

# A Review on Texture Feature Analysis Based Watermarking Scheme for Image Processing

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**Abstract** -The digital watermarking is the technique which is used to provide security to sensitive data which is stored in the form of image. The watermarking is the process in which features of the original and sensitive image is calculated and in the second step, the original image is embedded into the watermark image. In this research paper, the neural network based watermarking technique is improved using GLCM and PCA algorithm. The GLCM and PCA algorithm extracts the features of the original image. The output of PCA algorithm defines the scaling factor which is used for the embedding. The proposed algorithm is implemented in MATLAB and simulation results demonstrated that proposed algorithm performs well in terms of PSNR and MSE.

**Keywords**- GLCM, PCA, SVD, DWT

## I. INTRODUCTION

### 1.1 Digital watermarking

Computerized watermarking is a procedure in which some data is implanted inside an advanced media so that the embedded information turns out to be a piece of the media. This system fills various needs, for example, communicate checking, information verification, information ordering et cetera. An advanced watermarking framework should effectively fulfill exchange offs between clashing prerequisites of perceptual straightforwardness, information limit and heartiness against assaults. These exchange offs are examined from a data theoretic point of view [1]. Watermarks have two classes of parts: In the main classification, the watermark is considered as a transmission code and the decoder must recoup the entire transmitted data accurately. In the second classification, the watermark fills in as a confirmation code. In the last framework, the watermark indicator should basically decide the nearness of a particular example. Since the impression of the confirmation watermarking, that is, the quantity of pixels per watermark code bit is regularly higher, this case has higher heartiness when contrasted with the subliminal channel (transmission code) case. In watermarking plans, the watermark message is installed in the host motion in various courses, for instance, additively or multiplicatively. For around ten years, a few reversible watermarking plans have been proposed for securing pictures of touchy substance, similar to medicinal or military pictures, for which any adjustment may affect their understanding. These techniques enable the client to reestablish precisely the first picture from its watermarked form by expelling the watermark..

Accordingly, visual models conceived in the zone of picture pressure can likewise be suited to the watermarking issue. Watermark inclusion process misuses the shortcoming of human visual framework properties to make the watermark intangible with maximal quality [3]. We utilize Watson visual model as a standard model to accomplish this errand. Watson demonstrated three unique properties (shortcoming) of the human visual framework. An advanced watermark is a sort of marker clandestinely inserted in a clamor tolerant flag, for example, sound or picture information. It is regularly used to distinguish responsibility for copyright of such flag. "Watermarking" is the way toward covering up advanced data in a transporter flag; the concealed data should, however does not have to contain a connection to the bearer flag. Computerized watermarks might be utilized to check the credibility or respectability of the bearer flag or to demonstrate the personality of its proprietors

Reversible watermarking (RW) strategies are utilized to install watermarks, e.g., mystery data, into computerized media while saving high soundness and great constancy of host media. It assumes a critical part in ensuring copyright and substance of computerized media for delicate applications, e.g., restorative and military pictures. In spite of the fact that scientists proposed some RW techniques for different media, e.g., pictures, sounds, recordings, and 3-D networks; they expect the transmission channel is lossless. The hearty RW (RRW) is in this way a testing errand. For RRW, the basic goal is to achieve watermark installing and extraction in both lossless and misfortune condition. Accordingly, RRW is required to not just recuperate have pictures and Watermarks without twisting for the lossless channel, yet in addition oppose inadvertent assaults and

concentrate however many watermarks as could reasonably be expected for the noised channel. As of late, twelve of RRW strategies for advanced pictures have been proposed, which can be characterized into two gatherings: histogram turn (HR)- based techniques and histogram dispersion obliged (HDC) techniques [2]. The HR-based strategies, achieve powerful misfortune less implanting by marginally turning the cancroids vectors of two arbitrary zones in the no covering squares. histogram conveyance. Shockingly, these strategies experience the ill effects of temperamental reversibility and heartiness as per. In outline, the above investigation demonstrates that the two sorts of RRW techniques are not promptly pertinent practically speaking. Computerized watermarking is an innovation for inserting different sorts of data in advanced substance. When all is said in done, data for ensuring copyrights and demonstrating the legitimacy of information is inserted as a watermark. A computerized watermark is an advanced flag or example embedded into computerized content. The advanced substance could be a still picture, a sound clasp, a video cut, a content archive, or some type of computerized information that the maker or proprietor might want to ensure. The fundamental reason for the watermark is to distinguish who the proprietor of the advanced information is, yet it can likewise recognize the expected beneficiary.

