DIGITAL RECORDING OF TV BROADCASTING AND ADVERTISEMENT DETECTION

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Abstract: In this paper we provide an integrated approach for detecting commercial advertisements in TV broadcasting for a digital recording of old TV shows. This approach uses Artificial Vision for detecting the TV logo in the video streams. The results of comprehensive experiments on a heterogeneous data emission set of 300 minutes of video taken from 5 different sources are reported. Our method provides almost 98% correct detection and elimination of the advertisements for a digital recording. We offer an effective solution with the new software developed.

1 INTRODUCTION

The new video digital formats allow an optimization in the storage of the TV shows of the TV enterprises. An important detail to reduce the recording volume is to eliminate the advertising of programs recorded on older video formats

On the other hand, it is important to control the emission of advertising in the media. In the focus of the market studies and control of TV publicity, some precedent of a digital system of advertising control exists in (Campoy) present ADETECT (Automatic Detection and Recognition of TV Advertisements) as a program for the detection of announcements in an advertising emission, comparing them with a data base of announcements, that is, this system identifies that announcement is emitting itself at every moment. This detection is made comparing first frames of the announcements with those of the data base through areas or landmarks in the image, using artificial vision concepts. This system for 4 years it has been commercialized and implanted in several consultancies of several countries to take the control of which announcements are being emitted and to that hour relay it.

A similarity system, for written press, has been developed by Centre de Vision by Computer of the University of Barcelona and in the program of European Union EUTIST-IMV (Integrated Machine for Vision European Industry), (INFOADEX). This system facilitates the control of the publicity in mass media.

We offer an effective solution to advertising control and commercial-free digital recording by means of visual identity in the live broadcast.

2 THE PROJECT: ADVERTISEMENT DETECTION AND ELIMINATION IN TV BROADCASTING

The main of our system is the automatic discrimination between advertisements and TV shows o films in TV broadcastings. Artificial vision will permit us to recognize emission sequences continuity of programming or advertising emission. Some similar systems use audio information (Marlow, 2001). Our method is the detection of the symbol or logo of the TV enterprise in the image. The TV logo is appearing/disappearing when there is program emission or advertisements. TV disappears in publicity.

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The television channels or enterprises that have been used in our study are: “1-tve”, “2-tve”, “Antena3”, “Tele5” and “Canal9”.

The developed system has been applied to the digital recording by a professional video from the analogical broadcasting.

The program will detect, by the recognition of logo, if the emission is valid or not, and it will come to send a command to the digital video (REC or STOP). A digital recording of program TV which is free of advertising announcements is obtained.

A very interesting utility of our project is the conversion of TV emission from analogical to digital media, without advertisements or publicity. This is very useful in TV producers in which they keep a file from the emitted thing, since when keeping the daily emission also stores the emitted publicity (commercial control).

On the other hand, also it is useful this system to have a control of time emission of advertisements in TV enterprises. This information is very important for TV channels and ANUNCIANTES

3 SYSTEM DESCRIPTION

Next, we detail the hardware and software characteristics of our system for detecting and eliminating advertisements in TV broadcasting:

- Digital video. JVC Digital-S BR-D750E, digital video of professional quality used in this investigation to have port series and communicate command from the computer with standard Sony protocols in professional video.
- Analogical video. Standard analogical video system.
- PC. Standard PC. Intel Pentium D. Windows XP operating system.
- Digital card. “Matrox Corona”. This hardware permits to digitize in PAL and NTSC system, and composite video signal, according to norm CCIR by Y/C and RGB. Also, it can capture non-standard systems. True quality color 24 bits.
- Software: The original software has been developed in C++ language.

The TV signal comes from the analogical video and it goes to the digitizer "Matrox Corona" in PC. This same signal is also derived to the digital video that will record the information coming from the analogical video. The signal produced by the analogical video or analogical antenna can be visualized through the screen of the PC using the program "Intellicam" that provides Matrox.

4 STEPS OF THE ALGORITHM FOR DIGITAL RECORDING WITHOUT TV ADVERTISEMENTS

Our system for advertisement detection of TV broadcasting consists of several modules that make different functions.

One first previous task to the execution of the algorithm is the save in a file of the patterns of TV logos with which the study will be made. They will be saved in binary format. Without these patterns, we can not detect the valid emission (without TV advertisements). We save together the patters a threshold of coincidence of logos. This will help to differentiate them to each other and from the background in which they are located and to obtain a greater success in the detection. In the following table we show a percentage of coincidence between TV logos. Also, we work with another superior threshold that allows us to differentiate the TV logo shape from the background. In our case, 80% have been considered as optimal as recognition of the shape of the logo.

In Figure 1, we can see a logo TV detection in a corner of the original image of a TV sequence of “Canal9”.

Once the system gets the logos from file, the algorithm begins a “*do…while*” loop. Initially, four small images corresponding to four corners of the TV emission are acquired in where the TV logos are located. The algorithm searches the TV logos in the four corner images every 0,5 seconds. If there is not similarity, there is a change in the process from REC to STOP. If there is similarity with a TV logo, then, the system is REC the analogical TV broadcasting to a digital system. Also, in the next iteration of the main loop, only the same corner is analyzed.

