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ADVERTISEMENT FILTRATION METHOD AND SYSTEM

Field Of Invention

The present invention relates generally to an advertisement filtration method. Specifically, the present invention relates to an advertisement filtration method for filtering advertisement from normal programming and an advertisement filtration system for implementing the same.

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Background

Free-to-air television programmes are watched by a large number of viewers. The broadcast of these programmes are typically supported by television commercials. In fact, these commercials occupy a significant proportion of airtime. On an average, viewers can expect 2.4 minutes of commercials for every 10 minutes of broadcast time. This can vary with different broadcasters. This naturally translates into inconvenience for the consumers, who have to sit through these commercial breaks. The inconvenience is compounded for viewers who do not watch a show live, but rather, for individuals who record or store the television programmes for later viewing. TV commercials are not only parasitic on the storage capacity of storage systems, for example VCRs and DVD recorders, but also force the viewers to proactively engage in fast-forwarding pass the TV commercials when viewing pre-recorded television programmes.

One conventional approach is to use a storage system, for example a videocassette recorder (VCR) to selectively record only regular programming and to suspend recording during a commercial break. However, this requires a person to be physically present for discriminating the commercial portion from the regular programming. Pre-programming of the storage device to stop recording at certain time intervals is also not a feasible option as the time and schedule of appearance of advertisements during screening of a television programme are often not available to viewers.

Hence, this clearly affirms a need for an advertisement filtration method and an advertisement filtration system for addressing the foregoing disadvantages of conventional manual selective recording of television programmes.

Summary

Television programmes are generally broadcasted with an image object therein. The image object watermarks the television programmes and is usually removed during broadcast of advertisements. An embodiment of the invention described hereinafter identifies the presence of the image object in order to determine portions of a plurality of images that do not belong to an advertisement. These non-advertisement images are buffered and subsequently stored for future retrieval as television programmes without advertisements.

Therefore, in accordance with a first aspect of the invention, there is disclosed an advertisement filtration method comprising the steps of:

receiving an image from a broadcast source, the image being received during one of an advert period and a non-advert period;

identifying one of presence and absence of an image object in the image, the image being associated with one of the advert period and the non-advert period, each of the advert period and the non-advert period corresponding with one of the absence of the image object from and the presence of the image object in the image; and

providing the image associated with the non-advert period to an image storage system.

In accordance with a second aspect of the invention, there is disclosed an advertisement filtration system comprising:

means for receiving an image from a broadcast source, the image being received during one of an advert period and a non-advert period;

means for identifying one of presence and absence of an image object in the image, the image being associated with one of the advert period and the non-advert period, each of the advert period and the non-advert period corresponding with one of

the absence of the image object from and the presence of the image object in the image; and

means for providing the image associated with the non-advert period to an image storage system.

In accordance with a third aspect of the invention, there is disclosed an advertisement filtration method comprising the steps of:

receiving an image from a broadcast source, the image being received during one of an advert period and a non-advert period;

capturing an image segment from a predefined portion of the image;

matching the image segment with a reference image;

correlating the image segment with the reference image to obtain a correlation coefficient;

comparing the correlation coefficient with a threshold value, the threshold value being predetermined;

establishing a match between the image segment and the reference image upon the correlation coefficient being at least equal to the threshold value;

associating the image with the non-advert period upon achieving a match between the image segment and the reference image; and

providing the image associated with the non-advert period to an image storage system.

Brief Description Of The Drawings

Embodiments of the invention are described hereinafter with reference to the following drawings, in which:

FIG. 1 shows a process flow diagram of an advertisement filtration method according to an embodiment of the invention;

FIG. 2 shows a system flow diagram of an advertisement filtration system for implementing the advertisement filtration method of FIG. 1;

FIG. 3 illustrates an image being obtainable from colour data constituting digital broadcast signals being received into the advertisement filtration system of FIG. 2;

FIG. 4 illustrates the digital broadcast signals of FIG. 3 carrying images received during an advert period and non-advert periods;

FIG. 5 illustrates an image segment being segmented from the image of FIG. 3, with a processed image segment being obtainable from the image segment;

FIG. 6 shows a process flow diagram of processing the image of FIG. 5 in a step of the advertisement filtration method of FIG. 1;

FIG. 7 shows a process flow diagram of a first method of matching the image segment of FIG. 5 with a reference image in a step of the advertisement filtration method of FIG. 1;

FIG. 8 illustrates the steps of FIG. 7 for determining one of an advert image and a non-advert image from the image of FIG. 5;

FIG. 9 shows a process flow diagram of a second method of matching the image segment of FIG. 5 with a reference image in a step of the advertisement filtration method of FIG. 1;

FIG. 10 illustrates the steps of FIG. 9 for determining one of an advert image and a non-advert image from the image of FIG. 5; and

FIG. 11 shows a process flow diagram of storing the non-advert image, determined in FIG. 7 and illustrated in FIG. 8, in a step of the advertisement filtration method of FIG. 1.

