



- (51) International Patent Classification:
H04N 21/00 (2011.01) *G06F 17/30* (2006.01)
H04H 60/37 (2008.01)
- (21) International Application Number:
PCT/IL2013/050328
- (22) International Filing Date:
16 April 2013 (16.04.2013)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
PCT/IB2012/051584 1 April 2012 (01.04.2012) IB
61/669,132 9 July 2012 (09.07.2012) US
13/821,983 10 March 2013 (10.03.2013) US
13/832,083 15 March 2013 (15.03.2013) US
- (71) Applicant: TVTAK LTD [IL/IL]; Harel Road 3, 85025 Meitar (IL).
- (72) Inventors: SHAVIT, Adi; 91 HaShalom St., P.O.B. 511, 90805 Mevasseret-Zion (IL). SHAVIT, Dana; 91 HaShalom St., P.O.B. 511, 90805 Mevasseret-Zion (IL).
- (74) Agents: FLASHPOINT IP LTD. et al.; Rehov Rabban Gamliel 2, 40800 Elad (IL).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,

DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- with amended claims (Art. 19(1))
- with information concerning one or more priority claims considered void (Rule 26bis.2(d))
- the filing date of the international application is within two months from the date of expiration of the priority period (Rule 26bis.3)

(54) Title: METHODS AND SYSTEMS FOR PROVIDING BROADCAST AD IDENTIFICATION

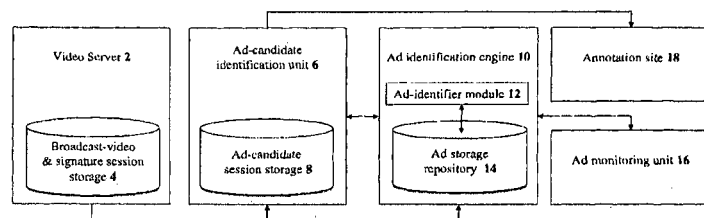


Figure 1

(57) Abstract: The present invention discloses methods and systems for providing broadcast ad identification. Methods include the steps of: providing fingerprint signatures of each frame in a broadcast video; and designating at least two repeat fingerprint signatures upon detecting at least one fingerprint-signature match from the signatures. Preferably, methods further include: prior to the designating, determining whether the fingerprint signatures correspond to a known ad based upon detecting at least one fingerprint-signature match of the fingerprint signatures with pre-indexed fingerprint signatures of pre-indexed ads. Preferably, method further include: creating segments of the fingerprint signatures, ordered according to a timeline temporal proximity of the fingerprint signatures, by grouping at least two fingerprint signatures based on a repeat temporal proximity of at least two repeat fingerprint signatures respective of at least two fingerprint signatures. Preferably, methods further include detecting at least one ad candidate based on an occurrence of at least one repeat segment.



METHODS AND SYSTEMS FOR PROVIDING BROADCAST AD IDENTIFICATION

5

CROSS REFERENCE TO RELATED APPLICATIONS

This patent application claims priority to U.S. Patent Application No. 13/832,083, filed on March 15, 2013, which therein claims priority to U.S. Patent Application No. 13/821,983, filed on March 10, 2013, which therein claims priority
10 U.S. Provisional Patent Application No. 61/469,875 filed March 31, 2011, and to PCT Patent Application No. IB2012/051584 filed April 1, 2012, and which are hereby incorporated by reference in their entirety.

This patent application further claims priority U.S. Provisional Patent Application No. 61/669,132 filed July 9, 2012, which is hereby incorporated by
15 reference in its entirety.

FIELD AND BACKGROUND OF THE INVENTION

The present invention relates to methods and systems for providing broadcast ad identification. In particular, the present invention relates to systems that can
20 identify when (i.e., in time and duration) and where (e.g., on which TV channel) each TV ad is broadcast.

Televised broadcast advertising has been a staple of consumer marketing and brand recognition for countless retailers since the advent of the television. Over the decades, while changing in content, TV ads have largely maintained a fairly-standard
25 format. For numerous applications, the ability to accurately and precisely detect TV

ads is considered to be valuable. However, the identification of TV ads from broadcasts is a task that is fraught with complexity. Adequate methods for detection are not known in the art.

In the art, US Patent Publication No. 2012/0114167 by Tian et al. (hereinafter referred to as Tian '167) discloses method for identifying repeat clip instances in video data by partitioning the data into ordered video units using content-based key-frame sampling, with each video unit having a sequence interval between two consecutive key-frames. The methods of Tian '167 create a fingerprint for each video unit, and group consecutive video units into time-indexed video segments in order to identify repeat clip instances based on correlation of the video segments.

The methods of Tian '167 are based on utilizing sequential frame similarity relying on multi-frame fingerprints, not the reoccurrence of single-frame fingerprints. The fingerprints are unit fingerprints of a segment. Such a "bottom-up" approach has inherent limitations with regard to frame-boundary issues, detection accuracy, and real-time detection.

Some important observations can be generally made regarding the nature of TV ads in comparison to the rest of the broadcasts that the ads are presented within. Ads obey a certain patterns that distinguish them from other broadcast video content.