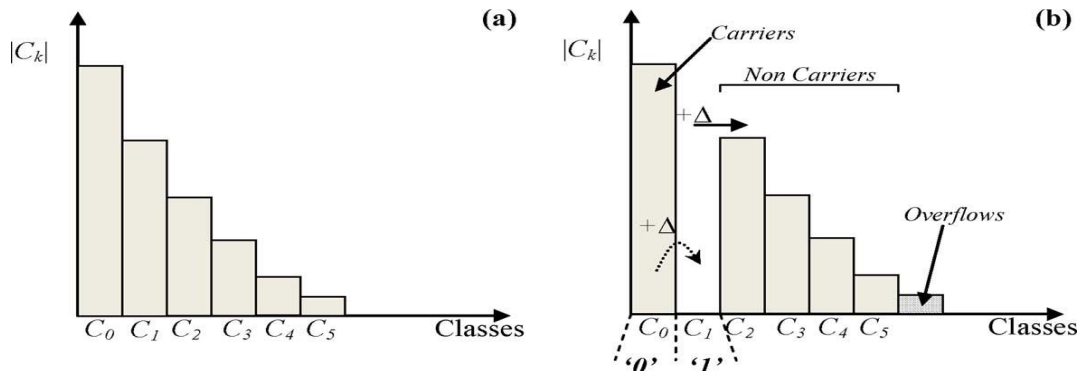


Fig.1.1:- Histogram shifts modulation. (a) Original histogram. (b) Histogram of the watermarked data.

### 1.2 Purpose of advanced watermarking

Imperceptible watermarks, then again, are possibly helpful as a methods for recognizing the source, creator, maker, proprietor, and merchant or approved purchaser of a record or picture. For this reason, the goal is to for all time and unalterably check the picture so the credit or task is past question. In case of illegal utilization, the watermark would encourage the case of possession, the receipt of copyright incomes, or the accomplishment of arraignment [10]. Watermarking has additionally been proposed to follow pictures in case of their unlawful redistribution. Though past encroachment with copyrighted reports was regularly restricted by the unfeasibility of huge scale photocopying and conveyance, present day computerized systems make

Advanced watermarking is a system which enables a person to include shrouded copyright sees or other confirmation messages to computerized sound, video, or picture flags and archives. Such shrouded message is a gathering of bits portraying data relating to the flag or to the creator of the flag (name, put, and so on.). The strategy takes its name from watermarking of paper or cash as a safety effort. Computerized watermarking isn't a type of steganography, in which information is covered up in the message without the end client's learning, albeit some watermarking strategies have the steganography highlight of not being discernible by the human eye

The huge prominence of the World Wide Web in the mid 1990's exhibited the business capability of offering sight and sound assets through the advanced systems. Since business intrigues try to utilize the computerized systems to offer advanced media revenue driven, they have a solid enthusiasm for ensuring their proprietorship rights. Computerized watermarking has been proposed as one approach to achieve this.

In this way, the watermark Embedders and extractor stay synchronized on the grounds that the extractor will recover a similar reference picture. In this, we adjust this procedure to choose the most locally suitable watermarking balance.

vast scale scattering straightforward and cheap. Computerized watermarking makes it conceivable to interestingly stamp.

### 1.2 Purpose of computerized watermarking

Undetectable watermarks, then again, are possibly valuable as a methods for distinguishing the source, creator, maker, proprietor, and wholesaler or approved purchaser of a report or picture. For this reason, the goal is to for all time and unalterably check the picture with the goal that the credit or task is past debate. In case of unlawful use, the watermark would encourage the case of possession, the receipt of copyright incomes, or the achievement of indictment [10].