Detailed Description

An advertisement filtration method for addressing the foregoing problems and an advertisement filtration system for implementing the same are described hereinafter.

An embodiment of the invention, an advertisement filtration method 200 is described with reference to FIG. 1. Further described is an advertisement filtration system 20 for implementing the advertisement filtration method 200 with reference to FIG. 2. Free-to-air television broadcast signals are typically analogue broadcast signals 22 received from a broadcast source 21 as shown in FIG. 2. The analogue broadcast signals 22 are first received into an analogue-to-digital converter (A/D converter) 23 for conversion into digital broadcast signals 24. In places where the television broadcast signals received from the broadcast source 21 are digital broadcast signals 25, the digital broadcast signals 25 are provided directly to the advertisement filtration system 20 without undergoing conversion by the A/D converter 23.

As shown in FIG. 3, the digital broadcast signals 24 contain colours signals 26 for forming an image 28. The colour data 26 have red, green and blue (RGB) elements. By varying intensity of each RGB element, within an intensity range of 0 to 255, colours represented by the colour data 26 can be varied.

With reference to FIG. 4, the digital broadcast signals 24 are received into the advertisement filtration system 20 wherefrom a stream of the images 28 are obtained. The plurality of images 28 are sequentially received by the advertisement filtration system 20, in a step 210 of FIG. 1, with each image 28 being received during an advert period 30 or a non-advert period 32 as shown in FIG. 4. Advertisements are images 28 received during the advert period 30.

Television programs are typically received with a watermark. The watermark is typically descriptive of a particular broadcasting station or channel. For example, programmes from channel five can have a logo of a "5" watermarked at the top right corner a television screen. However, the watermark is not limited to being just a graphical description of the particular broadcasting station or channel. Instead, the watermark can be, for example, an image of a comic character.

On most television channels, the watermark is usually not present during an advertisement. Therefore, the watermark is usable as an indicator of whether an image 28 is received during the advert period 30 or the non-advert period 32.

Once the plurality of images 28 are received by the advertisement filtration system 20, each of the images 28 is individually processed to determine whether it is an advertisement or not. In a step 212 of the advertisement filtration method, the image 28 is processed to determine whether the image 28 is part of an advertisement received during the advert period 30. Therefore, in the step 212, the advertisement filtration system 20 proceeds to identify one of presence or absence of an image object 36 in the image 28, the watermark being the image object 36 as shown in FIG. 5.

In order to identify the presence of the image object 36 in the image 28, an image segment 38 is segmented from the image 28 in a step 220 of FIG. 6. As shown in FIG. 5, the image segment 38 is located within a predefined portion of the image 28 containing the image object 36. The advertisement filtration system 20 is connected to a user interface 40, as shown in FIG. 2, for allowing a person to predefine and thereby calibrate the location of the image segment 38 of FIG. 5.

Television programmes are constantly changing. This therefore leads to the image object 36 being located on varying backgrounds within the image segment 38. Due to the inconsistency of the background within the image segment 38, the image object 36 is visually identifiable but not computationally identifiable.

In a step 222 of FIG. 6, the image segment 38 is processed by flood filling the background of the image segment 38 to obtain a processed image segment 42. Once the image segment 38 has been processed in the step 222, the processed image segment 42 is compared with a reference image 44 as shown in FIG. 8. The reference image 44 contains a reference image object.

The reference image 44 is pre-definable by a person using the user interface 40 as different channels use different image objects 36 and therefore require different reference images 44. The processed image segment 42 obtained from the step 222 is pre-definable as the reference image 44 with the image object 36 contained therein being the reference image object.

Once the image segment 38 has been processed in the step 222, the processed image segment 42 is matched with the reference image 44 in a step 226.

A variety of methods are applicable for matching the processed image segment 42 with the reference image 44 for determining whether the image object 36 is present in or absent from the image 28. As the image object 36 is primarily used as a watermark for promotional and commercial purposes, the position of the image object 36 on a television screen translationally varies for different time of the day and for different days of a week. Therefore, a match is not obtainable by matching pixel-to-pixel the image segment 38 and the reference image 44.

