IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 7, Issue 5, May 2018

Real Time Commercials Detection in Television (TV) Program

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Abstract: We explained here the real-time commercial detection in recorded Television (TV) program. TV commercials have become an inescapable part of modern life, significantly influencing our work habits and other aspects of life. The commercial can be interpreted as a special TV program which attempts to communicate up-to-date "product" information to a tremendous number of consumers. We are developing a system “Automatic Switching of Channels between Commercial Breaks” in which we give a solution for commercial block detection by using a technique like BSM.[2] The purpose is to eliminate commercials from their recordings to watch their recorded television shows without the annoyance of commercials by using the methods like Block based background subtraction image followed by frame retrieval, color conversion, frame comparison. After detection of the commercial break the channel automatically switches to next channel.

Keywords: Automatic Switching, Commercial Breaks, Frame Extraction, Block-based background subtraction image, Break Detection.

I. INTRODUCTION

TV programs especially sports programs usually are embedded with the large group of commercial blocks. However, the contents of TV programs are independent on commercial blocks inserted into them. So commercial blocks have no contribution and even side effects to program processing like analysis, understanding, indexing, and retrieval of the TV program.[1] Therefore automatic detection and removal of commercial blocks have a great meaning to the multimedia broadcasting system. This application is used to switch the channel when commercial break occurs on the channel. The main purpose of this module is to convert video into images so that they can be compared with ads. After starting the channel Ad detection engine starts followed by frame retrieval, color conversion, frame comparison. After detection of the commercial break the channel automatically switches to next channel. The novel motion detection technique uses a method such as BSM [2] which use the subtraction among the current frame image and the background image. The background image used at this time is not a background image prepared in advance. However, it creates the background screen in real-time when video shooting. The commercial blocks and non-commercial blocks can be successfully separated, by using a bottom-to-top scheme [1] with four layers: frame layer, shot layer, block layer, and program layer. It can separate all commercial and non-commercial clips even if there is no distinct separation indicator between two adjacent blocks, and thus improve the detection efficiency. The new learning-based method [3][4], has been developed by exploring various semantic characteristics associated with commercials versus general programs. Prior to automatic online commercial detection. Automatic TV commercial block detection (CBD) and commercial block segmentation (CBS) by the means of collaborative exploitation of visual-audio-textual characteristics [5] embedded in commercials is explained. Mizutani et al. [6] fused audio/visual/temporal-based local features of commercials in the context of their global temporal characteristics to detect commercial blocks.

II. PROPOSED SYSTEM

The main purpose of this module is to convert video into images so that they can be compared with ads. Commercial boundaries are primarily detected using video frames and the detected boundaries are validated and enhanced using splash screen of a program in the video domain. The different modules of the system are shown below.

1. Video Frame Extraction

Channels broadcasted are stored as videos and these videos are converted to frames to check start and end of the commercial break. The main purpose of this module is to convert video into images so that they can be compared with ads.

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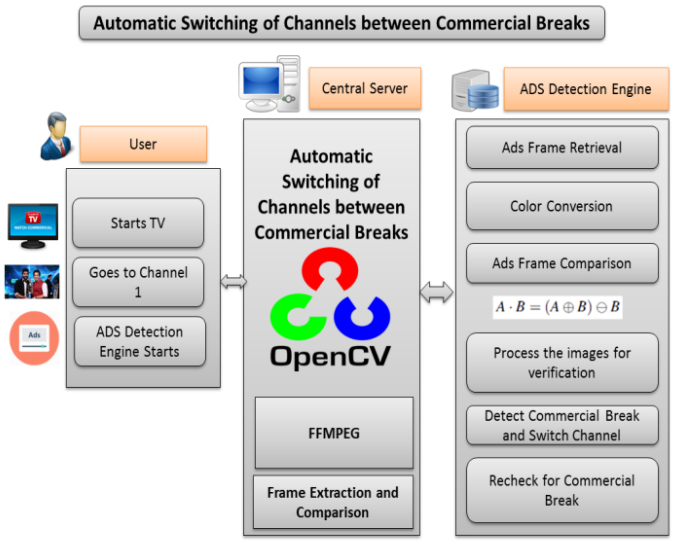


Fig. Architecture Diagram [2]

2. Smart Commercial Break Detection

Start and end frames of commercial Ads are stored in the database. Each Frame of the video is compared to start and end frame of the commercial ad. If it matches the start of the ad then it is marked as break start and the channel is switched to next.

3. Channel Switching

Channel is changed to subsequent one if the present channel has an advertisement and if the second channel also has a break it is switched to next one and so forth till it reaches selected 4 channels.

4. Video Tagging

The video is tagged for the commercial break and normal serials.

5. Template Matching against mentioned region

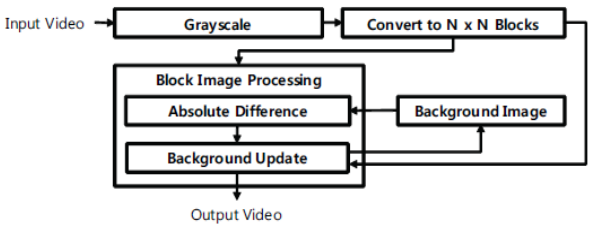
Ads Images are compared to channel video frames and differences are calculated to know start and end of the video.

III. PROPOSED ALGORITHM

A. Block-based background subtraction image:

The BSM technique we used uses the subtraction between the current frame image and the background image. The background image used at this time is not a background image prepared in advance. However, it creates the background screen in real-time when video shooting. The motion detection technique given here can run through the following steps:

a. blocking the input image and pre-processing the image by block zoning
b. obtaining the difference image between the background image and block zoning
c. Updating the background image.



