A Video Dataset for an Efficient Camcording Attack Evaluation

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Abstract: Any video watermarking scheme dedicated to copyright protection should be robust against several attacks and especially against malicious and dangerous attacks such as camcording. Indeed, this attack has become a real problem for cinematographic production companies. However, until now the researchers don't evaluate the robustness of their video watermarking approaches against this attack or they consider it as a combination of some usual attacks. To resolve this problem, several studies proposed camcording simulators which encourage and help researchers in video watermarking domain to include the camcording in the robustness evaluation. In this paper, a dataset of camcorder videos dedicated to an efficient robustness evaluation of watermarking schemes is proposed which can help researches on camcording simulators' creation. In this dataset, videos are captured in realistic scenarios in the cinema and are recorded using five capture devices and from four positions. In more, the proposed dataset contains marked versions of the proposed videos using three different video watermarking techniques. This allows researchers comparing their approaches with these techniques. Experimental results show that the robustness evaluation based on the proposed dataset is more efficient than simulators based evaluation thanks to the diversity of the used capturing devices and the real conditions of videos recording.

1 INTRODUCTION

With the evolution of hacking techniques and the performance of smartphones that are, nowadays, equipped with high quality cameras and powerful processors allowing users to conveniently record, edit, and share videos, movies' hacking risks in screening rooms and movie theaters became a very dangerous problem. Hence, video watermarking algorithms that can resist to this kind of attack, called "camcording", and can help producers to protect their copyrights should be developed. Unfortunately, until now, researchers either still ignore this attack during the watermarking evaluation, or they consider it as a combination of usual attacks (rotation, compression, cropping ...) and this doesn't reflect in any case this attack. In order to facilitate and encourage researchers to evaluate the robustness of their proposed approaches against this attack, several researches are developed to propose efficient camcording simulators. Despite of their performance, these simulators are insufficient to obtain a real comcorded video. In this paper, we present the efficient methodology used to collect a dataset of Camcorded videos captured in realistic scenarios in a cinema using different capturing devices placed in various positions. In addition, some videos of this dataset are marked by three video watermarking schemes in order to evaluate their robustness against camcording attack. The proposed dataset can be used in order to help researchers to develop efficient camcording simulations or to compare their video watermarking schemes with existing techniques used in the proposed dataset.

This paper is organized as follows: the first section presents a survey of camcording attack where we present the existing watermarking methods dedicated to this attack, the usual robustness evaluation method and the developed simulators for camcording attack. In the second section we explain the capturing methodology and we give the characteristics of the proposed dataset. In the section 3, the evaluation of the proposed dataset is provided by comparing the classical robustness evaluation and the proposed one. In section 4, we enumerate some potentials applications of the proposed dataset. Finally, a conclusion and some perspectives are drawn.

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2 SURVEY OF CAMCORDING ATTACK

Robustness is the most critical and important constraint that each watermarking algorithm must satisfy. Despite the importance of this constraint, the majority of researchers evaluate the robustness of their algorithms against attacks that no longer represent a real risk to the video stream and ignore new techniques of piracy. In fact, a video watermarking algorithm can resist to usual attacks such as noise or geometric transformations while it may be inefficient against more dangerous attacks such as camcording.

This last one is a malicious attack that consists of capturing a video projected on a screen or in a movie theater using a given capture device like camera, smartphone, and camcorder in order to broadcast it in an illegal way after having applied some transformations to destroy the mark that has been inserted. This attack has become a major problem for film's industry in these recent. Hence, the robustness of video watermarking algorithms against this attack has become a necessity.

The Motion Picture Association affirms that the annual loss caused by pirated movies is 6.1 billion dollars and that over 90% of the pirated new release titles are illegal recordings made by camcorder piracy (of America, 2005), (Association.,) which is explicitly banned in many countries by law.In the United Sates, for example, the law of Family Entertainment and Copyright Act, prohibits the uses of recording devices in theatres. The law also imposes a strict penalty on anyone who pre-release works not just films. Also in Japan, to avoid the increasing of the loss of box-office revenues, an anti-camcorder law, which prohibits recording movies even for private uses, has been enforced and then permitted by the previous copyright law that encourages the movie industry to prevent any person from making illegal recordings.

