A Trusted Multimedia Content Protection Scheme Based on Hybrid Watermarking and Blockchain Model

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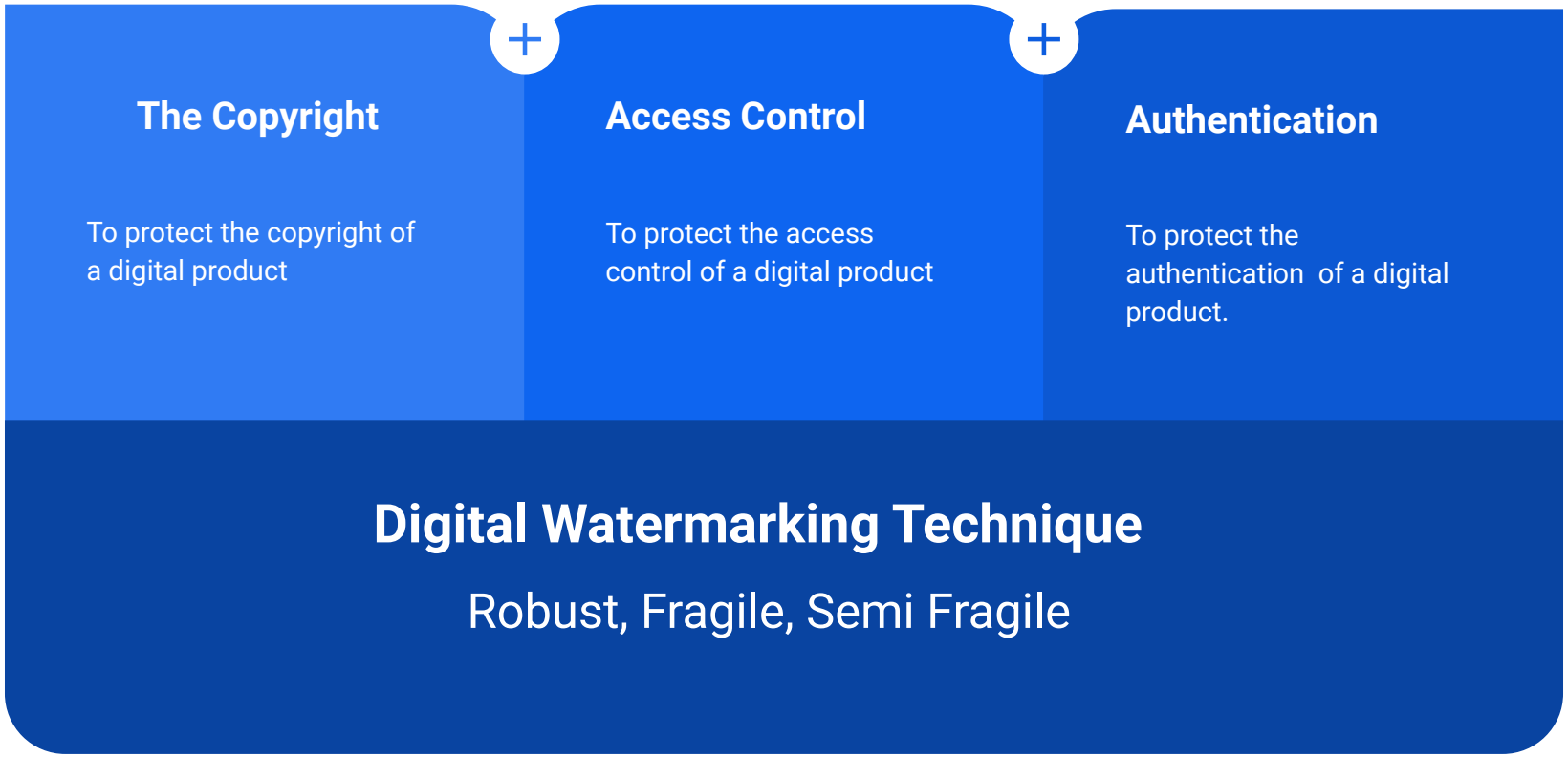
Introduction