- (1) Ads are relatively short in duration (i.e., typically about 5-30 seconds) – distinguishing the ads from other longer video content, or from certain, very short, repeating slides or frames.
- (2) Ads are repeatedly broadcast during the day – distinguishing the ads from show-specific video clips which may repeat (e.g., title sequences and re-entry excerpts from commercials), since TV shows are not broadcast throughout the day but are limited to a designated time slot.

- (3) Ads are repeatedly broadcast at varying intervals during the day (i.e., there is a minimum time period between two broadcasts of an ad).
- (4) Ads are broadcast on multiple channels – distinguishing the ads from channel and show promotion, since competing channels won't usually broadcast the same promotions.
- (5) Ads typically appear within a batch of other commercials.

It would be desirable to have such methods and systems for providing broadcast ad identification. Such methods and systems would, *inter alia*, overcome the various limitations mentioned above utilizing the distinguishing ad characteristics mentioned above.

SUMMARY OF THE INVENTION

It is the purpose of the present invention to provide methods and systems for providing broadcast ad identification.

In the interest of clarity, several terms which follow are specifically defined for use herein. The terms "video," "video feed," "TV feed," "broadcast feed," and "video clip" are used herein to refer to various technological embodiments of electronically processing and reconstructing a sequence of still images representing scenes in motion. The term "video server" is used herein to refer to a computer hardware system dedicated to run one or more video-feed services (detailed below) as a host in order to serve the needs of other components in the ad detection system of the present invention. The term "fingerprint signature" is used herein to refer to a compact representation of a frame of a video feed.

It is noted that the term "exemplary" is used herein to refer to examples of embodiments and/or implementations, and is not meant to necessarily convey a more-

desirable use-case. Similarly, the term “preferred” is used herein to refer to an example out of an assortment of contemplated embodiments and/or implementations, and is not meant to necessarily convey a more-desirable use-case. Therefore, it is understood from the above that “exemplary” and “preferred” may be applied herein to
5 multiple embodiments and/or implementations.

It is noted that a non-transitory computer-readable medium includes a hard drive, a compact disc, flash memory, volatile memory, non-volatile memory, and similar device memory, but does not include a transitory signal per se.

Preferred embodiments of the present invention enable recognition of TV ads
10 that have not been previously detected, and therefore are not pre-indexed.

Other embodiments of the present invention enable recognition of TV ads. In preferred implementations of such embodiments, the system identifies in real time a commercial being broadcast. Utilizing the distinguishing ad characteristics mentioned above, the detection of repeating segments that aren’t typically ads is enabled.

15 Such implementations enable revenue generation via real-time ad recognition, competitor analysis, and affiliate call-to-actions. Ad broadcast statistics including ad count, frequency, and time-of-day airing can be used in business-to-business (B2B) relationships. Real-time ad notification of an ad broadcast while it is being aired also provides enhanced B2B value.

20 Therefore, according to the present invention, there is provided for the first time a method for providing broadcast ad identification, the method including the steps of: (a) providing fingerprint signatures of each frame in a broadcast video for ad identification; and (b) designating at least two repeat fingerprint signatures upon detecting at least one fingerprint-signature match from the fingerprint signatures.

Preferably, the method further includes the step of: (c) prior to the step of designating, determining whether the fingerprint signatures correspond to a known ad based upon detecting at least one fingerprint-signature match of the fingerprint signatures with pre-indexed fingerprint signatures of pre-indexed ads.

5 Preferably, the method further includes the step of: (c) creating segments of the fingerprint signatures, ordered according to a timeline temporal proximity of the fingerprint signatures, by grouping at least two fingerprint signatures based on a repeat temporal proximity of at least two repeat fingerprint signatures respective of at least two fingerprint signatures.

10 More preferably, the method further includes the step of: (d) detecting at least one ad candidate based on an occurrence of at least one repeat segment.

Most preferably, the step of detecting at least one ad candidate is checked for consistency based on a segment-to-segment mapping.

According to the present invention, there is provided for the first time a system
15 for providing broadcast ad identification, the system including: (a) a server including:
(i) a CPU for performing computational operations; and (ii) a memory module for storing data; and (b) a processing module, residing on the server, configured for: (i) processing fingerprint signatures of each frame in a broadcast video for ad identification; and (ii) designating at least two repeat fingerprint signatures upon
20 detecting at least one fingerprint-signature match from the fingerprint signatures.

Preferably, the processing module is further configured for: (iii) prior to the designating, determining whether the fingerprint signatures correspond to a known ad based upon detecting at least one fingerprint-signature match of the fingerprint signatures with pre-indexed fingerprint signatures of pre-indexed ads.

Preferably, the processing module is further configured for: (iii) creating segments of the fingerprint signatures, ordered according to a timeline temporal proximity of the fingerprint signatures, by grouping at least two fingerprint signatures based on a repeat temporal proximity of at least two repeat fingerprint signatures
5 respective of at least two fingerprint signatures.

More preferably, the processing module is further configured for: (iv) detecting at least one ad candidate based on an occurrence of at least one repeat segment.

Most preferably, the detecting at least one ad candidate is checked for
10 consistency based on a segment-to-segment mapping.

These and further embodiments will be apparent from the detailed description and examples that follow.

