feature extraction, can be color, texture, motion, frame difference, displaced frame difference and the semantic feature;
- Then a uniform standard to determine the segmentation based on decision, according to the feature extraction of the video data is classified; the last is related to processing, in order to achieve filtering noise and accurate extraction of the boundary.

In this paper of video object segmentations are given below:

- First, the video of foreground and background objects are segmented.
- Then the foreground object of human being character is segmented.
- Otherwise the living or non-living things are segmented.

2. RELATED WORK

This paper is used to segment a video of human characters are segmented in moving or unmoving time using the genetic algorithm. That work is accommodating the human genes and the above human character segmented function is depending upon the genetic algorithm. The genetic algorithm is used to discover the each and every human of chromosomes. Otherwise the living or non-living things are segmented in the paper using the kernel mean (k- mean) algorithm; this segment is to leverage both static and dynamic cues to detect persistent object-like regions, and then estimate a complete segmentation of the video using those regions and a novel localization prior that uses their partial shape matches across the sequence. To implement this idea, we first introduce a measure that reflects a region's likelihood of belonging to a foreground object. Then the face detection proposes to merge two types of face detection algorithms in the literature, skin color based and texture based face detection.

Background subtraction is a technique in the fields of image processing and computer vision where in an image's foreground is extracted for further processing (object recognition etc.). Generally an image's regions of interest are objects (humans, cars, text etc.) in its foreground. After the stage of image preprocessing (which may include image demising etc.) object localization is required which may make use of this technique. Background subtraction is a widely used approach for detecting moving objects in videos from static cameras. The rationale in the approach is that of detecting the moving objects from the difference between the current frame and a reference frame, often called "background image", or "background model" Background subtraction is mostly done if the image in question is a part of a video stream.

3. APPROACH

Here our paper is contained in three approaches:

- Detection
- Recognition
- Segmentation

3.1. Detection

The detection is going to detect the single human character in video of clustering of foreground objects using the genetic algorithm. The genetic algorithm is used to discover the foreground objects of a single human character; this is occurred in video of moving or unmoving time. Here our work is segment the single human character in video of

moving or unmoving time and the segmentations are based on the human of genes. The human genes are different in all peoples, so this action is very useful one of the human character segmentation. Then this paper is not contain above concept only, it is include another concept. That concept is segments the living things and non-living things using the kernel mean (k- mean) algorithm.

Object detection has also been studied in a number of multimedia applications. Most detection algorithms reported so far in multimedia research have been human face detection and anchorperson detection, due to their pervasive appearance in multimedia videos and their well-defined structures. Detection of faces and anchorpersons help in efficient indexing and retrieval design in multimedia databases.

In the literature, the detection algorithms can be classified generally into two groups:

- Color based approaches and
- Texture based approaches

3.1.1. Color based approaches

Color based works try to model human skin color in various chromatic spaces (RGB, YCbCr, and HSV) with various statistical models.

3.1.2. Texture based approaches

Most texture-based methods are developed from face recognition algorithms, which need various training stages. They have good detection accuracy within the scope of their training set but the missing rate climbs high for data outside the training data set.

3.2. Recognition

The recognition is used to the recognize the human characters and living or non-living things. The genetic algorithm is used to discover the video of clustering objects of single human character. And the kernel mean (k-mean) algorithm is used to discover the living or non-living things.

3.3. Segmentation

Automatic video object segmentation has been several ways:

- Foreground and Background segmentation.
- Human being character segmentation.
- Living and Non-Living things segmentation.

3.3.1. Foreground and background segmentation

These algorithms assume that the foregrounds of the picture, e.g., human beings, are moving objects while the background is static objects.

Therefore, the object segmentation problem is solved by moving region detection. Early works in this area include [23, 26], several similar but improved algorithms [24, 25] were also proposed to MPEG- 4 as optional video object segmentation methods. The quality of these algorithms are good when the assumptions are true, but when foreground motion stops, the performance degrades greatly.