### 1.3 Types of Watermarks

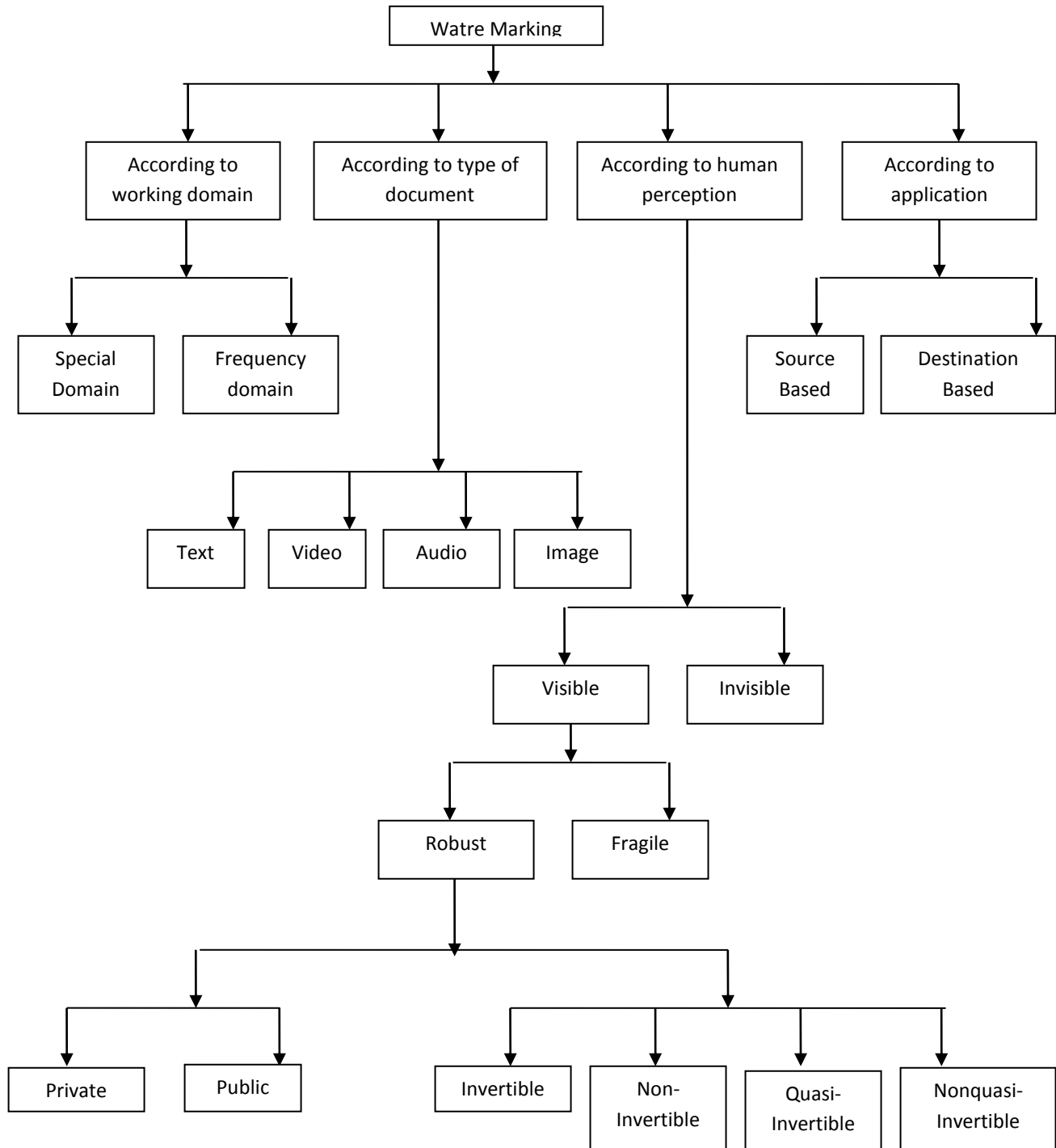


Fig. 1.2:- Hierarchy of Watermark

### 1.3.1 Visible watermarks

Obvious watermarks are an augmentation of the idea of logos. Such watermarks are pertinent to pictures as it were. These logos are decorated into the picture however they are straightforward. Such watermarks can't be expelled by editing the inside piece of the picture. Further, such watermarks are ensured against assaults, for example, measurable examination [11].