BRIEF DESCRIPTION OF THE DRAWINGS

15 The present invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

Figure 1 is a simplified schematic diagram of the system architecture for providing broadcast ad identification, according to preferred embodiments of the present invention;

20 Figure 2A is a simplified flowchart of the major process steps on a video server for providing broadcast ad identification, according to preferred embodiments of the present invention;

Figure 2B is a simplified flowchart of the major process steps on an ad-candidate identification unit for providing broadcast ad identification,
25 according to preferred embodiments of the present invention;

Figure 2C is a simplified flowchart of the major process steps on an ad identification engine for providing broadcast ad identification, according to preferred embodiments of the present invention;

Figure 2D is a simplified flowchart of the major process steps on an annotation site for providing broadcast ad identification, according to preferred embodiments of the present invention;

Figure 3A is a simplified flowchart of the major process steps on a video server for providing broadcast ad identification, according to alternate embodiments of the present invention;

Figure 3B is a simplified flowchart of the major process steps on an ad-candidate identification unit for providing broadcast ad identification, according to alternate embodiments of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention relates to methods and systems for providing broadcast ad identification. The principles and operation for such methods and systems, according to the present invention, may be better understood with reference to the accompanying description and drawings.

Referring now to the drawings, Figure 1 is a simplified schematic diagram of the system architecture for providing broadcast ad identification, according to preferred embodiments of the present invention. A video server **2** is shown having a broadcast-video & signature session storage **4**. The designation "session" is used herein to indicate that the storage of the bulk data is temporary. Once the bulk data of a session (e.g., a day's worth of video feeds) has been processed, the data will be removed to make room for the next session batch.

Video server **2** is operationally connected to an ad-candidate identification unit **6** having an ad-candidate session storage **8**. Ad-candidate identification unit **6** automatically detects all new, unindexed ads, and extracts the ads as ad candidates for external tagging. Ad-candidate identification unit **6** processes in bulk from fingerprint session signatures.

Fingerprint signatures are computed from the TV feeds, and, optionally, relevant metadata is added to the fingerprint signatures. In such embodiments, fingerprint-signature comparison is performed using the well-known Hamming distance between bit-strings (i.e., the number of bits that are different between 2 bit-strings). The larger the Hamming distance is, the worse the match is between the signatures.

Bulk processing by ad-candidate identification unit **6** includes the processing of all sequential fingerprint signatures of multiple broadcast channels. Such bulk data of fingerprint signatures are required to be from a fairly-long duration of time (e.g., a day's worth of multi-channel broadcast feed) in order to identify ad candidates which have repeating elements. Processing can be performed on all the extracted fingerprint signatures (as described below with regard to Figure 2B), or only on the fingerprint signatures corresponding to unidentified new content (as described below with regard to Figure 3B).

Ad-candidate identification unit **6** is operationally connected to an ad identification engine **10** having an ad-identifier module **12** and an ad storage repository **14**. Ad identification engine **10** is also operationally connected to an ad monitoring unit **16** which monitors all broadcast channels in real time, and detects the start and end of a known, pre-indexed ad (i.e., an ad that had previously been detected and tagged). Once a new, unindexed ad candidate is identified (and tagged at an

annotation site **18** described below) as an ad by ad-candidate identification unit **6**, the ad is added to ad storage repository **14**, which allows the ad to be detected by ad monitoring unit **16** in real time. It is noted that in some implementations ad monitoring unit **16** resides on video server **2**.

5 The ad-candidate extraction process employs a fingerprint-to-fingerprint (F2F) matching method. For each frame fingerprint signature, all – if any – matching fingerprint signatures (i.e., repeats) are found in the new session data in which ad identification engine **10** matches the bulk data to itself. Such operations need to be very fast and algorithmically efficient, since self-matching requires matching millions
10 of fingerprint signatures to the same millions of fingerprint signatures.

For example, 24 hours of video, indexed at 15 frames/sec, generates $15 \times 60 \times 60 \times 24 = 1.3$ million fingerprint signatures. If matched naively against each other, such operations would require $1.3M \times 1.3M = 1.678$ billion signature comparisons. With a speedy 1 ms/comparison, more than 53 years of computing time
15 would be required to complete the task.

Segments are then created by grouping together all consecutive fingerprint signatures which have repeats that are close together in time. The segment-creation process is sequentially performed over all fingerprint signatures. Fingerprint signatures are added to a current segment if the signatures' matches are close (in time)
20 to the matches of previously-added fingerprint signatures in the current segment. If the signatures' matches aren't close to the matches of previously-added fingerprint signatures in the current segment, a new segment (having a new segment ID) is created. Fingerprint signatures with no matches are grouped into zero-segments.

The data is thus split into consecutive segments, with each segment being a
25 sequence of consecutive fingerprint signatures. All fingerprint signatures possibly

have matching fingerprint signatures in other segments. Since the segments are non-overlapping with no gaps between them, each fingerprint signature belongs to one and only one segment (and segment ID).

Optionally, a segment-to-segment (S2S) mapping method is then employed in which each segment is mapped to all other segments that contain matching fingerprint signatures to fingerprint signatures within a given segment. Mapping consistency is checked by creating a consistent S2S mapping that identifies true repeats for each segment. For each segment, all the other segments (IDs) that are from a different broadcast of the same video feed are found. Short segments are optionally removed.