3.3.2. Human being character segmentation

The genetic algorithm is used to segment the cluster of a single human being character in video object segmentation, then this is accommodate human of genes. The human character segmentation is present in moving or unmoving of video.

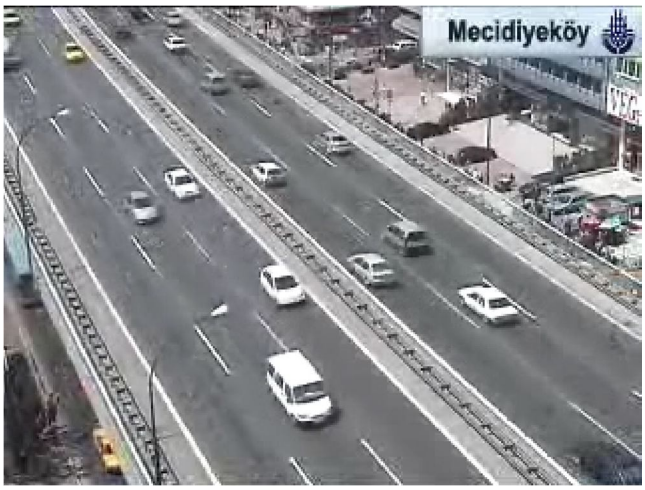
3.3.3. Living and Non-Living things segmentation

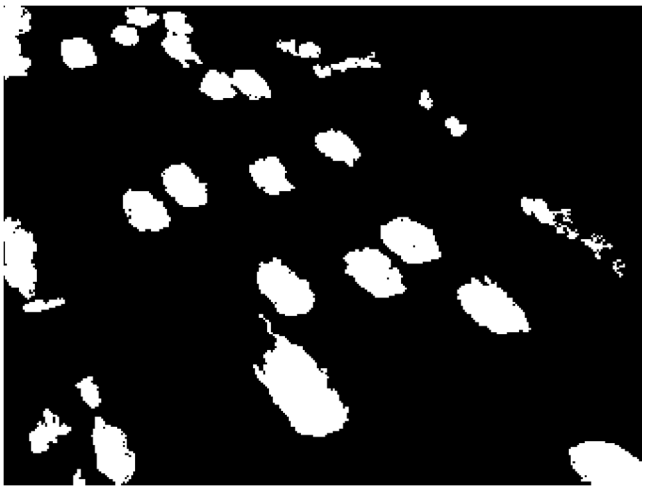
The living and non-living things are segmented in video of moving or unmoving time. Then the k-mean algorithm is used to that the object of segmentation.

4. REQUIREMENTS

A reliable and robust genetic algorithm and k-mean algorithm should handle:

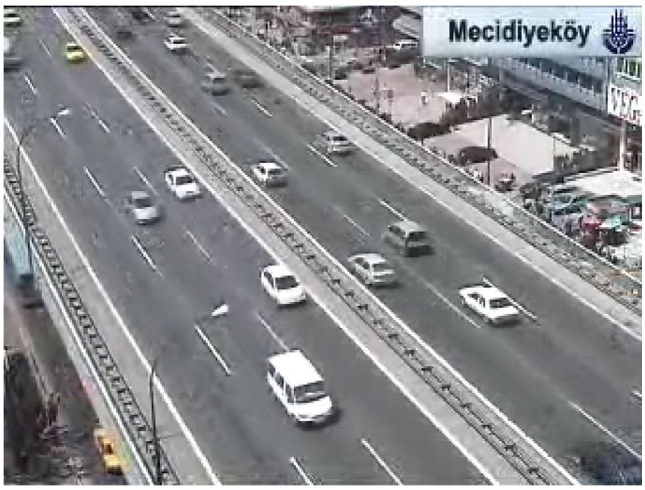
- The genetic algorithm is used for the segment the video of single human character. This segmentation is accommodating the human of genes.
- Then the k-mean algorithm is used to the segment the living and non-living things of video.
- Sudden or gradual illumination changes, High frequency, repetitive motion in the background (such as tree leaves, gs, waves), and Long-term scene changes (a car is parked for a month).
- Given an image (mostly likely to be a video frame), we want to identify the foreground objects in that image