In the step 224, the image segment 38 can be matched with the reference image 44 by determining the amount of correlation between the image segment 38 and the reference image 44. However, there must first be a basis for correlating between the image segment 38 and the reference image 44.

As mentioned in the foregoing, the images 28 are formed from the colour data 26 obtained from the digital broadcast signals 24 and being representative of the colour of each pixel within the image 28. Therefore from the colour data 26, image colour values 50 are obtained from the processed image segment 42, in a step 230 of FIG. 7, with each image value 50 being a numerical representation of the colour of each corresponding pixel of the processed image segment 42. Similarly, reference colour values 52 of the reference image 44 are pre-established. The image colour values 50 and the reference colour values 52 are also typically known as RGB values.

Following the step 230, the image colour values 50 are correlated with the reference colour values 52, in a step 232, to statistically obtain a correlation coefficient 54 therefrom. The step 232 of obtaining the correlation coefficient is illustrated in FIG. 8. The correlation coefficient 54 is a numerical value within a range of "0" to "1" with "1" being indicative of high correlation and "0" being indicative of no correlation between the image segment 38 and the reference image 44.

The correlation coefficient 54 obtained in the step 232 is compared with a threshold value 56 in a step 234. The threshold value 56 is also a numerical value within a range of "0" to "1". When the correlation coefficient 54 obtained is equal to or larger than the threshold value 56, for example the correlation coefficient 54 being quantitatively equal to or larger than the threshold value 56, the image 28 is determined as being received during the non-advert period 32 and therefore is not an advertisement. However, when the correlation coefficient 54 is lower than the threshold value 56, the image 28 is determined as being received during the advert period 30 and therefore forms part of an advertisement.

Therefore in a step 236 of FIG. 7, the correlation coefficient 54 obtained in the step 234 enables the advertisement filtration system 20 to determine whether the image 28 is obtained during the advert period 30 or during the non-advert period 32. In a step 226 of FIG. 7 and as illustrated in FIG. 8, an image 28 obtained during the advert period 30 is declared as an advert image 58 while an image 28 obtained during the

non-advert period 32 is declared as a non-advert image 60. The threshold value 56 is determinable by a person using the user interface 40.

Alternatively as shown in FIG. 9 and FIG. 10, the correlation coefficient 54 obtained in the step 234 is used for determining a deviation value 61a in a step 235a. FIG. 9 is a process flow similar to FIG. 7 with the exception of steps 235a and 235b. The deviation value 61a is the statistical deviation of the correlation coefficient 54 from the value '0', with the deviation value 61a being a dimensionless magnitude. The deviation value 61a is then compared with a deviation threshold value 61b in a step 235b. The deviation threshold value 61b is determinable by a person using the user interface 40.

When the deviation value 61a obtained is less than the deviation threshold value 61b, the image 28 is determined as being received during the non-advert period 32 and therefore is not an advertisement. However, when the deviation value 61a is at least the deviation threshold value 61b, the image 28 is determined as being received during the advert period 30 and therefore forms part of an advertisement.

In a step 214 of FIG. 1, the advertisement filtration system 20 proceeds to store the images 28 that have been declared as non-advert images 60. In the step 214, the advertisement filtration system 20 comprises an image buffer 62 for receiving and buffering the non-advert images 60 in a step 240 of FIG. 11. As shown in FIG. 2, the non-advert images 60 buffered in the image buffer are subsequently transmitted to an image storage system 64 in a step 242 of FIG. 11. The image storage system 64 is one of a videocassette recorder (VCR), a DVD recorder, a computer-based storage or the like devices for storing images for at least one of archiving and future retrieval.

The step 240 of buffering the non-advert images 60 before transmission thereof to the image storage system 64 is for facilitating continuity in the image stream that is being transmitted to the image storage system. Each of the non-advert images 60 are purged from the image buffer 62 upon being transmitted to the image storage system 64.

The advertisement filtration system 20 is in operational communication with the image storage system 64 for synchronising the recoding of the non-advert images 60 received from the image buffer 62. During an advertisement of a relatively longer duration, recording function of the image storage system 64 can be temporarily paused as the image buffer 62 is emptied and new non-advert images 60 are temporarily unavailable.

The advertisement filtration system 20 is incorporable with the image storage system 64, for example a VCR, to exist as a single physical unit.

In the foregoing manner, an advertisement filtration method and an advertisement filtration system are described according to an embodiment of the invention for addressing the foregoing disadvantages of conventional methods filtering advertisement. Although only one embodiment of the invention is disclosed, it will be apparent to one skilled in the art in view of this disclosure that numerous changes and/or modification can be made without departing from the scope and spirit of the invention.