For each segment s , given $N(s)$ is the set of neighboring segments previously mapped, all mapped segments t belonging to $N(s)$ are then iterated. If s belongs to any of $N(t)$, and the segment durations of s and t are similar, then the match between s and t is considered consistent – a type of bidirectional mapping.

Once all consistent repeating segments are found, the segments **are** classified using a segment filtering based on several segment types including:

- (1) unique segments which appear only once;
- (2) segments which repeat only on a single channel; and
- (3) segments which repeat across multiple channels.

Ad-candidate identification unit **6** is also operationally connected to an annotation site **18**, which is also operationally connected to ad identification engine **10**. Annotation site **18** enables each ad candidate to be identified and tagged. Once the broadcast times, durations, and channels of all ad candidates are determined, each ad candidate is identified and tagged. Such identifying and tagging can be done manually by displaying the relevant video clip at the appropriate time to a user, and letting the user select the appropriate brand, and assign any relevant metadata to the clip.

Alternatively, such identifying and tagging can be done by using additional metadata associated with the video feed. Such additional metadata may include (but is not limited to):

- (1) closed-caption text – often aired in-sync with the video feed, and
5 which may contain brand names and other valuable ad information (in such a case, the video feed corresponding to the bulk data must be stored for the viewing process);
- (2) speech-to-text – involving converting the audio track of the video feed into text, such captured text extracted from the video feed itself can
10 contain valuable information and metadata (in such a case, there is no need to store the video feed itself, but only the additional metadata such as the audio track, the converted text, and/or the closed-caption text); and
- (3) logo recognition – certain brands may be identified by automatic logo
15 identification within a video feed.

Note that none of the identifying and tagging methods involving additional associated metadata allow for the precise extraction of the ad boundaries and repeats, nor are such approaches always feasible to perform in real time once an ad has been indexed.

20 Once an ad candidate has been identified and tagged, the ad candidate can be added to ad identification engine **10** for later identification in real time via ad-identifier module **12**. All appearances of ads in the bulk data are also uploaded (retroactively) into ad statistics logs on ad identification engine **10**.

Figure 2A is a simplified flowchart of the major process steps on a video
25 server for providing broadcast ad identification, according to preferred embodiments

of the present invention. The process starts on video server **2** by receiving a broadcast video feed (Step **20**). Session signatures are then generated (Step **22**), and the broadcast video and signatures are stored in broadcast-video & signature session storage **4** (Step **24**).

5 Figure 2B is a simplified flowchart of the major process steps on an ad-candidate identification unit for providing broadcast ad identification, according to preferred embodiments of the present invention. The process starts when ad-candidate identification unit **6** receives the stored session signatures from video server **2**. The stored session signatures are analyzed (Step **26**), and ad candidates associated with
10 repeating segments within and across channels are detected (Step **28**). Ad-candidate identification unit **6** then determines whether the ad candidates are known ads (Step **30**).

 If the ad candidates aren't known ads, the ad candidates are stored in ad-candidate session storage **8** (Step **32**). If the ad candidates are known ads, the ad
15 candidates are transferred to ad identification engine **10**.

 Figure 2C is a simplified flowchart of the major process steps on an ad identification engine for providing broadcast ad identification, according to preferred embodiments of the present invention. The process starts when ad-candidate identification unit **6** transfers the ad candidates that are known ads to ad identification
20 engine **10**. Ad identification engine **10** updates the ad broadcast statistics, stored in ad storage repository **14**, and used by ad-identifier module **12** (Step **34**). Ad identification engine **10** then provides the pre-indexed ad-identification service to ad monitoring unit **16** for real-time ad broadcast detection (Step **36**).

 Figure 2D is a simplified flowchart of the major process steps on an
25 annotation site for providing broadcast ad identification, according to preferred

embodiments of the present invention. The process starts when the ad candidates are retrieved from ad-candidate identification unit **6** by annotation site **18** (Step **38**). Corresponding video segments and/or additional metadata are retrieved (Step **40**), and any metadata is processed (Step **42**). The new ads are then stored (Step **44**), and the ad
5 candidates and video are removed from storage (Step **46**).

Figure 3A is a simplified flowchart of the major process steps on a video server for providing broadcast ad identification, according to alternate embodiments of the present invention. In alternate embodiments, video server **2** receives a broadcast video feed (Step **50**). Session signatures are then generated (Step **52**) as in the process
10 of Figure 2A. Video server **2** then determines whether the ad candidates are known ads (Step **54**).

If the ad candidates aren't known ads, the ad candidates are stored in broadcast-video & signature session storage **4** (Step **56**). If the ad candidates are known ads, the ad candidates are transferred to ad identification engine **10** for further
15 processing as in Figure 2C.

Figure 3B is a simplified flowchart of the major process steps on an ad-candidate identification unit for providing broadcast ad identification, according to alternate embodiments of the present invention. The process starts when ad-candidate identification unit **6** receives the stored session signatures from video server **2**. The
20 stored session signatures are analyzed (Step **58**), and ad candidates associated with repeating segments within and across channels are detected (Step **60**) as in the process of Figure 2B. The ad candidates are then stored in ad-candidate session storage **8** (Step **62**), and the ad candidates are retrieved by annotation site **18** for further processing as in Figure 2D.

