

Self-Embedding Watermarking System

Software Bug Report

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# Bugs

The following are the few bugs that were noticed during development phase.

## Image Watermark Loss

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| Submit by | Hunzlah Malik |
| Date Seen | February 2, 2022 |
| Versions | * Windows 10 * Image Watermark Embedding |
| Bug Description | A watermarked image will lose the embedded data once its extension is changed, this is due to compression of image. |
| Severity | Major |
| Steps to Reproduce | 1. Watermark an image through our system. 2. Change the extension of image e.g., if it is png, change it to jpg etc. |
| Actual Behavior | The image will not be able to detect any tampering. |
| Expected Behavior | When checked for authentication, it should determine whether the image is tampered or not. |
| Troubleshooting/  Testing Steps Attempted | Looked into various methods that would prevent loss of authentication and recovery bits when image extension is changed. |
| Workaround | The only workaround decided for now is to let the user know that image watermark will be lost of image extension is changed. A detailed solution would be out of the scope of this project. |

## Pixel-wise Image Watermark Bug

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| --- | --- |
| Submit by | Aashar Naseem |
| Date Seen | April 8, 2022 |
| Versions | * Windows 10 * Python3 |
| Bug Description | Image going through watermarking process was not being watermarked properly and hence it was not being authenticated properly. |
| Severity | Catastrophic |
| Steps to Reproduce | 1. Run watermark function on a selected image. 2. Tamper the watermarked image. 3. Run authentication on tampered image and untampered image that has been watermarked. |
| Actual Behavior | It will show both images as tampered. |
| Expected Behavior | It should only show the tampered image as tampered and watermarked image as authentic image. |
| Troubleshooting/  Testing Steps Attempted | Debugged and reexamined the whole watermarking process along with the research paper. |
| Workaround | The issue was found in one of the bit sequences which was later on fixed. |

## Recovery Process in Pixel-wise Method

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| --- | --- |
| Submit by | Aashar Naseem |
| Date Seen | April 20, 2022 |
| Versions | * Windows 10 * Python3 |
| Bug Description | PSNR of recovered image is too low. |
| Severity | Catastrophic |
| Steps to Reproduce | 1. Run watermark function on a selected image. 2. Tamper the watermarked image. 3. Run recovery process on the tampered image. |
| Actual Behavior | The recovered portion of image is too much distorted. |
| Expected Behavior | It should show the recovered area properly. |
| Troubleshooting/  Testing Steps Attempted | Revisited recovery bits embedding process along with calculations. |
| Workaround | Reimplemented recovery bits embedding process to ensure proper data is recovered. |

## Glitch in Video Recovery

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| --- | --- |
| Submit by | Usama Aslam |
| Date Seen | April 29, 2022 |
| Versions | * Windows 10 * Python3 |
| Bug Description | Video recovered using keyframe embedding process will feel glitchy when a large number of frames are tampered and it would be even more glitchy if the keyframe has been tampered or removed. |
| Severity | Catastrophic |
| Steps to Reproduce | 1. Watermark video 2. Tamper video at any point 3. Perform recovery process on the video |
| Actual Behavior | The recovered video feels glitchy and stutters due to repeated duplication of keyframes. |
| Expected Behavior | It should show file name when hovered on the preview image |
| Troubleshooting/  Testing Steps Attempted | Looked into various solutions and research papers to check for a valid method that would ensure that video runs smoothly. |
| Workaround | Watermark all frames of a video instead of only the keyframe so that we would not need to duplicate keyframes when a normal frame is tampered. |

## Issue in Triple Recovery Watermark Process

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| --- | --- |
| Submit by | Hunzlah Malik |
| Date Seen | December 26, 2021 |
| Versions | * Windows 10 * Python3 |
| Bug Description | Image that has been cropped cannot be recovered because we would not be able to determine the original image size. |
| Severity | Catastrophic |
| Steps to Reproduce | 1. Watermark image. 2. Tamper the image by cropping it from anywhere. 3. Perform recovery process. |
| Actual Behavior | Original image size might not be recovered. |
| Expected Behavior | Image should be recovered and original size should be preserved. |
| Troubleshooting/  Testing Steps Attempted | Looked into various methods that could be used to preserve original image size. |
| Workaround | Encoded image size as a multiple of 64 in the authentication bits hash by reducing hash size using a library called Blake2b. |

## Lookup Table Issue in Triple Recovery Method

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| --- | --- |
| Submit by | Arbab Hamd Rizwan |
| Date Seen | December 18, 2021 |
| Versions | * Windows 10 * Python3 |
| Bug Description | Our method claims that a tampered image can be recovered up to 75%, however if it is tampered on a few specific portions, it cannot be recovered even if it was tampered around 25%. |
| Severity | Major |
| Steps to Reproduce | 1. Watermark an image. 2. Tamper an image on various selected portions such that all sub-blocks of a specific partner block are tampered. 3. Run recovery process. |
| Actual Behavior | It will be unable to recover original image even if tampering rate is 25%. |
| Expected Behavior | It should be able to full recover such tampered image. |
| Troubleshooting/  Testing Steps Attempted | Looked into the lookup table generation and compared it to sudoku. |
| Workaround | Created multiple variants of lookup table. When a user uploads image for watermarking, it also takes in a string as a password from user. This password is also used to generate an integer that will select a specific lookup table. |

## Uploaded Image Description Issue

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| --- | --- |
| Submit by | Arbab Hamd Rizwan |
| Date Seen | March 10, 2022 |
| Versions | * Windows 10 * ReactJS Version 17 * Ant Design |
| Bug Description | Ant design image upload component was not displaying image description properly. In our case, it was image name, instead it would show html code when hovered. |
| Severity | Minor |
| Steps to Reproduce | 1. Click the upload image box. 2. Upload image. 3. Hover on the preview image. |
| Actual Behavior | It will show some html code when hovered on the preview image. |
| Expected Behavior | It should show file name when hovered on the preview image |
| Troubleshooting/  Testing Steps Attempted | Tried editing the CSS of Ant Design built in component. |
| Workaround | Replaced the component with MUI image upload component. |