2.1 Existing Video Watermarking Techniques Dedicated to Camcording Attack

To avoid the camcorder piracy, several watermarking techniques have been proposed in order to identify the illegally Camcording position (B. Chupeau and Lefbvre, 2008). The research and development unit of Kodak proposed a robust video watermarking method which permits to identify the cinema where the projection took place as well as the time and date of broadcast (Chandramouli R., 2001). Gosavi et al. (Gosavi and Mali., 2017) proposed a video watermarking technique which aims to detect the camcorder piracy based on DCT transform where the position of pirate is estimated by comparing original video frames with watermarked ones. Nakashima et al. (Yuta Nakashima and Babaguchi., 2009) proposed a deterrent to camcorder piracy, by developing a system for estimating the recording position from which a camcorder recording is made. The system is based on spread-spectrum audio watermarking for the multichannel movie soundtrack. It utilizes a stochastic model of the detection strength, which is calculated in the watermark detection process. Experimental results show that the system estimates recording positions in an actual theater with a mean estimation error of 0.44m. The results show that the method does not significantly spoil the subjective acoustic quality of the soundtrack. Lee et al. (Min-Jeong Lee and Lee., 2010) proposed also a video watermarking based on spread spectrum way that satisfies the requirements for protecting digital cinema and it enables the detector to estimate the position where the camcorder recording was made. The proposed position estimating model can detect the seat in a theater with a mean absolute error of 33.84, 9.53, 50.38 cm.

2.2 Camcording Evaluation for Video Watermarking Methods

Only a few researchers have tried to evaluate the robustness of their approaches against the Camcording attack. In order to make this evaluation, some consider the Camcording as a combination of usual attacks and simply test robustness against this combination. However, this combination can't provide, in any way, the real case of the application of Camcording. On the other hand, some researchers test the robustness against Camcording by capturing their watermarked video projected on standard screen like LCD.

Do et al. (Hoseok Do, 2008) propose a blind digital video watermarking scheme, robust to camcorder recording and to a variety of common video processing and geometric distortions. They test the robustness against Camcording by capturing the watermarked videos without specifying the camcorder and the projection's screen models. They tested three scenarios: recorder, recorder with rotation and recorder with cropping but they didn't specify the parameters of each attack. Choi et al. (Dooseop Choi, 2010) propose a new blind MPEG-2 video watermarking algorithm robust to camcorder recording and other attacks. They test the robustness of the proposed algorithm against Camcording by making several recordings of each video using a digital camcorder Sony, HDR-SR1 on a tripod 2.5m away from a 24-inch LCD screen Dell, 2405FPW. Two scenarios are used for testing: Recording 1: The recorded videos are resized to original size and recompressed by Xvid, 1000 Kbit per second. Recording 2: The recorded videos are resized to original size and recompressed by Xvid, 500 Kbit per second. Asikuzzaman et al. (Md. Asikuzzaman and Pickering, 2014) propose a blind video watermarking algorithm where the watermark is embedded into both chrominance channels using a dual-tree complex wavelet transform. This algorithm is robust to downscaling in arbitrary resolution, aspect ratio change, compression, and Camcording. The robustness against Camcording was tested by displaying watermarked video sequences at the rate of 25 fps and 30 fps on a 24-inch Samsung monitor and recorded the content with an iPhone 4S. Li et al. (Li Li, 2015) proposes an H.264/AVC HDTV watermarking method that is robust to camcorder recording, transcoding, recoding, and other geometric attacks. They test the robustness against camcorder attack by recording the watermarked video using a camcorder Sony HXR-MC1500C on a tripod 2 m away from a 24 in. LCD monitor.

2.3 Review of Camcording Simulators

Most of robustness tests against Camcording attack are carried out on a single screen model, using a single capture model and applying, generally, only one scenario of equipment's disposition. In fact, benchmarking of the camcorder path is far from being a frequent practice today due to the heavy logistical obstacles associated with this evaluation process. To solve this problem, some researchers are now focusing on the study of the impacts and distortions caused by the Camcording with the aim of designing precise simulators for this attack. In addition, the results of this study and analysis could be reused to improve video watermarking techniques. This process has been adopted in some previous works to model the printing and scanning process of still-image watermarking and the acoustic path transmission but Camcording is relatively not enough studied compared to this works focusing only on spatial deformations. Owing to the interaction between several devices, the displayed content of the camcorder changes video in some various ways, including temporal transformations, geometric distortions, variable and non-uniform luminance transformations, alteration colors saturation... It is necessary to understand the different phenomena involved to design effective and precise simulators that imitate these effects.