### 1.3.2 Invisible watermark

Undetectable watermark is covered up in the substance. It can be recognized by an approved office as it were. Such watermarks are utilized for content or potentially creator verification and for recognizing unapproved copier [12].

### 1.3.3 Public watermark

Such a watermark can be perused or recovered by anybody utilizing the particular calculation. In this sense, open watermarks are not anchor. Be that as it may, open watermarks are valuable for conveying IPR data. They are great other options to names [13].

### 1.3.4 Fragile watermark

Delicate watermarks are otherwise called carefully designed watermarks. Such watermarks are obliterated by information control.

### 1.3.5 Private Watermark

Private watermarks are otherwise called secure watermarks. To peruse or recover such a watermark, it is important to have the mystery key.

### 1.3.6 Perceptual watermarks

A perceptual watermark abuses the parts of human tactile framework to give undetectable yet vigorous watermark. Such watermarks are otherwise called straightforward watermarks that give to a great degree top notch substance [12].

### 1.3.7 Bit-stream watermark

The term is some of the time utilized for watermarking of packed information, for example, video.

## 1.4 Types of Watermarking

### 1.4.1 Video watermarking

Video watermarking can be considered as a superset of typical picture watermarking. All things considered, every one of the methods pertinent to static pictures can be connected to video pictures. Be that as it may, because of the high edge rate of video, the inserting procedure must happen nearly continuously for live transmissions (it sets aside a limited opportunity to install the watermark, which may impact the transmission rate). In the event that the substance is created disconnected, this impediment does not exist. An exceptionally famous type of on-line (live) video

watermarking is the use of an unmistakable watermark (regularly a logo or other distinctive sign set in a subtle place on each casing of video [14].

### 1.9.1 Requirements of Water Marking

To be compelling in the assurance of the responsibility for property, the imperceptibly watermarked record ought to fulfill a few criteria:

1. The watermark must be troublesome or difficult to expel, at any rate without noticeably debasing the first picture,
2. The watermark must survive picture adjustments that are basic to ordinary picture handling applications (e.g., scaling, shading re-quantization, dithering, editing, and picture pressure),
3. An undetectable watermark ought to be impalpable so as not to influence the experience of review the picture, and
4. For some undetectable watermarking applications, watermarks ought to be promptly distinguishable.

## II. WRITING REVIEW

Nikita Kashyap, "Picture Watermarking Using 3-Level Discrete Wavelet Transform (DWT)", 2012 in this paper they presented [1] about actualized a powerful picture watermarking strategy for the copyright assurance in light of 3-level discrete wavelet change (DWT). In this method a multi-bit watermark is installed into the low recurrence sub-band of a cover picture by utilizing alpha mixing strategy. The inclusion and extraction of the watermark in the grayscale cover picture is observed to be more straightforward than other change procedures. The proposed strategy is contrasted and the 1-level and 2-level DWT based picture watermarking techniques by utilizing factual parameters, for example, top flag to-clamor proportion (PSNR) and mean square mistake (MSE). The exploratory outcomes show that the watermarks produced with the proposed calculation are undetectable and the nature of watermarked picture and the recuperated picture are moved forward.

Chun-Shien Lu and Hong-Yuan Mark Liao, "Multipurpose Watermarking for Image Authentication and Protection", 2001 In this paper they proposed [2] a novel multipurpose watermarking plan, in which powerful and delicate watermarks are all the while inserted, for copyright assurance and substance confirmation. By quantizing a host picture's wavelet coefficients as veiling limit units (MTUs), two correlative watermarks are installed utilizing mixed drink watermarking and they canbe aimlessly separated without access to the host picture. With the end goal of picture insurance, the new plan ensures that, regardless of what sort of assault is experienced.

Navnidhi Chaturvedi, Dr.S.J.Basha, "Correlation of Digital Image watermarking Methods DWT and DWT-DCT on the Basis of PSNR", 2012 In this paper [4] they portrayed about the genuineness and copyright insurance are two

noteworthy issues in dealing with computerized mixed media. The Image watermarking is most mainstream technique for copyright assurance by discrete Wavelet Transform (DWT) which performs 2 Level Decomposition of unique (cover) picture and watermark picture is inserted in Lowest Level (LL) sub band of cover picture. Reverse Discrete Wavelet Transform (IDWT) is utilized to recuperate unique picture from watermarked picture. What's more, Discrete Cosine Transform (DCT) which change over picture into Blocks of M bits and after that remake utilizing IDCT. In this paper we have looked at watermarking utilizing DWT and DWT-DCT strategies execution examination on premise of PSNR, Similarity factor of watermark and recouped watermark.