While the present invention has been described with respect to a limited number of embodiments, it will be appreciated that many variations, modifications, and other applications of the present invention may be made.

WHAT IS CLAIMED IS:

1. A method for providing broadcast ad identification, the method comprising the steps of:
 - (a) providing fingerprint signatures of each frame in a broadcast video for ad identification; and
 - (b) designating at least two repeat fingerprint signatures upon detecting at least one fingerprint-signature match from said fingerprint signatures.
2. The method of claim 1, the method further comprising the step of:
 - (c) prior to said step of designating, determining whether said fingerprint signatures correspond to a known ad based upon detecting at least one fingerprint-signature match of said fingerprint signatures with pre-indexed fingerprint signatures of pre-indexed ads.
3. The method of claim 1, the method further comprising the step of:
 - (c) creating segments of said fingerprint signatures, ordered according to a timeline temporal proximity of said fingerprint signatures, by grouping at least two said fingerprint signatures based on a repeat temporal proximity of said at least two repeat fingerprint signatures respective of said at least two fingerprint signatures.
4. The method of claim 3, the method further comprising the step of:

- (d) detecting at least one ad candidate based on an occurrence of at least one repeat segment.

5. The method of claim 4, wherein said step of detecting said at least one ad candidate is checked for consistency based on a segment-to-segment mapping.

6. A system for providing broadcast ad identification, the system comprising:

- (a) a server including:
 - (i) a CPU for performing computational operations; and
 - (ii) a memory module for storing data; and
- (b) a processing module, residing on said server, configured for:
 - (i) processing fingerprint signatures of each frame in a broadcast video for ad identification; and
 - (ii) designating at least two repeat fingerprint signatures upon detecting at least one fingerprint-signature match from said fingerprint signatures.

7. The system of claim 6, wherein said processing module is further configured for:

- (iii) prior to said designating, determining whether said fingerprint signatures correspond to a known ad based upon detecting at least one fingerprint-signature match of said fingerprint signatures with pre-indexed fingerprint signatures of pre-indexed ads.

8. The system of claim 6, wherein said processing module is further configured for:

- (iii) creating segments of said fingerprint signatures, ordered according to a timeline temporal proximity of said fingerprint signatures, by grouping at least two said fingerprint signatures based on a repeat temporal proximity of said at least two repeat fingerprint signatures respective of said at least two fingerprint signatures.

9. The system of claim 8, wherein said processing module is further configured for:

- (iv) detecting at least one ad candidate based on an occurrence of at least one repeat segment.

10. The system of claim 9, wherein said detecting said at least one ad candidate is checked for consistency based on a segment-to-segment mapping.

AMENDED CLAIMS

received by the International Bureau on 13 September 2013 (13.09.13)

1. A method for providing broadcast ad identification, the method comprising the steps of:
 - (a) receiving a video feed;
 - (b) computing fingerprint signatures of each frame in the video feed for ad identification;
 - (c) grouping consecutive fingerprint signatures based on repeat temporal proximity into a set of fingerprint segments; and
 - (d) identifying whether a fingerprint segment of the set of fingerprint segments is a known ad.
2. The method of claim 1, wherein the step of identifying the fingerprint segment comprises matching the grouped consecutive fingerprint signatures with pre-indexed fingerprint signatures of pre-indexed ads.
3. The method of claim 1, the method further comprising the step of:
 - (e) mapping the fingerprint segment against other fingerprint segments in the set of fingerprint segments to identify repeating segments.
4. The method of claim 3, the method further comprising the step of:
 - (f) classifying each fingerprint segment in the set of fingerprint segments according to how often each fingerprint segment repeats.
5. The method of claim 1, the method further comprising the steps of:
 - (e) collecting metadata of the fingerprint segment; and
 - (f) adding the metadata and computed fingerprint signature to an ad identification database to improve real-time detection of ads.
- 6-10. (cancelled)
11. The method of claim 5, wherein the step of collecting metadata comprises converting an audio track of the fingerprint segment into text.
12. The method of claim 5, wherein the step of collecting metadata comprises recognizing a logo within the fingerprint segment.

13. The method of claim 5, wherein the step of collecting metadata comprises displaying the fingerprint segment to a user and receiving metadata from the user.

14. A system for providing broadcast ad identification, the system comprising:

- (a) a server including a CPU for performing computational operations, and a memory module for storing data;
- (b) a video retrieval module, residing on said server, configured to store a received video feed
- (c) an ad-candidate identification module, residing on said server, configured to:
 - (i) compute fingerprint signatures of each frame in the received video feed for ad identification, and
 - (ii) group consecutive fingerprint signatures based on repeat temporal proximity into a set of fingerprint segments; and
- (d) an ad identification module, residing on said server, configured to identify whether a fingerprint segment of the set of fingerprint segments is a known ad.

15. The system of claim 14, wherein the ad identification module is further configured to match the grouped consecutive fingerprint signatures with pre-indexed fingerprint signatures of pre-indexed ads.

16. The system of claim 14, wherein the ad-candidate identification module is further configured to map the fingerprint segment against other fingerprint segments in the set of fingerprint segments to identify repeating segments.

