# Video Segmentation on 2D Images with 3D Effect

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## ABSTRACT
Video segmentation is the process of partitioning the video into some meaningful images. These images are called 2D images in the video content. This paper focuses on video content which is transformed into 2D images. In our analysis, the video segmentation problem is transformed into a problem of Images, in which each video event is transformed into a 2D image with 3D effect using new cubic algorithm. Furthermore, one can use this cubic algorithm to implement any 2Dimage for creating 3D effect directly which shows the better result of other 3D effect methods.

## Keywords
Video segmentation, Cubic algorithm, 3D effect, Detect cuts, Color-histogram.

## 1. INTRODUCTION
Video segmentation contains three layers with depends upon the segmentation. (1)Spatial segmentation like a image activity is a still images. (2) The temporal segmentation like a image activity is a moving of images. (3) Spatio-temporal segmentation both moving and still images [1]. The choice of the video is associated with the presence of the different events, such as cut, dissolve, wipe, flash, zoom-in, zoom-out, pan, tilt, object motion, camera motion, and computer effects [2]. In this paper we choose only a cut event for the video. **C**ut is finding the location in a video in that one frame is replaced by another one with different visual content. Basically cut is classified into two types hard cut and soft cut. Hard cut means first frame to next frame. Soft cut means first frame to last frame [6]. The common approach is to find the cut using color histogram–based method. Patrick Lambert (2007) reviews some of the most popular methods for cut, such as Color histogram computation, Automatic threshold estimation, etc.

Another approach to the video segmentation problem is Automatic video segmentation using spatiotemporal **T**-junctions. This approach can be found in Nicholas Apostoloff, Andrew Fitzgibbon. The spatiotemporal T-junctions detected on the space-time slices (left) are used to learn the occlusion edge energy (top-right), where blue is low and red is high energy, and segment each frame using graph cuts (bottom-right).

We propose, in this work, different specific methods for video segmentation based on analysis of a 3D effect in 2D images, taking advantage of the fact that each video event is represented by a specific pattern in this image. This work is an extension of Silvio Jamil Ferzoli Guimar, Michel Couprie, Arnaldo de Albuquerque Ara_ujo, Neucimar Jeronimo Leite. (2003) which used visual rhythm by sub-sambling for 2d image analysis. Here, we introduce the idea of Cubic algorithm and we use it to detect to segment the video without the need of defining a dissimilarity measure between frames. In the general way, the simplicity of implementation, the low processing cost and the high quality of results can be considered as the main contributions of our work.

This paper is organized as follows. In Section 2 we present a related works. In Section 3 we propose a video transformation in 2D images, and implement the 3D effect of the 2D image In Section 4 we report on an experimental analysis for 2D image in 3D effect result. Some conclusions and a summary of future works are given in Section 5.

## 2. RELATED WORKS
Silvio Jamil Ferzoli ,Michel Couprie and Arnaldo have proposed a video segmentation problem is transformed into a problem of pattern detection, where each video event is transformed into a different pattern on a 2D image, called visual rhythm[2], obtained by a specific transformation. In this technique to use topological and morphological tools to detect cuts. Also, it uses discrete line analysis and max tree analysis to detect fade transitions and flashes, respectively.

Wang et al. (2000) and Del Bimbo (1999) review some of the most popular methods for cut detection such as pixel wise Comparison, histogram comparison etc. Unfortunately, the cut detection is complicated by the presence of effects, like gradual transitions, flashes and fast camera and object motions.

Tonomura et al., 1993; Chung et al., 1999; Ngo et al.,1999 have proposed to the video segmentation problem is to transform the video V into a 2D image R, and to apply image processing methods on R to extract the different patterns related to each transition. Informally, each frame is transformed into a vertical line of R.

## 3. VIDEO TRANSFORMATION
## 3. 1.Video Transformation into 2D image
Let D c $Z^2$, D={0,…,H-1} x {0,…, W-1}, where H and W are the height and the width of each frame, respectively. A video V, in domain 2D+t, can be seen as a sequence of frames $f_t$ and can be described by V= $(f_t)_{t\in [0, T-1]}$ where T is the number of frames contained in the video. Let V=$(f_t)_{t\in[0,T-1]}$ be an orbitary video in domain 2D+t. The 3D effect in domain 2D+t is a simplification of the video in which each frame $f_t$ is transformed into the 2D image A, defined by, A(f,z)= $f_t$ (a+b) where z Є{0,…$H_A$-1} , t Є {0,…T-1} , a, b are shift on each frame .$H_A$ & T are the height and the width of the 2D image respectively.

## 3.2. Cubic Method

### Definition – 1

In our analysis pixel, which has a RGB component inside, plays a vital role. If we process this pixel, we can get the result of the 3d effect in 2d image. Each one of the sampled numeric color data values is called a pixel. Pixels are small adjoining squares in a matrix across the length and width of one digital image. Each pixel is a single solid color that is blended from some combination of the 3 primary colors of Red, Green, and Blue. So, every pixel has a RED component, a GREEN component and BLUE component. These three RGB components are three 8-bit numbers for each pixel.