Ben Zid et al. (Cherif Ben Zid and Doerr, 2013) have study the luminance transforms due to the Camcording process and investigate three different alterations which are the spatial non-uniformity, the steady state luminance response, and the transient luminance response. To do this, they performed several controlled experiments where they simulated different configurations of the Camcording process. They used two alternative displays and one camcorder device which are a 24 "LCD monitor Dell U241014, a home theater video projector, Christie HD5Kc15 and a Sony HDR-CX200ETM camcorder. They then excited the system with several visual stimuli and looked at the recorded answers to infer the underlying mechanisms that take place as well as their characteristics. This study can be improved because it is focused on only three distortions that video content undergoes along Camcording process and uses only two displays and one capturing device.

Hajj-Ahmad et al. (Adi Hajj-Ahmad and Wu, 2017) have lead an investigation of the luminance flicker that is naturally present in camcorded recordings due to the interplay between liquid-crystaldisplay (LCD) screen and camcorder. To do this, they have break down the acquisition pipeline into three stages which are the emission of a back-light signal by the screen, the integration of the light emitted by the screen with a sensor of the camcorder, and the sequential sampling of the different rows of a video frame. They initially model the flicker signal and demonstrate that its parameters are related to such internal characteristics of the capture devices as the back-light frequency of the LCD screen and the read-out time of the camcorder. Then, they introduce an estimation strategy to recuperate these hidden parameters directly from camcorded recordings and demonstrate that such forensic cues could provide intelligence on the pirate devices. They additionally discuss on how to recuperate the shape of the low power flicker signal and demonstrate that it could be used to infer which back-light technology employed in the pirate LCD screen. The authors set out the prospects to better understand the applicability of flicker forensics which will involve large scale validation experiments with a wide diversity of devices, hence the utility of our proposed dataset.

The most complete simulator that is already available as open source tool to researchers is the CamMark developed by Schaber et al. (P. Schaber, 2014). This tool simulates a re-acquisition of a video from a camcorder to support watermarking development by enabling automated test cases for such camcorder copy attacks (fig 1). The authors are thus trying to simulate the typical artifacts of a camcorder capturing: geometric modifications (aspect ratio changes, cropping, perspective and lens distortion), temporal modifications (unsynchronized frame rates and the resulting frame blending), sub-sampling (rescaling, filtering, Bayer color array filter), and histogram changes (AGC, AWB), camera movement (e.g., a hand-held camera) and background insertion. To do this, they developed separate models for the various effects that appear at various stages of the Camcording process and apply their model in a natural order that resembles the actual physical order. In fact, there are effects that are caused from display like cropping, AR changes and visible parts of display, from optics they consider the perspective distortion, lens distortion and movement, from shutter there is frame blending due to frame rate changes, from sensor there is Resolution changes and bayer pattern interpolation and finally the processing induces automatic gain control and automatic white balance. The results obtained by CamMark are comparable to actual camcorder copies but cannot yet represent a real case of camcording process. The authors set out the prospects to consider the characteristics of different displaying devices in future releases of CamMark tool. Moreover, this tool is not easy to use. In fact, it is based on command line and the graphical user interface was a part of the original first version and was removed in version 1.1 and we are still waiting for a new CamMark interface which will offer a web-based interface to an entirely server-side processing.

Figure 1: CamMark simulation.

3 PROPOSED DATASET FOR CAMCORDING VIDEOS

In this paper, we propose a video dataset dedicated to evaluate the robustness of watermarking approaches against camcording attack. This dataset can help researchers to build their own camcording simulators by studying the distortion caused by camcorded videos. In more, it gives the researchers the possibility to compare their approaches of video watermarking with the robustness of tested techniques. In fact, the proposed dataset contains different videos (marked and not marked) recorded from different positions in a movie theater using different capturing devices.

3.1 Chosen Benchmark Videos

The first step in the dataset building is the choice of test videos. Indeed, we have chosen five color free right video (fig2) which present the most sensitive scenes for a video watermarking. The first video is the sequence Stephan which is a benchmark for video watermarking algorithms evaluation and researches on video processing. The second video is a sequence of the famous cartoon HD ”Big Buck Bunny”. The third one is a sequence of a HD cartoon ”Sintel” which presents complex scenes with a fast luminance changing. The fourth video is a video clip ”Varoshsequence” which presents a rock concert. The last one is an Italian advertising video ”Segugio”. The characteristics of these videos are presented in Table 1.