17. The system of claim 16, wherein the ad-candidate identification module is further configured to classify each fingerprint segment in the set of fingerprint segments according to how often each fingerprint segment repeats.

18. The system of claim 14, wherein the ad identification module is further configured to collect metadata of the fingerprint segment and add the metadata and computed fingerprint signature to an ad identification database.

19. The system of claim 18, further comprising an ad monitoring unit that uses the metadata and computed fingerprint signature to detect ads in real-time.

20. The system of claim 18, the ad identification module is further configured to collect the metadata by converting an audio track of the fingerprint segment into text.

21. The system of claim 18, the ad identification module is further configured to collect the metadata by recognizing a logo within the fingerprint segment.

22. The system of claim 18, the ad identification module is further configured to collect the metadata by displaying the fingerprint segment to a user and receiving metadata from the user.

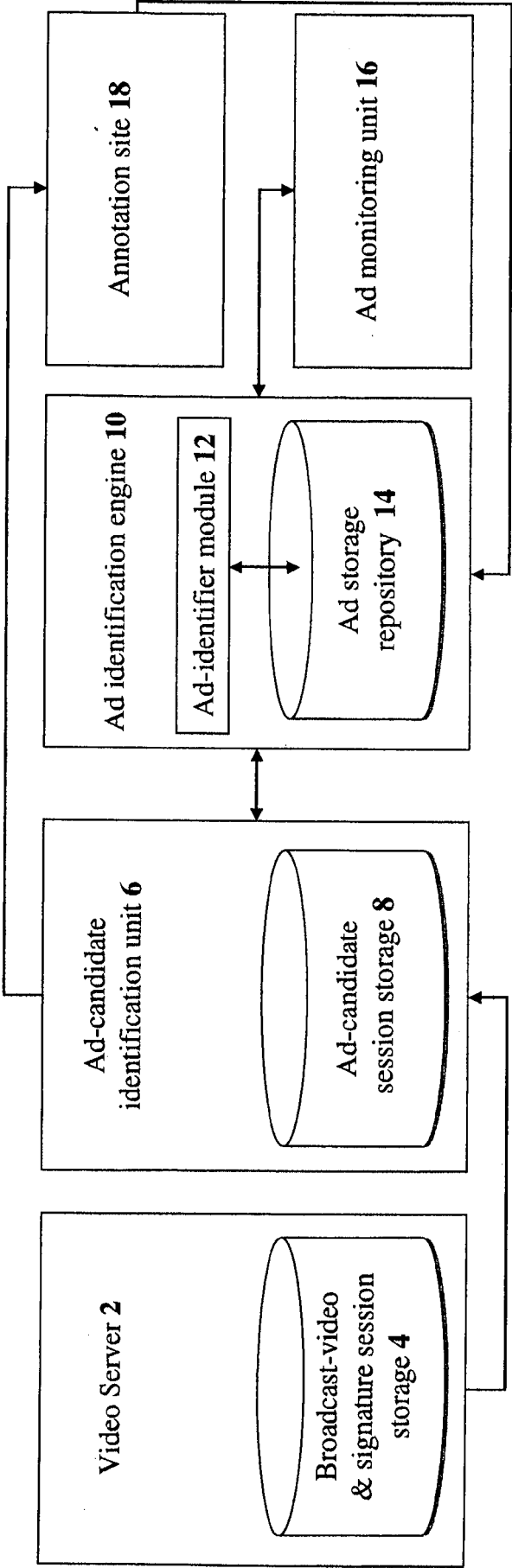


Figure 1

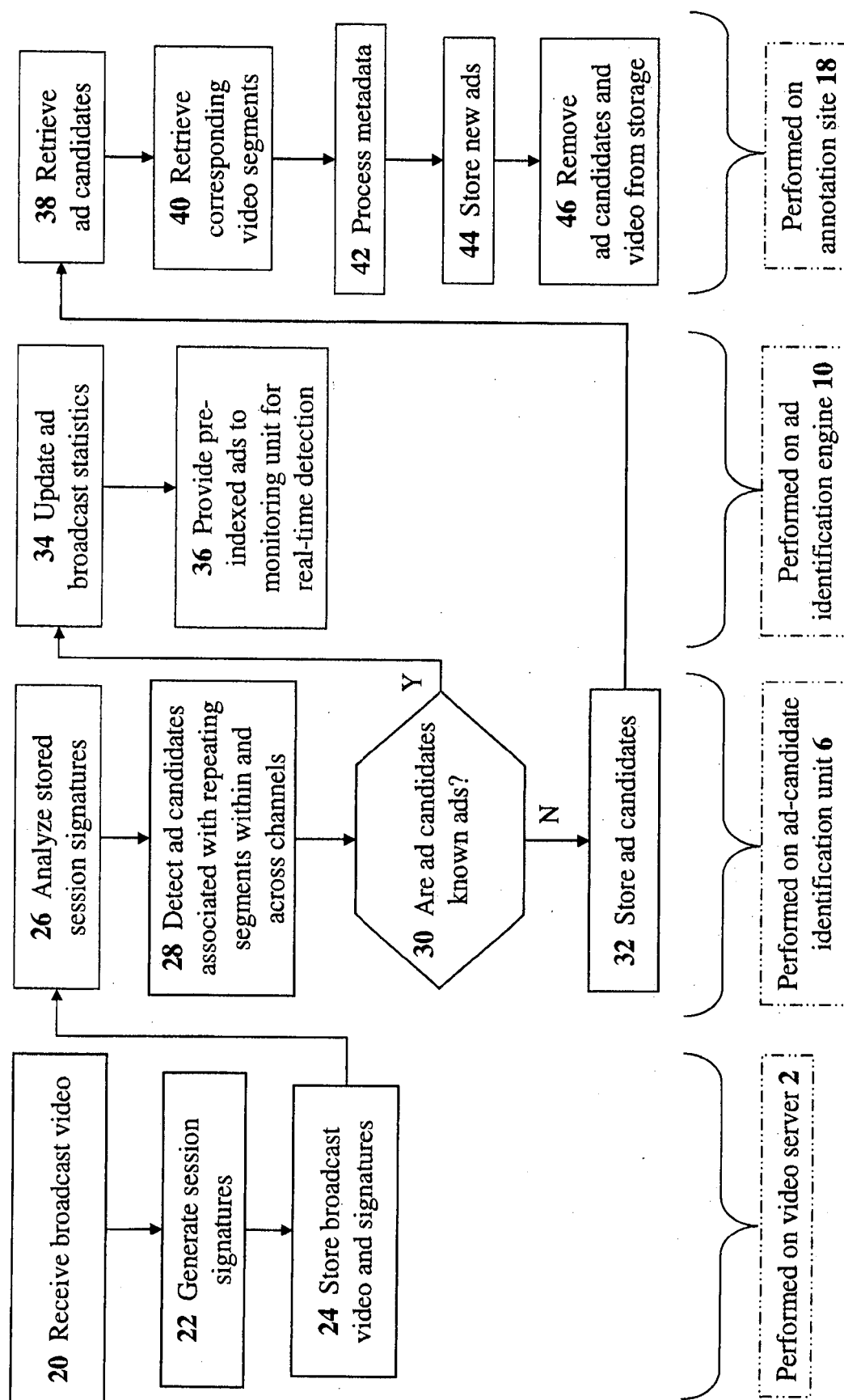


Figure 2A

Figure 2B

Figure 2C

Figure 2D

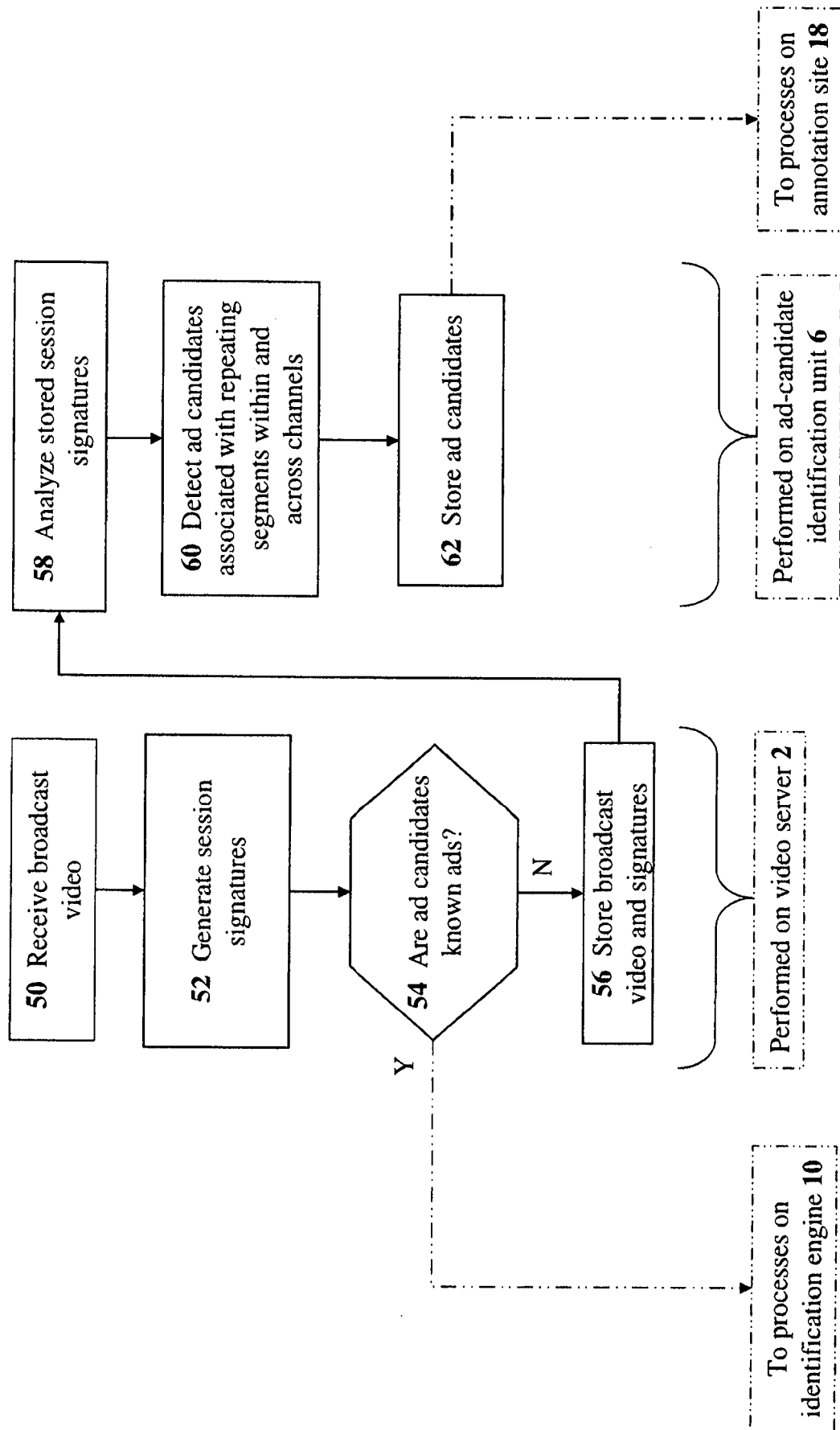


Figure 3A

Figure 3B

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL2013/050328

A. CLASSIFICATION OF SUBJECT MATTER
