

Analysis of Open Source Watermarking Softwares

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Abstract: A watermark is an image or text that has been applied to a piece of paper or another image, to either protect the original image or to make it harder to copy it. Digital Watermarking is the act of hiding a message related to an image within the image itself. The added information can be more or less transparent to make it either easy or hard to notice the watermark.

In virtual presence, there is a total possibility that our work gets duplicated by people who actually don't have any contribution in it. Watermarking is also the best way to protect images from online misuses. It not only helps you to get credit from all other persons who use your images, screenshots, digital art etc. but it also helps you to establish a brand of your work.

When adding a watermark to an image or any other media, you send a clear signal that this image/media should not be copied/used without your consent. In this review paper, we study about various available open source watermark softwares and analyse them on the basis of their features and advantages.

Keywords:- Digital Watermark, Robustness, Copyright, Watermarking.

1. Introduction

A digital watermark is visible information in the form of numbers, text or image that has been added to the original digital content. Watermarking is the process that embeds data called watermark into a multimedia object. Digital watermarking is that technology that provides and ensures security, data authentication and copyright protection to the digital media. [1] Watermarking has many desirable properties:-

- Effectiveness - Effectiveness is the probability that the message in a watermarked image will be correctly detected. Ideally this probability should be 1. [2]
- Image fidelity - Watermarking is a process that alters an original image to add a message to it, therefore it inevitably affects the image's quality. We try to minimize the degradation of the image's quality, so that no obvious difference in the image's fidelity can be noticed. [2]
- Robustness - A robust watermark should be able to withstand additive Gaussian noise, compression, printing and scanning, rotation, scaling, cropping and many other operations.[2]

Watermark uniquely identifies the author of copyrighted work. Users need to watermark their contents for avoiding disclosure to thieves, keeping contents copyrighted and for sense of satisfaction. Embedding the watermark in the images and other media is also not very difficult. [3]

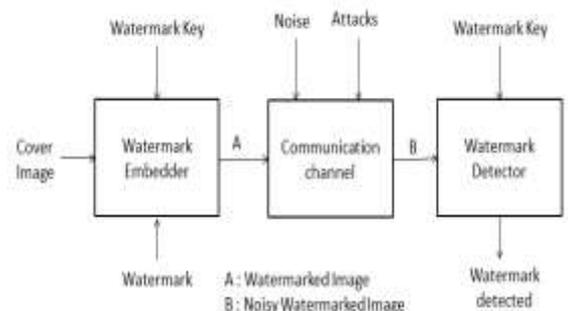


Figure 1. Digital Watermarking system

1.1 Applications

Digital watermarking may be used for a wide range of applications, such as:

- Copyright protection – It is an effort designed to prevent the reproduction of software, films, music and other media by unauthorized party. Various methods have been devised to prevent reproduction so that companies will gain benefit from each person who obtains an authorized copy of their product.[4]
- Source tracking (different recipients get differently watermarked content) - Watermarking could be used to record the recipient of every legal copy of a movie by embedding a different watermark in each copy. If the movie is then leaked to the Internet, the movie producers could identify which recipient of the movie was the source of the leak. [2]
- Broadcast monitoring (television news often contains watermarked video from international agencies) - It is important when the broadcast agency need to keep track, when a specific video is being broadcasted by a TV station. This is also

important to advertising agencies that want to ensure that their commercials are getting the air time they paid for.[2]

- Content management on social networks
- Transaction tracking - In transaction tracking, the watermark embedded in a digital work can be used to record one or more transactions taking place of this work.

2. Classification of Digital watermarking

Digital watermarks can be classified into different types depending on their characteristics, attached media, perceptivity, watermark type, domain, detection process and use of keys.

2.1 According to characteristics / robustness

- a. **Robust:** Robustness watermarking is mainly used to sign copyright information of the digital work. The embedded watermark can resist the common edit processing, image processing and lossy compression. The watermark is also not destroyed after various attacks, geometrical or non-geometrical and can still be detected to provide certification. [1]
- b. **Fragile:** Fragile watermarking is mainly used for integrity protection, which is very sensitive to the changes in signal. We can determine whether the data has been tampered, according to the state of fragile watermarking. [10]
- c. **Semi fragile:** Semi fragile watermarking is capable of tolerating some degree of change to a watermarked image, such as the addition of quantization noise from lossy compression. [1]

2.2 According to attached media/host signal

- a. **Image watermarking:** This is used to hide the special information into the image and to later detect and extract that special information for the author's ownership.[1]
- b. **Video watermarking:** This adds watermark in the video stream and is the extension of image watermarking. This method requires real time extraction and robustness for compression.
- c. **Audio watermarking:** An audio watermark is a unique electronic identifier embedded in an audio signal, to identify ownership of copyright. [11] This application area is one of the most popular due to internet music, MP3.
- d. **Text watermarking:** This adds watermark to the PDF, DOC and other text files to prevent the changes made to text. The watermark is inserted in the font shape and the space between characters and line spaces. [1]
- e. **Graphic watermarking:** It embeds the watermark to 2D or 3D computer generated graphics to indicate the copyright. [1]

2.3 According to perceptivity:

- a. **Visible watermark:** These watermarks can be seen clearly by the viewer and also identify the logo or the owner. [10] For eg. stamping a watermark on paper

or in television channels, like HBO, whose logo is visibly superimposed on the corner of the TV picture.