In Figure, the initial input image is a TV input method proposed in the NTSC standard. This is the YIQ method. It is converted to grayscale using following formula. Herein, F represents the frame image, and r, g, b indicates Red, Green, Blue value, respectively, to the pixel corresponding to the position of x andy.

$$G(x,y) = 0.299 \times F_r(x,y) + 0.587 \times F_g(x,y) + 0.114 \times F_b(x,y)$$

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The images obtained after converting to grayscale are segmented into the square block with the entire number of pixels, N. Subsequently, the absolute difference image of the block is divided in the front using formula.

$$D_n(x,y) = \begin{cases} 1, & |W_n(x,y) - B_n(x,y)| > t_T \\ 0, & otherwise \end{cases}$$

$(x, y=0,1,2,\ldots\ldots,N\text{-}1 \qquad N$: window block size)

In above formula, n represents the number of blocks, W the block corresponding to the current image, B the block corresponding to the background image, and D the value of the absolute difference between W and B.

B. Background Image Update:

Step 1: One-dimensional array is declared to store each difference image luminance change rate by block R(n), and initialized to 0. This step is performed only once during the first run.

Step 2: Integer variable C to calculate the degree of change for the entire block is declared and initialized into 0. Here in, C represents the number of blocks with a change. For the block difference image (Dn). Steps 3 and 4 are performed repeatedly.

Step 3: The number of pixels that have 1 as a value of the block difference image (Dn) is put together. At this time, the sum of pixels represents the change in the luminance within the block. If it is equal to or greater than t, it is considered to have a change in the movement in the block, and the value of R(n) increases by 1. In addition, the value of C increases by 1. Conversely, if the sum of the pixels is less than t we consider there is no change, the value of R(n) reduces by 1, and all the values of Dn are initialized to 0. The image with no change in the luminance value in the block is initialized into0 to eliminate noise. Herein, t uses an arbitrary threshold value i.e. block size N.

$$R(n) = \begin{cases} R(n)+1, & C = C+1, \quad \sum_{k=0}^{N^2} D_n(k) > \Delta t \\ R(n)-1, & D_n = 0, \ldots, 0., \quad otherwise \end{cases}$$

Step 4: In above formula, if the value of $R(n)$ is less than '-1', the background image of the block is updated. Otherwise, it is not updated and remains as the previous background image.

IV. IMPLEMENTATION

The main purpose of this module is to convert video into images so that they can be compared with ads. After starting the channel Ad detection engine starts followed by frame retrieval, color conversion, frame comparison. After detection of the commercial break the channel automatically switches to next channel. The index page gives the mode of switching details along with the TV show details for the particular channel.

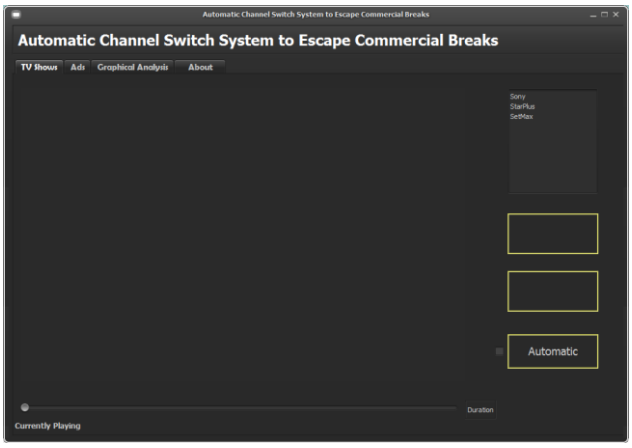

Fig.2. Index Page

After adding the automatic switching mode the channel gets to next channel automatically when break occurs in the current channel. The automatic channel switch mode when breaks detect is as shown in below figure 3.

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Fig.3. Automatic Channel Switch Mode

Fig.4. Manual Mode

In existing system we have to go to the next channel manually when break occur in the channel as shown in figure 4. For switching the channel when add break occur we have to record the start and end time of add breaks in the particular channel. Figure 4 shows the start and end time of the add breaks in channels.

Fig.4. Ads

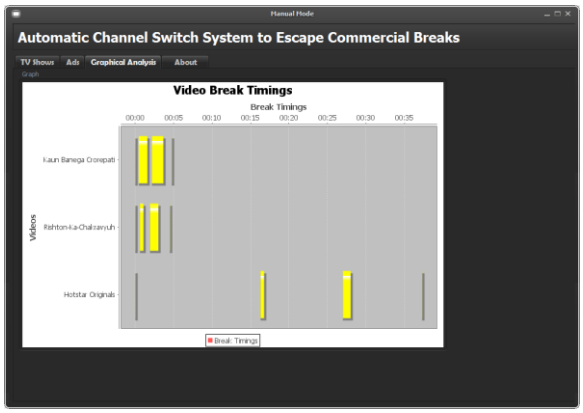

Fig.5. Graphical Analysis

Graphical analysis of video break timing for switching the channel is shown in figure 5.

V. CONCLUSION

We give a scheme, which provides a solution for commercial block recognition. Commercial boundaries are primarily detected using video frames and the detected. Boundaries are validated and enhanced using splash display of a program in the video domain. We use a technique like BSM. That is, it uses the subtraction between the current frame image and the background image. Ads Images are compared to channel video frames and differences are calculated to know start and end of the video.

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