IPC (2013.01) H04N 21/00, H04H 60/37, G06F 17/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC (2013.01) H04N 21/00, H04H 60/37, G06F 17/30

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Databases consulted: THOMSON INNOVATION, Google Patents
Search terms used: ad, identification, fingerprint, signature, match, frame, segment

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6469749 B1 Dimitrova et al. 22 Oct 2002 (2002/10/22) Col. 2 lines 5-11, 30-40, 48-50; col.3 lines 1-19; col. 6 line 11 - col. 7 line 6; col. 8 lines 21-46.	1-10
A	WO 2011032168 A1 TIVO INC. 17 Mar 2011 (2011/03/17) The whole document	1-10

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"T" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

14 Jul 2013

Date of mailing of the international search report

15 Jul 2013

Name and mailing address of the ISA:

Israel Patent Office
Technology Park, Bldg.5, Malcha, Jerusalem, 9695101, Israel
Facsimile No. 972-2-5651616

Authorized officer

GORBONOVA Yelena

Telephone No. 972-2-5651669

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/IL2013/050328

Patent document cited search report			Publication date	Patent family member(s)		Publication Date
US	6469749	B1	22 Oct 2002	DE	60029746 D1	14 Sep 2006
				DE	60029746 T2	18 Oct 2007
				EP	1138151 A1	04 Oct 2001
				EP	1138151 B1	02 Aug 2006
				JP	2003511934 A	25 Mar 2003
				US	6469749 B1	22 Oct 2002