- b. **Invisible watermarking:** There is technology available which can insert information into an image which cannot be seen, but can be interrogated with the right software. As the watermark is invisible, the imposter cannot crop the watermark as in visible watermarking.[10]

You can't prevent the theft of your images this way, but you can prove that the image that was stolen was yours, which is almost as good. [1]

2.4 According to watermark type:

- a. **Noise type:** Noise type has pseudo noise, Gaussian random and chaotic sequences. [1]
Image type: There are binary image, stamp, logo and label. [1]

2.5 According to domain:

- a. **Spatial domain:** This domain focuses on modifying the pixels of one or two randomly selected subsets of images. It directly loads the raw data into the image pixels. Some of its algorithms are LSB and SSM Modulation based technique.
- b. **Frequency domain:** This technique is also called transform domain. Values of certain frequencies are altered from their original values. There are several common used transform domain methods, such as DCT, DWT, and DFT. [1]

2.6 According to detection process:

- a. **Visual watermarking:** It needs the original data in the testing course, it has stronger robustness but its application is limited. [1]
- b. **Semi blind watermarking:** It does not require an original media for detection. [10]
- c. **Blind watermarking:** It does not need original data, which has wide application field, but requires a higher watermark technology. [1]

2.7 According to use of keys:

- a. **Asymmetric watermarking:** This is a technique where different keys are used for embedding and detecting the watermark. [1]
- b. **Symmetric watermarking:** Here same keys are used for embedding and detecting the watermark. [1]

3. Open Source Watermarking Softwares

Digital media can be marked with a sign or text, known as watermark that represents the authority to its original owner as well as for search engine optimization purposes. [3] Though there are many image editors or free photo editing softwares available with which we can watermark images one by one, but that is a very complex and time consuming process.

If we want to save our time and watermark multiple images at once (text watermark, image watermark), then we can use

below mentioned powerful and professional Watermark softwares. [5]

3.1 **uMark** - It is one of the most commonly used watermarking tool available on the internet. This is full free software for protecting our images with watermarks. With uMark, we can add visible watermarks to hundreds of images at one go, can convert and rename images and generate thumbnails. [3] Some of the most attractive features of uMark free Watermark Software are:

- Text watermark
- Image watermark
- QR code watermark
- Shape watermark
- Batch processing (allows watermark 50 images at once)
- Set watermark position, transparency and rotation
- Add border and shadow effects to digital photos, images [5]

3.2 **JACo** - It is another free watermarking software which supports almost all image formats including BMP, GIF, JPG, JPEG, PNG and WBMP. JACo supports text and images as watermarks. We can easily make colorful watermarks on our images, containing font sizes with transparency support. It is also capable of batch processing and enable/disable the anti-aliasing for text watermarks.[3]

It comes with multiple watermark options and is a free Java Open Source application that is specially designed to watermark images. [5]

Its user interface is quite attractive and the software is very simple to access. Some useful features of JACo Watermark software are:

- Easy to use interface
- Preview for all images
- Text and image as watermark
- Batch image processing
- Supported formats: BMP, GIF, JPG, JPEG, PNG, WBMP
- Easy to change the font, size, style and colour of the text watermark
- Enable/disable the anti-aliasing for text watermark
- Allow the change of the opacity level of the watermark (transparency)
- Adjustment for watermark position [5]

3.3 **Kigo Image Converter** - With Kigo Image Converter, we can change image formats, resize

images, compress them as well as add watermarks by batch. This simple easy to use free watermarking tool is capable to process file formats including BMP, JPG, J2K, JPC, PNG, TIF, TIFF, with extra features like batch conversion, making thumbnails and previewing images. [3]

3.4 **WatermarkLib** - It is a professional free watermarking tool that lets you watermark your images with text or images, to protect them from unauthorized use. This amazing free application supports creating and editing watermarks by batch processing, with all image formats including JPEG, JPG, GIF, BMP, PNG, TGA, TIFF. You can add date and time stamps on your memorable digital photos too. [3]

3.5 **Watermark Images** - It is a simple free open source project developed in Java, capable to watermark images with texts, shapes and images as logo which can be scaled before adding. This software works with jpg, tif, gif, png, and bmp image file formats. This java based software lets you preview images before adding watermarks. Watermark images can produce output in PDF and JPEG formats, but requires Java to be installed on the host computer. [3]

3.6 **Star Watermark Software** - Star Watermark is one the most easy-to-use tool and best freeware to watermark pictures, images, photos for Windows and Mac. Batch watermarking is the most popular speciality of this Watermark Software.[5]

Free version of Star Watermark includes several interesting features like batch watermark photo files, text and image watermark, multiple layer watermark, text edge, cover text on image and resizing image etc.