Table 1: Video tests characteristics.

Videos	Resolution	Size	Duration
Stephan	SD 346*280	7.29 Mo	0 :12 sec
Big Buck Bunny	SD 854*480	6.08 Mo	0 :20 sec
Sintel	HD 1280*720	10 Mo	0:16 sec
Varosh Sequence	HD 1280*720	9.94 Mo	0:16 sec
Segugio	HD 1280*720	9.63 Mo	0:16 sec

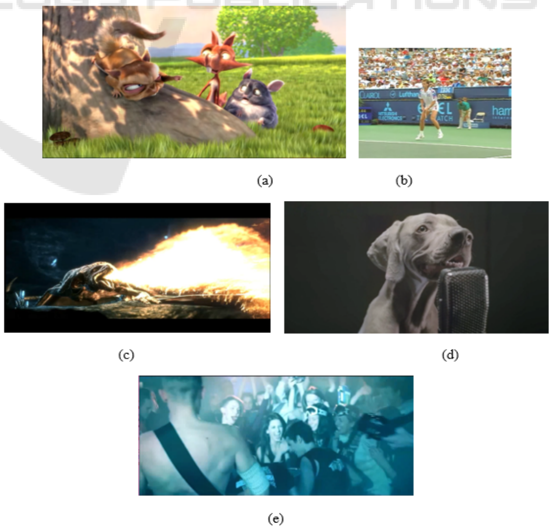

Figure 2: Chosen videos.

Subsequently, in addition of the original versions, we have marked these videos by using three different video watermarking algorithms: multi-frequency insertion (DWT-SVD-DCT) and feature region based approach proposed by Kerbiche et al. (A. Kerbiche, 2012), the algorithm proposed by Agilandeeswari et al. (L. Agilandeeswari, 2013) and based on the two transforms DWT-SVD, and spatial algorithm proposed by Datta et al. (S. Datta, 2014) which is based on the LSB method. We choose to test three robust and efficient video watermarking algorithms which embed signature in different domain of insertion (multi-frequency and spatial) in order to study their robustness against a realistic case of camcording attack. In addition, these camcorded marked videos can be used by researches to compare their proposals with these videos. Moreover, the usefulness of these camcorded watermarking versions, was to evaluate the proposed dataset and compare it with existing camcording methods, and this by testing their robustness.

3.2 Used Devices

The materials and capture devices that we used to record the chosen videos are: 3 tripods, laser meter, two smartphones (Samsung galaxy note 2 and iPhone 4s), a webcam Logitech V-u0028, a Panasonic camera HDC-tm900 and a Canon camera EOS 450D. Each capturing device has at least 16 GB of storage capacity and the videos are recorded with frame rate ranging from 20 to 30 frames per second. The characteristics of these capture devices are illustrated in Table 2.

Table 2: Capture devices characteristics.

Smartphones			
	Processor	**Camera**	**Resolution**
Galaxy Note 2	1.6 Ghz Quad core 2Go Ram	8 Mpx	1920×1080
Iphone 4s	1 Ghz Apple A5	8 Mpx	1920×1080
Cameras			
	Capturing system		**Resolution**
Panasonic HDC-tm900	3MOS (2 × 2.53 Mpx)		1920×1080
Canon EOS 450D	CMOS (12.2 Mpx)		1280×720
Webcam Logitech V-u0028	5 Mpx		800×600

3.3 Capturing Scenarios

Once videos are ready we displace to the Utopia cinema in Toulouse which was at our disposal for 2 hours. This room is 9.78m in width, 21.7m in length, 2.84m height at the back and 3.67m in the middle. It is composed of 224 seats (14 × 16) and the size of the projection screen is 8.16 meters (fig3).

Figure 3: Utopia cinema.

Turning to the capture step, to camcorder our videos we have placed the capturing devices in several places (fig4): in front, in the left, in the right and in the projection room given that the employees of the cinema affirmed that the majority of camcordred videos are captured from the projection room. For this reason we used two different scenarios:

Concerning the first one, we exposed our capturing devices as follows (fig5):

1. The Panasonic camera to the right of the screen to 12m of the projection screen, 50cm from the wall and 1.50m height.
2. The Canon camera to the left of the screen, to 16.6m of the projection screen, 1m from the wall and 1.20m height.
3. Samsung Galaxy Note 2 in front of the screen to 10.5m of the projection screen, 4.5m from the wall and 1.50m height.
4. IPhone 4s in the left of the screen to 6.34 m of the projection screen, 1m from the wall and 1.80m height.