## Definition -2

The image A doubled into the two image for each frame. The two images namely contain the Im1 and Im2. The image Im1 stores the value of ,green and blue pixels set to zero this process should create the red image. The image Im2 store the value Red pixel set to zero. This process should create the cyan image. After which the two images by some specific amount (depending upon depth). Such that, Im1 is on the left and Im2 is on the right, the orders of the pixel combination take correctly. Because in most 3D videos we obtain the reality of the effect the 3D red – cyan glasses have red on the left and cyan on the right. Final step set shift this two image pixel wise addition we obtain the original 2D image in 3D effect.

The cubic method is a simplification of the video content represented by a 3D effect of the 2Dimage. So the video should be divided into several frames. One frame we assign on One image and then process should be started with single image. 3D Effects is achieved by one single image doubled into two images, left image and right image, to the left eye and right eye, respectively. In that case, we need to somehow doubled that single image into two new images. That is done by Left image for the left eye and Right image for the right eye. Generally, we start by inferring the depth of each pixel in the 2D image.

## 3.3. Cubic Algorithm:

To enhance the cubic algorithm initially takes an images are from the arbitrary video V and then, doubled the images based on the color channels ( Green, Blue, Cyan), named as P and Q. Give the input Image A as 2D from the arbitrary video V. After the implementation of the cubic algorithm we can obtain the single and original 3D effect for the given input image A. The algorithm works as follows

For each and every image A from the arbitrary video $V_i$ if they are identical to each other, then set the green and the blue pixels of the image A to be zero(Fig1 (g)). This will end in the red image creation such as it is stored at the image value P. If the pixels red, then the cyan image will be created (Fig1 (f)). Its value will be provided in the value Q. Then, the values at the P and Q will be merge , such that if all the P values is towards the left of the image based on the depth , and all the Q values towards the right of the image based on its depth, the approximate 3D image will be resulted. Finally, left shift the pixels of the P image and right shift the pixel value of the Q image then merge both the P and the Q pixel values. The resulted Image will be in the original 3D effect (Fig1(h)). The loop will be continued till every image from the arbitrary video $v_i$ is identical.

**Cubic Algorithm**

**Input : Get the Image A for arbitrary Video V.**

**Output : Obtain the single and original 3D effect for imageA**

**Procedure:**

**1: For each $V_i \in A$**

**2: If ($G_i$=0, $B_i$=0 then $R_i$=1) Else $R_i$=0 :=P**

**3: If ( $R_i$=0 then $C_i$=1) Else $C_i$=0 :=Q**

**4: P ← Left U Q ← Right = ~3D Effect**

**5: P>> + Q << = 3D Effect**

**6: End if**

**7: End if**

**8: End For**

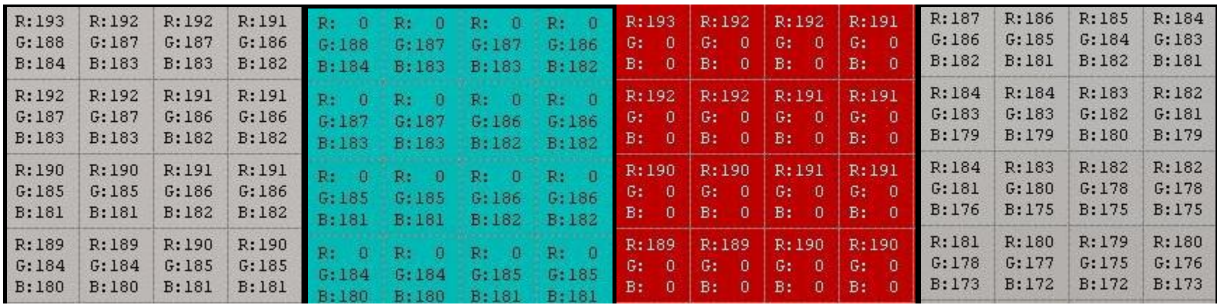
## 4. EXPERIMENTAL ANALYSIS

In this section, we show the experimental analysis for cubic method result and cut experiments result.

### 4.1. Experimental result for 3D effect in 2D images

The proposed cubic algorithm was tested on 2640 frames containing several images and converted into 3D effect of each images. The following Fig (2) sample image shows the implementation of 3D effect on 2D images.

**(a)** **(b)** **(c)** **(d)**




**(e) (f) (g) (h)**

**Fig 2: Cubic algorithm results: (a)Original Image (b) Cyan Image (c) Red Image (d) 3D effect from Original Image**

**(e) Original Image Pixel (f) Cyan Image Pixel (g) Red Image Pixel (h) 3D effect image Pixel**

## 6. DISCUSSIONS AND CONCLUSIONS

In this work, we transformed the video segmentation problem into a 3D image segmentation problem. Method for cubic algorithm is proposed. The main contribution of our work is to transform the 2D image with 3D effect using Cubic Algorithm. Besides it solve a problem of video segmentation. The exploitation of the Cubic Technique, mainly for conversion of 3D effect of the 2D image, also represents an original contribution of this work. The effectiveness of the results is associated with the choice of good parameters. From this work, we observed that the 2D image with 3D effect presents an adequate simplification of the video content, which can constitute the basis for future developments such as:(i) To identify some other video events, like fade and flash from the detection of their correspondent patterns; (ii) To transform the each video sequence as 3D images, we could apply an extension of our method directly to the video data. We have to verify if the computation effort is rewarded by a better segmentation quality.

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