When the system has located the logo TV, it shows the information by a control window: a logo TV "v_x" with a coincidence level "p_x" is in the corner “c_x" and shows the image and its four processed sub-images. Then, it sends the command "REC" to the digital video for the recording the emission. If the system does not search any logo TV, the algorithm makes four consecutive verifications every 0.5 seconds without sending any command to the digital video. The command “STOP” is sent to digital video once these cycles have finished. This preserves to the system of continuity errors of TV emission: in

Figure 1: Logo TV detection in a corner of the original image.

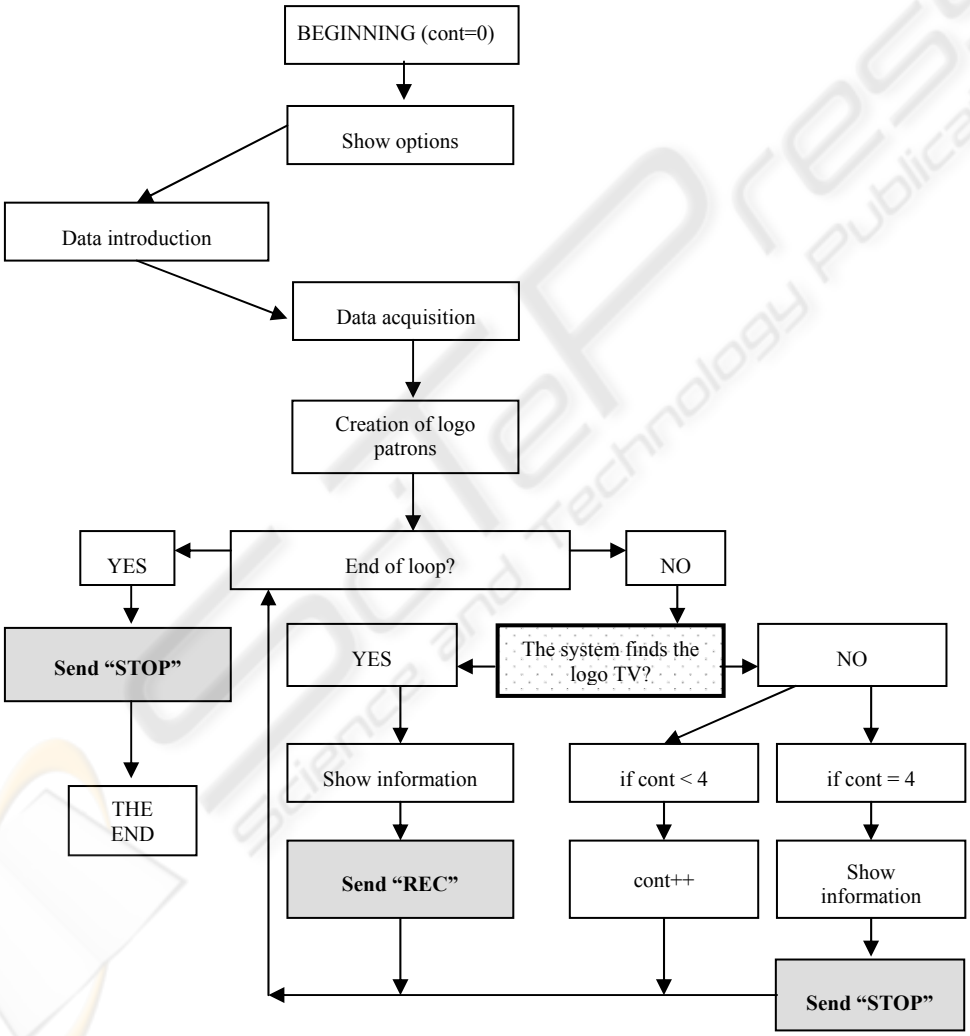

Figure 2: All the steps of the algorithm for detecting TV advertisements.

order to maximise the visual impact of TV advertisements, producers frequently use a faster rate of shot cuts than normal TV content (Hauptmann). Figure 2 shows all the steps of the algorithm for detecting TV advertisements.

In the algorithm, the "loop" is in process until the user paralyzes the system. In any case, the command "STOP" is sent to the digital video when this happens.

5 RESULTS

Now, show a significant example of the results obtained in the execution of our system of recording without advertising (Table 1). This example represents 5 hours of emission (300 minutes) 60 minutes by each one of the TV enterprise that compose the study (percentage in erroneous state):

Table 1: Results of advertisement detection.

TV enterprise	percentage in erroneous state
"1-tve"	2,2%
"2-tve"	1,83%
"Antena3"	2,1%
"Tele5"	3,4%
"Canal9"	2,8%

Of the 60 minutes of test by TV transmitter, it has been arrived at a high efficiency, then in the case of "2-tve", only there is a difference of 35 seconds (1,83% in erroneous state). In all the cases the system detects without failure some logo when this one is present in the image and the emission is valid. The over-recording has been procured until being completely safe of not finding logo of the transmitter in the image.

6 CONCLUSIONS

We can conclude that the developed system fulfills the expectations wished and it can to be used to eliminate the advertisement in new digital recording of old TV shows.

At present, we work on improving the algorithm of digital recording. It aims to decrease the error rate to less than 1%, by increasing the speed of detection of the TV logo. We are reducing the computation time of the algorithm, improving the "identification" functions (pattern recognition).

In addition, we are making adjustments to the system for recording digital TV, reducing, in this case the complexity of the tasks.

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