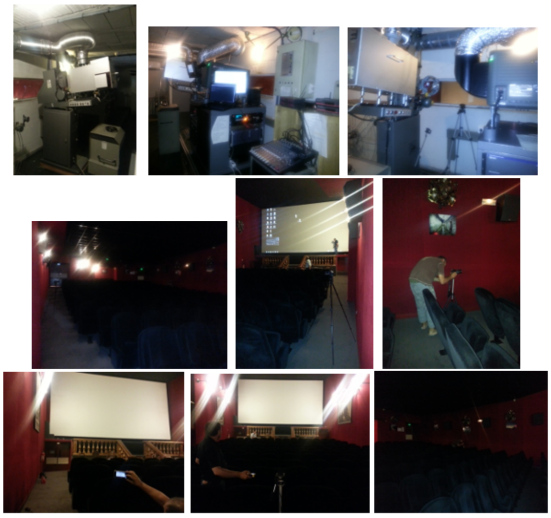

Figure 4: Videos' camcordering.

5. Logitech Webcam in the projection room in front of the screen at 19m, 4.5m from the wall and 2.5m height.

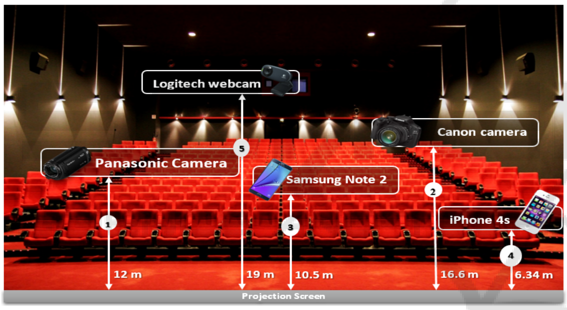

Figure 5: Capturing's Scenario 1.

In the second scenario, we exposed our capturing devices as follows (fig6):

1. The Panasonic camera in the projection room in front of the screen at 19m, 4.5m from the wall and 2.5m height.
2. Samsung Galaxy Note 2 in the right of the screen to 13.5m of the projection screen, 1.5m from the wall and 0.95m height.
3. IPhone 4s in the right of the screen to 13m of the projection screen, 1.3m from the wall and 0.95m height.
4. Logitech Webcam in front of the screen at 15m, 4.5m from the wall and 1.10m height.

3.4 Dataset Characteristics

The proposed dataset contains 180 camcorded watermarked videos. Figure 7 presents some of those

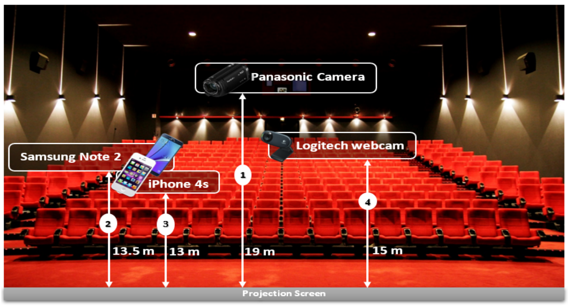

Figure 6: Scenario 2.

videos: (a) Segugio video camcordred with Panasonic in the right, (b) Sintel video camcordred with Panasonic in the projection room, (c) Big Buck Bunny video camcordred with Samsung Galaxy Note2 in the right, (d) Stephan video camcordred in the right with IPhone 4s and (e) VaroshSequence camcordred in the front with webcam.

Camcordred videos by IPhone 4s and Canon camera are .mov files which is a common multimedia container file format developed by Apple and compatible with both Macintosh and Windows platforms and it commonly uses the MPEG-4 codec for compression. The video obtained by the Panasonic camera are .MTS files which is a file extension for an AVCHD (Advanced Video Coding High Definition) video clip format for high-definition video. The MTS file format supports 1080i (a high definition video format with 1080 horizontal scan lines, interlaced) and 720p (720 horizontal scan lines, progressive scan, rather than interlaced) in a relatively small file size. AVCHD files are based on the MPEG 4 codec. Finally, the video obtained by the webcam and the Samsung Galaxy note 2 are .mp4 files. Table3 presents the characteristics of the camcordred videos.