Digital Watermarking Technique



Blockchain

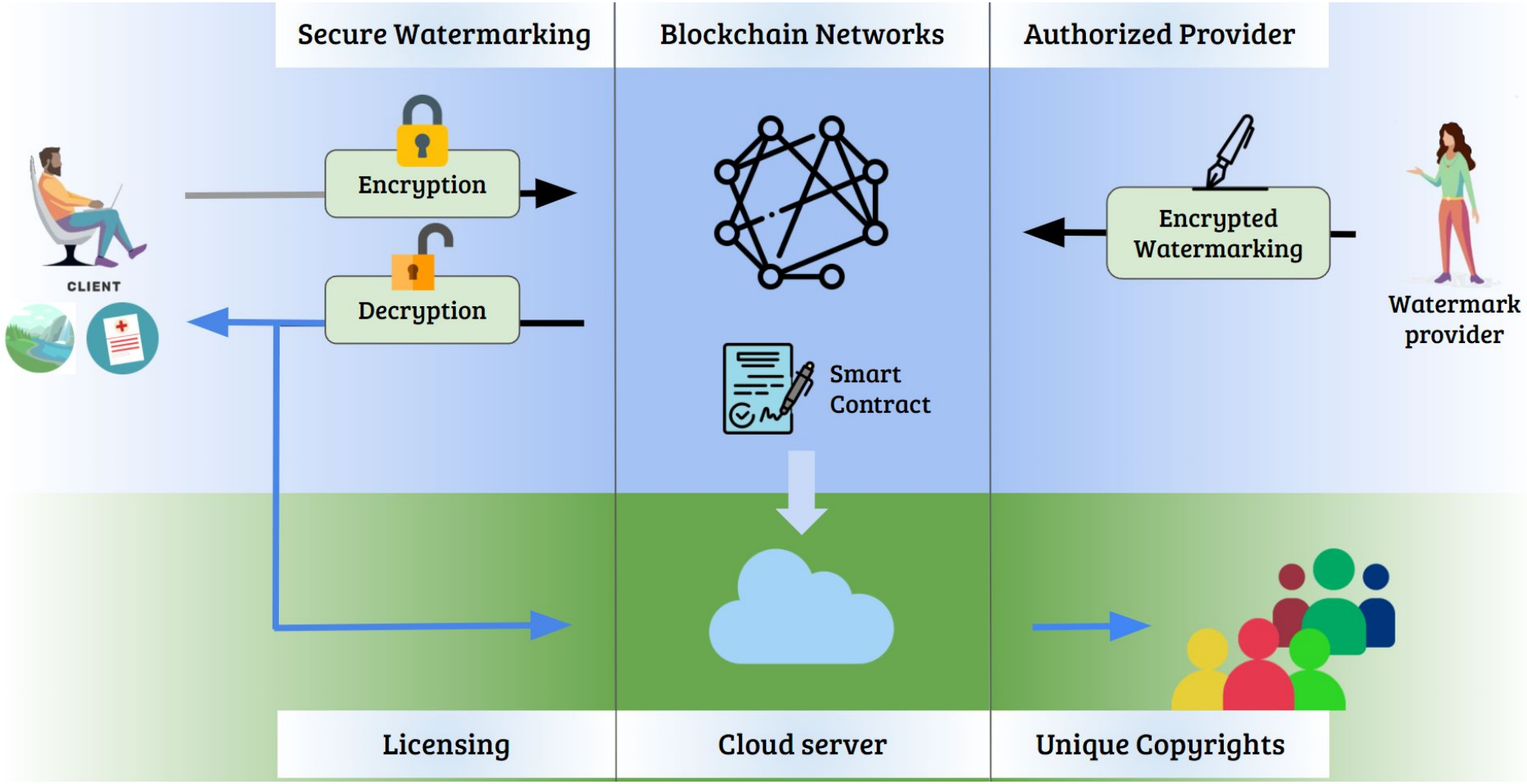
- An essential and an emerging technology as an open distributed ledger or database that records all transactional details referred (blocks)
- Each record is tamped and correlated to a previous block and robust to modification of the data and to be trusted for transactions between two entities in an efficient and verifiable manner.
- Essentially blockchain is relevant to anything that requires transaction verification or a signature leading to authenticity and trust
- In [1], proposed a novel watermarking based Multimedia Blockchain framework, which used a cryptographic hash and an image hash that preserves retrievable original media content.