Ali Al-Haj, "Joined DWT-DCT Digital Image Watermarking", 2007 In this paper creator [5] portrayed about the expansion of digitized media because of the quick development of organized sight and sound frameworks, has made an earnest requirement for copyright authorization advancements that can ensure copyright responsibility for objects. Advanced picture watermarking is one such innovation that has been produced to shield computerized pictures from illicit controls. Specifically, advanced picture watermarking calculations which depend on the discrete wavelet change have been broadly perceived to be more common than others. Surya Pratap Singh, "A Robust Watermarking Approach utilizing DCT-DWT", 2012

This paper presents [6] a hearty watermarking method for shading and grayscale picture. The proposed strategy includes numerous systems to accommodate a protected and hearty watermarking. In the proposed procedure the watermark is implanted in third level of DWT

A Mansouri et.al, "SVD-based computerized picture watermarking utilizing complex wavelet change", 2009 In this paper [7] another strong strategy for non-dazzle picture watermarking is proposed. The recommended technique is performed by change on solitary esteem deterioration (SVD) of pictures in Complex Wavelet Transform (CWT) space while CWT gives higher limit than the genuine wavelet area. Adjustment of the proper sub-groups prompts a watermarking plan which positively safeguards the quality.

Anthony T.S.Ho et.al, "A Robust Digital Image-in-Image Watermarking Algorithm Using the Fast Hadamard Transform", 2011 In this paper, they propose [8] a strong picture in-picture watermarking calculation in view of the quick Hadamard change (FHT) for the copyright security of computerized pictures. Most ebb and flow look into makes utilization of an ordinarily dispersed arbitrary vector as a watermark and where the watermark must be recognized by cross-associating the got coefficients with the watermark created by mystery key and afterward contrasting a test limit esteem.

Alexander Sverdllov et.al, "Secure DCT-SVD Domain Image Watermarking: Embedding Data in All Frequencies", 2003 In this paper they proposed [9] both Discrete Cosine

Transform (DCT) and Singular Value Decomposition (SVD) have been used as mathematical tools for embedding data into an image. In the DCT-domain, the DCT coefficients are modified by the elements of a pseudo-random sequence of real values. In the SVD domain, a common approach is to modify the singular values by the singular values of a visual watermark. In this paper, we present a new robust hybrid watermarking schemes based on DCT and SVD. After applying the DCT to the cover image, we

### III. PRESENT WORK

#### 3.1. Problem Formulation

With the rapid growth of internet the various digital methods has been proposed to protect the multimedia information from the non-authorized accesses use and change. Among all the proposed methods the watermarking technique is the most common technique for protecting the multimedia data for unauthorized access. The water marking methods have been categorized as spatial domain method and frequency domain method. In spatial domain method we modify the lower order bits of cover image to embed the water mark.

The main advantage of this technique is of low complexity and less computational values. But this technique is very robust to certain types of security attacks. The second method is frequency domain transform method. These methods are based upon the using of some invertible transformations like discrete cosine transform i.e. DTC. Discrete Fourier transforms (DFT) and Discrete Wavelet Transform (DWT) to host image. To embed the water mark in the image simply changes the coefficient value of these transforms according to the watermark and the inverse transform is applied to the original image. These methods are too complicated and require more computational power. These methods are also provides more reverts to the security attacks. The another method is GLCM technique.

#### 3.2. Objectives of Research

The main objectives are:

1. To analyze the properties of existing watermarking algorithm i.e. DWT.
2. To propose change in the watermarking method to create a visually impaired watermark.
3. The proposed strategy will be founded on the GLCM calculation to break down highlights of the first picture
4. To actualize proposed method and contrast it and existing system ,i.e., DWT as far as PSNR, BER and MSE.