Table 3: Camcordred videos' characteristics.

	Format	**Resolution**
Panasonic	.mts	1920 × 1080
Canon	.mov	1280 × 720
IPhone 4s	.mov	1920 × 1080
Galaxy note 2	.mp4	1920 × 1080
Webcam	.mp4	800 × 600

The whole dataset will be soon available on our website http://camcordingvideos.github.io/dataset.html for download or you can drop an email to the authors. The dataset website allows users to search videos by watermarking algorithm (not watermarked version, algo1, algo2, algo3) and capturing device. The users may choose to download all resulting videos, or select a subset from them.

Figure 7: Camcorded videos.

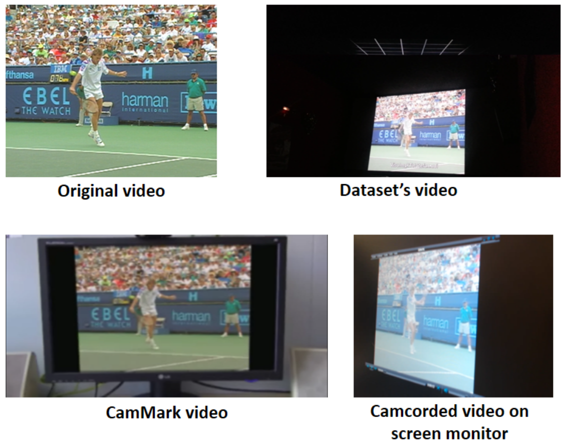

Figure 8: Different versions of camcorded Stephan video.

Table 4: Performances of the watermarking algorithms as cited in their papers.

Algorithms		**(A. Kerbiche, 2012)**	**(L. Agilandeeswari, 2013)**	**(S. Datta, 2014)**
Robustness	**MPEG4**	Good	Good	Poor
	Collusion	Good	Poor	Poor
	Rotation	Good	Good	Good
	Cropping	Good	Good	Good
	Noise	Good	Good	Poor
Invisibility		Good	Good	Good

4 DATASET EVALUATION

The proposed dataset was evaluated based on robustness results obtained after the evaluation of the three watermarking approaches which were applied on the proposed benchmark videos. Indeed, in order to prove the efficiency of the proposed dataset, we compare the obtained results with those obtained after applying other techniques of camcording which are: the CamMark simulator and the results obtained after camcording with a Smartphone (Samsung note 2) using a monitor screen Dell Professional 469-3134 19" LED LCD. Figure 8 presents camcorded versions of the watermarked video Stephan with these three camcording techniques. In more, we compare these results with those cited in the papers corresponding to the tested approaches (given in table 4) in order to prove that usual evaluation based on classic attacks only, can not reflect the real performance of video watermarking algorithms.

The robustness was evaluated on five videos obtained from the proposed dataset:

- The Video Bug Buck Bunny camcorded in the projection room with the Panasonic camera.
- The video Stphan camcorded in the right of the projection screen with the smartphone Samsung Galaxy note2.
- The video Sintel camcorded in the left of the screen projector with IPhone 4s.
- The video VaroshSequence camcorded in front of the screen projector with the Logitech webcam.
- The video Segugio camcorded in the left of the screen projector with the Canon camera.

For the CamMark simulator we have used the standard configuration presented in figure 9 and projected on the three simulated screens: SonyHDR-TD20 Monitor BrightEnv, SonyHDR-TD20 Projection BrightEnv and SonyHDR-TD20 Projection DarkEnv. Then, the robustness was tested on these videos:

- The Video Bug Buck Bunny simulated with the projector SonyHDR-TD20 Monitor BrightEnv.
- The video Stephan SonyHDR-TD20 Projection BrightEnv.
- The video Sintel SonyHDR-TD20 Projection DarkEnv.
- The video VaroshSequence SonyHDR-TD20 Monitor BrightEnv.
- The video Segugio SonyHDR-TD20 Projection DarkEnv.

Finally, for the third type of camcording, we have camcorded the same videos and positions used for the test of the proposed dataset using the smartphone Samsung note 2 and a LCD screen monitor. The obtained robustness results are shown in the table 5.