3.7 **TSR Watermark Image** - TSR Watermark Image is the most appropriate freeware for personal use and watermark photos on Windows in a simple and quick manner. It not only offers you a powerful batch-watermarking facility but also provides you the one-click share buttons (Facebook, WordPress or FTP) to Share your watermarked photos. With the free trial version of TSR Watermark Image, you can enjoy several useful features like Batch Watermark, text Watermarks, Image & 3D Watermarks, Borders, crosses & special effects.[5]

3.8 **BImageStudio** - BImageStudio is not only designed for watermarking images, but is a free batch image studio editor that helps you to quickly edit multiple images and photos at once. It also allows you to add text and image as the watermark on your digital photos. [5]

BImageStudio software is compatible with Windows XP SP2, Windows Vista, Windows 7 (Both x86 and x64) operating systems. Here are some most useful features of BImageStudio:

- Batch Processing of multiple images at once
- Drag & Drop images
- Resize and Crop images
- Rotate and flip images
- Adjust images setting, Brightness, Contrast, Saturation
- Insert a text or image Watermark
- Rename images setting a filename, a separator
- Convert to different formats
- Set the Processor sequence
- Fast processing and Multilanguage support
- Export to new Directory without overwriting original images. [5]

3.9 **cdWorks Photo Helper** - CdWorks Photo Helper lets you edit camera metadata, rotate pictures and add a copyright watermark with just a few mouse clicks.[6]

3.10 **Picture Stamper** - It is an application that allows us to watermark with an intuitive and easy to use user interface. We just have to add our photos, logo and watermark text and Picture Stamper will do the remaining work for us. We can add as many photos as we want and stamp all of them at once. Our last stamp design is always saved for later use so we don't need to redesign from scratch each time we run Picture Stamper.[6]

3.11 **SquiggleMark** - It is a watermarking application that was designed with simplicity and ease of use in mind. (It's free version adds their own watermark along with ours). It can be used to watermark and resize multiple pictures at a time. [6]

3.12 Photo Watermark Software(Mass Watermark)

- Available for Windows and Mac
- Add Text or Image Watermarks to a collection of Images with Few Clicks
- Automated Batch Image Watermarking in a simple, fast and Unified Workflow
- Batch Resize Images to meet Web standards
- Retouch your Images before Watermarking with unique Image Optimizer
- Create your own Branding Watermark with Custom Text and Custom Logo
- Supports Wide Range of image formats JPEG,PNG,BMP,TIFF and GIF [7]

3.13 Visual Watermark

- We designed both import and export modules to be quick and responsive under high load. Visual Watermark software uses up to 4 processor cores to add watermark as quickly as your computer allows.
- Visual Watermark is desktop software and thus imports and watermarks photos really quickly. It loads them directly from your hard disc.
- Auto-resize tool solves inconsistencies with cropped and full-sized photos in the same batch and watermark all photos quickly at once. [8]

4. Analysis Between Various Open Source Watermarking Softwares

We can analyze some of the above described open source watermarking tools on the basis of their features and advantages:- [9]

S. No.	Tool	Type	Feature	Advantage
1.	UMark	Free	Fully customizable watermark softwares where we can choose the font, font size, style and color, also set custom transparency level, add shadow or rotate watermark according to our choice.	1.Batch Watermarking supports watermarking hundreds of photos in one go. 2.Can save watermark for later use. 3.Availablefor windows as well as MAC
2.	Mass Water Mark(Trial)	Free	Automated Batch Image watermarking in a simple and fast manner. It can watermark 100s of photos within minutes with just few clicks.	1. Retouch your image before watermarking with unique image optimizer. 2.Supports wide Range of image formats JPEG, PNG, BMP, TIFF and GIF.
3.	Visual Water mark	Free	It has 12 built-in watermark templates and appearance options, which helps you to get the	1. Watermark 100 photos in just 1 minute. 2. It can use logo and text in any combination.

			watermark look the way you want.	3. It can run on Windows and MAC.
4.	Water mark Lib	Free	This photo watermark software places very strong watermarks that no one can remove.	1. Add date and Time stamp. 2. Edit watermarks in a convenient interface.

5. Conclusion

We have studied different types of open source watermark softwares that can be used for authenticating the communication between the sender and the receiver. We have also analysed some of them on the basis of their features and advantages.

All softwares are capable of watermarking the pictures with text or images, to protect them from unauthorized use. These free applications support the creation and editing of watermarks and work with all image formats. Most of the above described softwares are easy to use that lets you edit multiple pictures at one time.

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