#### 3.3. Research Methodology

The watermarking is the effective system to give security to the picture information. The watermarking strategies are comprehensively arranged into visually impaired and semi-daze watermarking procedures. In the base paper, the semi-daze watermarked picture is produced utilizing the OS-ELM

strategy which the machine learning procedure. The four levels DWT strategy is connected to extricate the highlights of the first and watermark pictures. The preparation pictures which is dissected with the DWT calculation is given as contribution to create last preparing sets for the age of semi-daze watermarks. The DWT calculation will break down

literary highlights of the pictures which can be supplanted with the glcm calculation which has less multifaceted nature and simple to create preparing sets for the age of visually impaired watermarks.

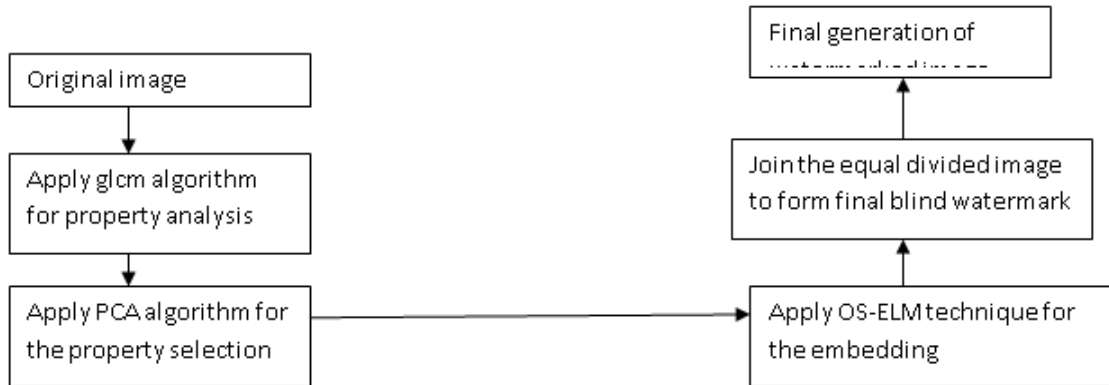


Fig 3: Proposed Flowchart of inserting

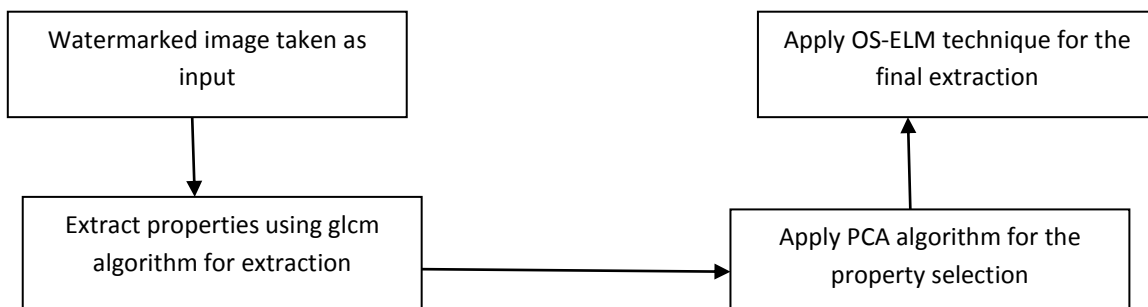


Fig 4: Proposed Flowchart for extraction

The proposed calculation can be connected in the accompanying advances:-

1. Pre-preparing Phase: - In the pre-handling stage, the two picture are taken as info. The main picture is the first picture and second picture is the picture which need to scramble. The main picture is utilized to produce key and second picture will be encoded with the key of first picture.

2. Highlight removed: - In the second stage, the printed highlights of the main picture is extricated utilizing the glcm calculation. The glcm calculation will separate the highlights like vitality, entropy and so on picture.

### 3.4 GLCM calculation

1. Check all the quantity of pixels in the framework in which the information is spared.
2. Store the included pixels network  $P[I,j]$ .
3. Check similitude between pixels in the network by

applying histogram strategy.

4. Ascertain differentiate factor from the lattice:

$$g = \exp \left[ \frac{\text{mean}(I) - \text{minimum}(I)}{\text{maximum}(I) - \text{mean}(I)} \right]$$

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