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  <!--<OverrideSourceFPS value="24" />-->

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    <CameraResolution width="0" height="0" />
    <TransformationFile path="../presets/spatial-movement/Monitor-16to10_Cam-
16to9_HandheldMovement_VisibleBG.yml" background-insertion="true" />
    <SoftenBorders extend-border-px="3" fade-border-px="3" />
  </SpatialDistortion>

  <TemporalDistortion enabled="true">
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  </TemporalDistortion>

  <AutomaticGainControl enabled="true">
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    <LowerBound count="0" thresh="95" adjust="2.25" />
    <UpperBound count="0" thresh="114" adjust="2.75" />
  </AutomaticGainControl>

  <AutomaticWhiteBalance enabled="true">
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  <ColorFilterArray enabled="true">
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    <AAFilter enabled="true" />
  </ColorFilterArray>

  <Defocus enabled="true">
    <GaussianBlur kernel-size="3" sigma="1.0" />
  </Defocus>

</Scenario>
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Figure 9: Configuration of the CamMark simulator.

Table 5: Comparative study of Camcording techniques based on robustness of the tested watermarking algorithms.

Algorithms		**(A. Kerbiche, 2012)**	**(L. Agilandeeswari, 2013)**	**(S. Datta, 2014)**
Proposed dataset	(a)	✓	✓	-
	(b)	-	-	-
	(c)	✓	✓	-
	(d)	✓	✓	-
	(e)	✓	-	-
CamMark	(a)	✓	✓	✓
	(b)	✓	✓	-
	(c)	✓	✓	✓
	(d)	-	✓	-
	(e)	✓	-	-
Camcording on a LSD screen monitor	(a)	✓	✓	✓
	(b)	✓	-	-
	(c)	✓	✓	-
	(d)	✓	✓	-
	(e)	-	✓	-

According to this comparative study, we can notice that despite the performance proved by the authors of the tested watermarking algorithms and the good robustness results obtained with usual attacks, some algorithms have not resist to camcording attack and we have failed to detect the presence of the mark on several tested videos whatever the camcording techniques used. In fact, the algorithm proposed by Datta et al. (S. Datta, 2014), which is based on the insertion in spatial domain, doesn't succeed to detect the mark on any video while for the algorithm proposed by Kerbiche et al. (A. Kerbiche, 2012) we were able to detect the presence of the mark on the most of selected videos.

Moreover, we can also notice that for each camcording technique we have obtained different results. In fact, we success to detect the inserted mark on some videos camcordred by the CamMark simulator and by using the standard capturing scenario (Camcording on a LCD screen monitor) but we fail to detect it on the dataset's video. In fact, for the algorithm proposed by Datta et al. (S. Datta, 2014) the detector fails to extract the mark for the five dataset's videos but successes for the CamMark simulated video and the camcorded video on a LCD screen. These results are logical as the proposed dataset represents the most realistic case of camcording which causes a variety of distortions that are not yet well simulated. In addition, the test of camcording using only a standard screen monitor and using one capture device is insufficient to evaluate the robustness against this attack.

5 POTENTIAL APPLICATIONS

Among applications that can use the proposed dataset and benefit from the availability of such a dataset, we can enumerate:

- Evaluation protocols of video watermarking algorithms: The proposed dataset can be used in order to compare the efficiency of video watermarking algorithms against the Camcording attacks. In fact, the captured watermarked videos can be used directly by video watermarking researches to compare their algorithms directly with the watermarked videos in the proposed dataset or after applying combination of attacks on them.
- Camcorder's simulators development: This dataset can greatly helps the studies on camcorder simulators. In fact, these videos are captured with several capture devices and with different disposition scenarios of these tools, which will allows researchers in this field to study the effects and impacts caused by camcorder process and try to simulate them.

6 CONCLUSION

This paper presents a survey of Camcording attack and proposes a camcordred videos dataset which contains recorded videos from a movie theater with several capture devices and from different shooting. This dataset can be useful for the comparative study of video watermarking algorithms. In fact, it will allow researchers comparing their approaches with the techniques tested in the proposed dataset. Moreover, experimental results show that the robustness evaluation based on the proposed dataset is more realist and efficient than the evaluation based on Camcording simulators thanks to the diversity of the used capturing devices and the real conditions of videos recording. For this reason, the proposed dataset is useful, specially, to improve the camcorder's simulators development by helping researches studding the impact of Camcording and the caused distortion using several capture devices on videos. In future, we intend to carry out an in-depth study of the distortions caused by the camcording on the dataset's videos.

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