Claims

1. An advertisement filtration method comprising the steps of:

receiving an image from a broadcast source, the image being received during one of an advert period and a non-advert period;

identifying one of presence and absence of an image object in the image, the image being associated with one of the advert period and the non-advert period, each of the advert period and the non-advert period corresponding with one of the absence of the image object from and the presence of the image object in the image, comprising:

segmenting the image to obtain an image segment, the image segment being a portion of the image, comprising:

processing the image segment for removing artifacts therefrom by flood-filling at least a portion of the image segment with a predefined background colour; and

matching the image segment with a reference image; and

providing the image associated with the non-advert period to an image storage system,

wherein the reference image comprises of the image object and a background, the background of the reference image being of the predefined background colour and the image segment.

2. The advertisement filtration method as in claim 1, the step of receiving an image from a broadcast source comprising the steps of:

receiving analogue image signals from the broadcast source;

converting the analogue image signals into digital image signals; and

obtaining the image from the digital image signals.

3. The advertisement filtration method as in claim 1, the step of receiving an image from a broadcast source comprising the steps of:

receiving digital image signals from the broadcast source; and

obtaining the image from the digital image signals.

4. The advertisement filtration method as in claim 1, the step of identifying one of presence and absence of an image object in the image comprising the steps of:

associating the image with the non-advert period upon achieving a match between the image segment and the reference image.

5. The advertisement filtration method as in claim 4, the step of segmenting the image to obtain an image segment comprising the steps of:

capturing the image segment from a predefined portion of the image.

6. The advertisement filtration method as in claim 4, the step of matching the image segment with the reference image comprising the steps of:

correlating the image segment with the reference image to obtain a correlation coefficient;

comparing the correlation coefficient with a threshold value, the threshold value being predetermined; and

establishing a match between the image segment and the reference image upon the correlation coefficient being one of equal to and larger than the threshold value.

7. The advertisement filtration method as in claim 4, the step of matching the image segment with the reference image comprising the steps of:

obtaining image colour values from the image segment;

obtaining reference colour values from the reference image;

correlating the image colour values with the reference colour values to obtain a correlation coefficient;

comparing the correlation coefficient with a threshold value, the threshold value being predetermined; and

establishing a match between the image segment and the reference image upon the correlation coefficient being one of equal to and larger than the threshold value.

8. The advertisement filtration method as in claim 4, the step of matching the image segment with the reference image comprising the steps of:

obtaining image colour values from the image segment;

obtaining reference colour values from the reference image;

correlating the image colour values with the reference colour values to obtain a correlation coefficient;

statistically determining deviation of correlation coefficient from the value ‘0’ to obtain a deviation value (*p*-value), the deviation value being a dimensionless magnitude;

comparing the deviation value with a deviation threshold value, the deviation threshold value being predetermined; and

establishing a match between the image segment and the reference image upon the deviation value being less than the deviation threshold value.

9. The advertisement filtration method as in claim 1, the step of providing the image associated with the non-advert period to an image storage system comprising the step of:

providing the image to one of a videocassette recorder (VCR), a DVD recorder, a VCD recorder and a computer-based storage device.

10. The advertisement filtration method as in claim 1, the step of providing the image associated with the non-advert period to an image storage system comprising the steps of:

providing the image associated with the non-advert period to an image buffer, the image buffer for buffering a plurality of images; and

transferring the image from the image buffer to the image storage system,

wherein the image buffer is for buffering a plurality of images for providing substantially continuous streaming of the plurality of images to the image storage system therefrom.

11. The advertisement filtration method as in claim 10, the step of transferring the image from the image buffer to the image storage system comprising the steps of:

establishing operational communication between the image buffer and the image storage system;

initiating recording function of the image storage system; and

transferring the image from the image buffer to the image storage system upon the recording function of the image storage system being initiated.

12. An advertisement filtration system comprising:

means for receiving an image from a broadcast source, the image being received during one of an advert period and a non-advert period;

means for identifying one of presence and absence of an image object in the image, the image being associated with one of the advert period and the non-advert period, each of the advert period and the non-advert period corresponding with one of the absence of the image object from and the presence of the image object in the image, comprising:

means for segmenting the image to obtain an image segment, the image segment being a portion of the image, comprising:

means for processing the image segment for removing artifacts therefrom by flood-filling at least a portion of the image segment with a predefined background colour; and

means for matching the image segment with a reference image; and

means for providing the image associated with the non-advert period to an image storage system,

wherein the reference image comprises of the image object and a background, the background of the reference image being of the predefined background colour and the image segment.