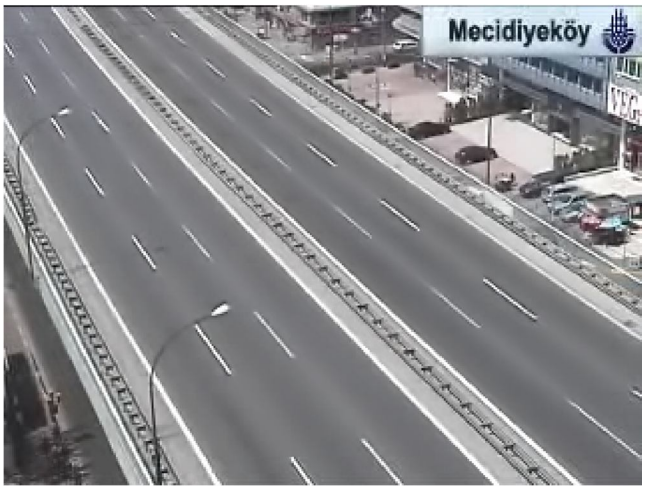


Motivation
In most cases, objects are of interest, not the scene.
Makes our life easier: less processing costs, and less room for error.

Simple Approach
Image at time t:
I(x; y; t)



Background at time t:
B(x; y; t)



I (x; y; t) - B(x; y; t) | > Th

1. Estimate the background for time t.
2. Subtract the estimated background from the input frame.
3. Apply a threshold, Th, to the absolute difference to get the foreground mask.

ADVANTAGES

- Extremely easy to implement and use!
- All pretty fast.
- Corresponding background models are not constant, they change over time.

- Automatically discovers key-segments of the video object segmentation
- Predict the foreground objects in a video
- Obtain similar or higher quality segmentation than state-of-the-art supervised methods with minimal human input.
- Segment the foreground and background objects in video.

DISADVANTAGES

- Accuracy of frame differencing depends on object speed and frame rate!
- Mean and median background models have relatively high memory requirements.
- In case of the mean background model, this can be handled by a running average:

$$B(x,y,t) = \frac{t-1}{t}B(x,y,t-1) + \frac{1}{t}I(x,y,t)$$

or more generally:

$$B(x,y,t) = (1-\alpha)B(x,y,t-1) + \alpha I(x,y,t)$$

Where α is the learning rate.
There is another major problem with these simple approaches:
I (x; y; t) - B(x; y; t)| > Th
1. There is one global threshold, Th, for all pixels in the image.
2. And even a bigger problem:
This threshold is not a function of t.
So, these approaches will not give good results in the following conditions:
If the background is bimodal,
If the scene contains many, slowly moving objects (mean & median),
If the objects are fast and frame rate is slow (frame differencing), and if general lighting conditions in the scene change with time!

5. PROPOSED WORK

The proposed work is automatically discovered the foreground and background objects are segmented. And a video of clustering object of single human character is segmented using the genetic algorithm. Then the living things or non-living things are discovered and segmented in the moving or unmoving objects in video using the k-mean algorithm. The above two works are occurred in the moving are unmoving of video. This is an efficient one of the researchers and practioners.

6. CONCLUSION

We have shown that the proposed two steps first the human character segmentation in video of foreground objects in moving or unmoving times. The genetic algorithm is used to automatically discover the cluster object of single human character. Otherwise the k-mean algorithm is used to segment the living or non-living things. The background and foreground objects are also segmented in this paper. Then the all process are present the static or dynamic cues. So this paper is very useful one and very efficient one of the today world.

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