FACIAL IMAGE PROTECTION BASED ON WATERMARKING TECHNIQUE

INVENTOR: KIUNG SIEW LIAN
FACULTY: FACULTY OF COMPUTING (FKOM)
UNIVERSITY: UNIVERSITI MALAYSIA PAHANG (UMP)
EMAIL: violakiung6070@gmail.com
CO-INVENTORS: DR. LIEW SIAU CHUIN

Product Background

- **Facial Image with Tamper Localization and Lossless Recovery.**
- **Automatically calculate the PSNR value & MSE value of watermarked facial images.**
- **Recovered the tampered watermarked facial image to its original image without decrease fidelity of the facial image.**

Novelty/ Originality/ Inventiveness

- **Image Preparation**
- **Watermarking Generation & Embedding**
- **Tamper Localization**
- **Recovery & Restoration**

Benefits/Usefulness/ Applicability

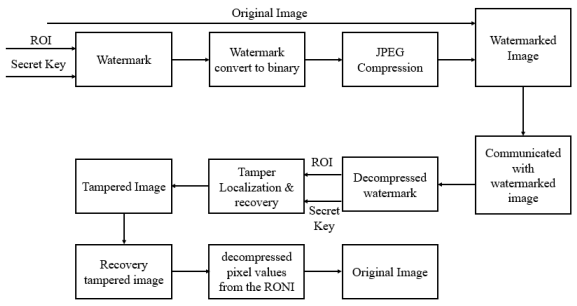
- **Maintain the confidentiality & integrity of the facial image in the face recognition system.**
- **Preserve the quality, recognition functionality of facial image.**

Objective

- **To develop watermarking scheme for facial image.**
- **To study the tamper localization and recovery watermarking schemes for facial image.**
- **To evaluate the recovered watermarked facial image.**

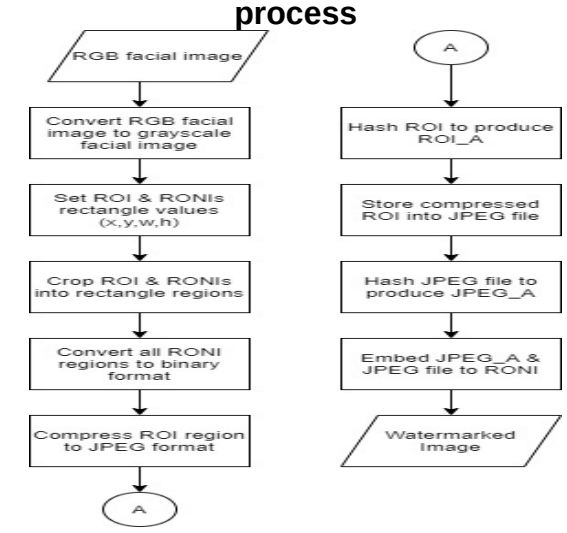
Methodology

Facial Image watermarking process

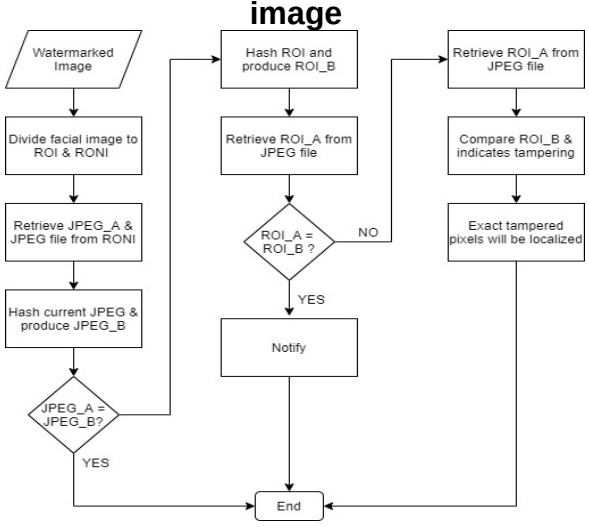


Methodology

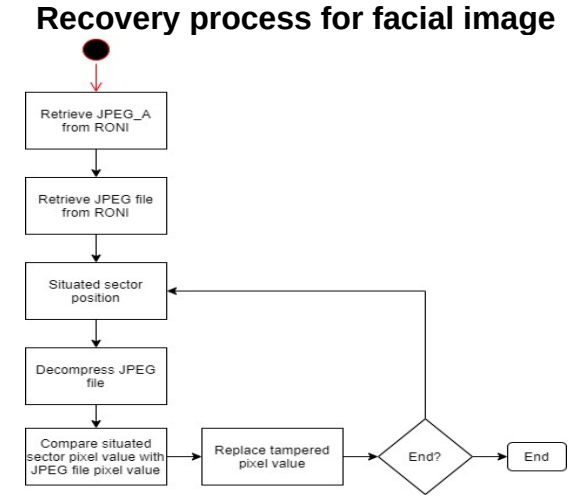
Watermark generation and embedding process



Tamper localization process for facial image

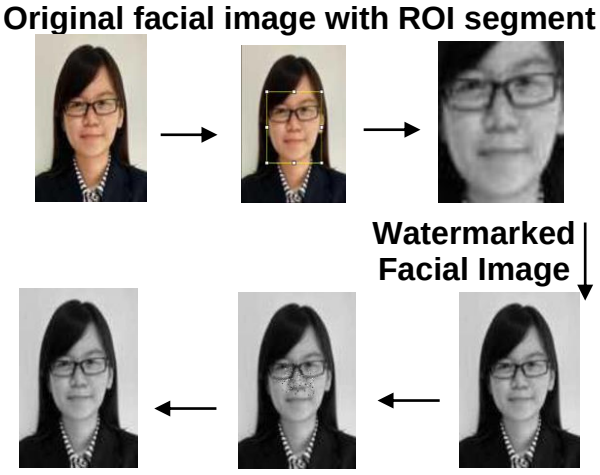


Recovery process for facial image



Result

Original facial image with ROI segment



Input Sample	Elapsed Time of Watermark Generation & Embedding (s)	MSE
sample01.jpg	2.1563	1.2360
sample02.jpg	1.0156	1.1449
sample03.jpg	0.7656	0.8844
sample04.jpg	1.0000	1.2862
sample05.jpg	0.7969	1.0613
Average	**1.1469**	**1.1226**

PSNR	Output	Elapsed Time for Tamper Localization & Recovery (s)
47.2107	sample01_watermarked.png	1.5625
47.5432	sample02_watermarked.png	1.2031
48.6643	sample03_watermarked.png	0.6719
47.0377	sample04_watermarked.png	1.2031
47.8724	sample05_watermarked.png	0.6875
47.6657	-	**1.0656**

Problem Statement

- **Challenge faced in maintaining the authenticity and confidentiality of the facial image in the face recognition system.**
- **Malicious attackers destroy the image during the message sending between the sender and receiver.**
- **Malicious attacker will destroy the watermarked facial image to get the key information from facial image.**

Scope

- **Investigate all type of the watermarking technique by listing out the concept and term in order to select the appropriate method to be apply toward the facial image.**
- **Investigate the efficient way for tamper localization and lossless recovery for the facial image.**
- **Implementation of the recovery method in getting the authentic facial image.**

Conclusion

- **Successfully detect & localized tampered facial image.**
- **Recovery tampered facial image to its original image without destroy the fidelity of the watermarked facial image.**
- **To maintain the authenticity of the facial image on the database face recognition system.**