13. The advertisement filtration system as in claim 12, the means for receiving an image from a broadcast source comprising:

means for receiving analogue image signals from the broadcast source;

means for converting the analogue image signals into digital image signals; and

means for obtaining the image from the digital image signals.

14. The advertisement filtration system as in claim 12, the means for receiving an image from a broadcast source comprising:

means for receiving digital image signals from the broadcast source; and

means for obtaining the image from the digital image signals.

15. The advertisement filtration system as in claim 12, the means for identifying one of presence and absence of an image object in the image comprising:

means for associating the image with the non-advert period upon achieving a match between the image segment and the reference image.

16. The advertisement filtration system as in claim 15, the means for segmenting the image to obtain an image segment comprising:

means for capturing the image segment from a predefined portion of the image.

17. The advertisement filtration system as in claim 15, the means for matching the image segment with the reference image comprising:

means for correlating the image segment with the reference image to obtain a correlation coefficient;

means for comparing the correlation coefficient with a threshold value, the threshold value being predetermined; and

means for establishing a match between the image segment and the reference image upon the correlation coefficient being one of equal to and larger than the threshold value.

18. The advertisement filtration system as in claim 15, the means for matching the image segment with the reference image comprising:

means for obtaining image colour values from the image segment;

means for obtaining reference colour values from the reference image;

means for correlating the image colour values with the reference colour values to obtain a correlation coefficient;

means for comparing the correlation coefficient with a threshold value, the threshold value being predetermined; and

means for establishing a match between the image segment and the reference image upon the correlation coefficient being one of equal to and larger than the threshold value.

19. The advertisement filtration system as in claim 15, the means for matching the image segment with the reference image comprising:

means for obtaining image colour values from the image segment;

means for obtaining reference colour values from the reference image;

means for correlating the image colour values with the reference colour values to obtain a correlation coefficient;

means for statistically determining deviation of correlation coefficient from the value ‘0’ to obtain a deviation value (*p*-value), the deviation value being a dimensionless magnitude;

means for comparing the deviation value with a deviation threshold value, the deviation threshold value being predetermined; and

means for establishing a match between the image segment and the reference image upon the deviation value being less than the deviation threshold value.

20. The advertisement filtration system as in claim 12, the means for providing the image associated with the non-advert period to an image storage system comprising:

means for providing the image to one of a videocassette recorder (VCR), a DVD recorder, a VCD recorder and a computer-based storage device.

21. The advertisement filtration system as in claim 12, the means for providing the image associated with the non-advert period to an image storage system comprising:

means for providing the image associated with the non-advert period to an image buffer, the image buffer for buffering a plurality of images; and

means for transferring the image from the image buffer to the image storage system,

wherein the image buffer is for buffering a plurality of images for providing substantially continuous streaming of the plurality of images to the image storage system therefrom.

22. The advertisement filtration system as in claim 21, the means for transferring the image from the image buffer to the image storage system comprising:

means for establishing operational communication between the image buffer and the image storage system;

means for initiating recording function of the image storage system; and

means for transferring the image from the image buffer to the image storage system upon the recording function of the image storage system being initiated.

23. An advertisement filtration method comprising the steps of:

receiving an image from a broadcast source, the image being received during one of an advert period and a non-advert period;

segmenting the image to obtain an image segment, the image segment being a portion of the image, comprising:

capturing an image segment from a predefined portion of the image; and

processing the image segment for removing artifacts therefrom by flood-filling at least a portion of the image segment with a predefined background colour,

matching the image segment with a reference image;

correlating the image segment with the reference image to obtain a correlation coefficient;

comparing the correlation coefficient with a threshold value, the threshold value being predetermined;

establishing a match between the image segment and the reference image upon the correlation coefficient being at least equal to the threshold value;

associating the image with the non-advert period upon achieving a match between the image segment and the reference image; and

providing the image associated with the non-advert period to an image storage system,

wherein the reference image comprises of an image object and a background, the background of the reference image being of the predefined background colour.

24. The advertisement filtration method as in claim 23, the step of receiving an image from a broadcast source comprising the steps of:

receiving analogue image signals from the broadcast source;

converting the analogue image signals into digital image signals; and

obtaining the image from the digital image signals.

25. The advertisement filtration method as in claim 23, the step of providing the image associated with the non-advert period to an image storage system comprising the steps of:

providing the image associated with the non-advert period to an image buffer, the image buffer for buffering a plurality of images; and

transferring the image from the image buffer to the image storage system,

wherein the image buffer is for buffering a plurality of images for providing substantially continuous streaming of the plurality of images to the image storage system therefrom.