				WO	0128240 A1	19 Apr 2001
<hr/>						
WO	2011032168	A1	17 Mar 2011	AU	2010291945 A1	29 Mar 2012
				AU	2010291945 A9	31 Jan 2013
				AU	2010291946 A1	05 Apr 2012
				CA	2773323 A1	17 Mar 2011
				CA	2773558 A1	17 Mar 2011
				CN	102696223 A	26 Sep 2012
				CN	102696233 A	26 Sep 2012
				EP	2478698 A1	25 Jul 2012
				EP	2478700 A1	25 Jul 2012
				JP	2013504947 A	07 Feb 2013
				JP	2013504948 A	07 Feb 2013
				SG	179091 A1	27 Apr 2012
				SG	179092 A1	27 Apr 2012
				US	2011064386 A1	17 Mar 2011
				US	8417096 B2	09 Apr 2013
				US	2011063317 A1	17 Mar 2011
				US	2011064377 A1	17 Mar 2011
				US	2011064378 A1	17 Mar 2011
				US	2011064385 A1	17 Mar 2011
				US	2011066489 A1	17 Mar 2011
				US	2011066663 A1	17 Mar 2011
				US	2011066942 A1	17 Mar 2011
				US	2011066944 A1	17 Mar 2011

Information on patent family members

PCT/IL2013/050328

Patent document cited search report	Publication date	Patent family member(s)	Publication Date
		US 2011067066 A1	17 Mar 2011
		US 2011067099 A1	17 Mar 2011
		WO 2011032167 A1	17 Mar 2011
		WO 2011032168 A1	17 Mar 2011
		WO 2011032168 A4	05 May 2011

IHE155034

(54) 发明名称：用于提供广播广告识别的方法和系统

(57) 摘要

本发明公开了用于提供广播广告识别的方法和系统。方法包括以下步骤：提供广播视频中每一帧的指纹签名；并且当从所述签名检测到至少一个指纹签名匹配时指定至少两个重复指纹签名。优先地，方法还包括：在所述指定之前，基于所述指纹签名的至少一个指纹签名匹配确定所述指纹签名是否对应于已知广告，所述指纹签名带有预先索引的广告的预先索引的指纹签名。优先地，方法还包括：创建所述指纹签名的段节，通过组合至少两个指纹签名，根据所述指纹签名时间线上的时间邻近性排序，所述组合基于关于至少两个指纹签名的至少两个重复指纹签名的重复时间邻近性。优先地，方法还包括基于至少一个重复段节的发生检测至少一个广告候选。