Blockchain Technology

b

- A distributed ledger technology domain allowing transactions to function in a decentralized system, such as allowing transactions to be verified without using a central organisation to process the transaction.
- This technology has main potential usage in transferring any digital content.

Privasi data and blockchain using homomorphic encryption for Image Watermarking

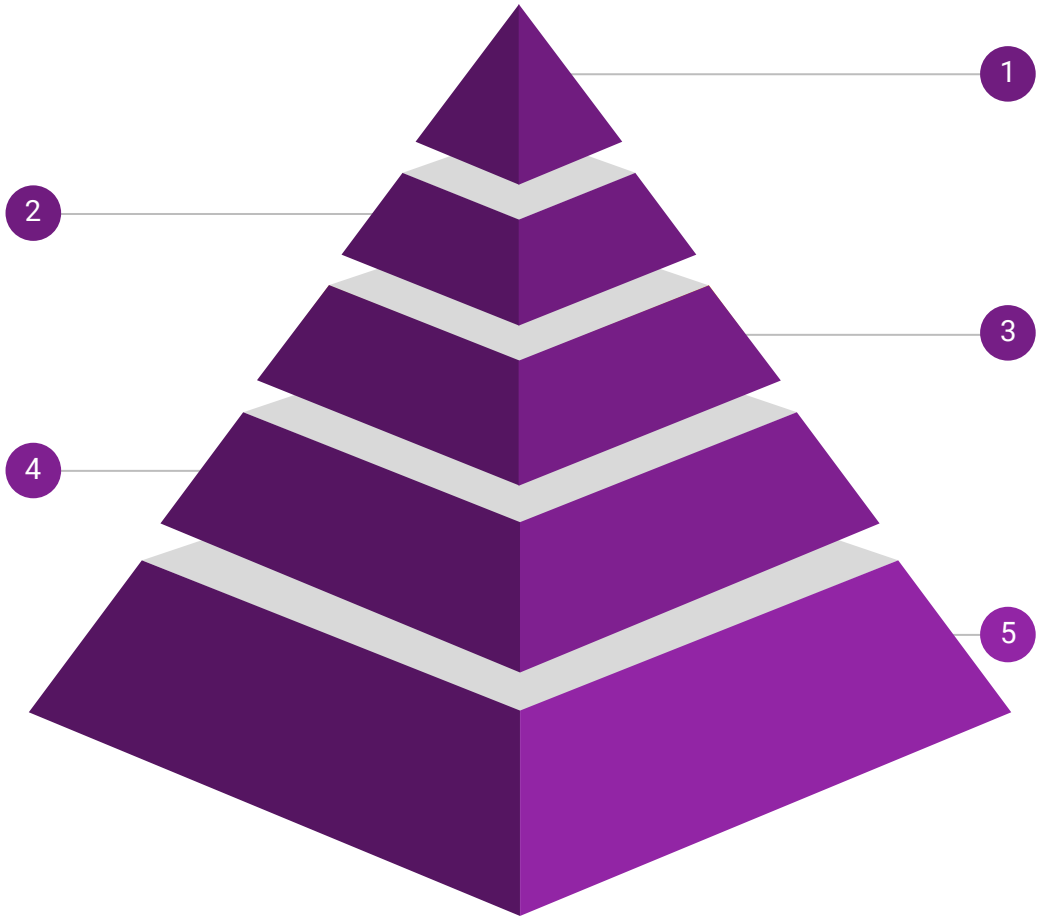


Multimedia Content

A multimedia content is artwork with right information (watermark) such as author, date, location, right holder, etc. All of the artwork 's right information are included in the artwork image data (host image).

Extraction Process

The watermark is extracted to trail the artwork image data misusing. Afterwards, We apply the blockchain model which saves the artwork image data and the artwork right in an un-tampered ledger for decentralized rights confirmation.



The hybrid of DCT and SVD

The hybrid watermarking model is combined by the discrete cosine transform (DCT) and the singular value decomposition (SVD) using a control parameter to avoid the false positive problem, and then the blockchain is used to store multimedia content.

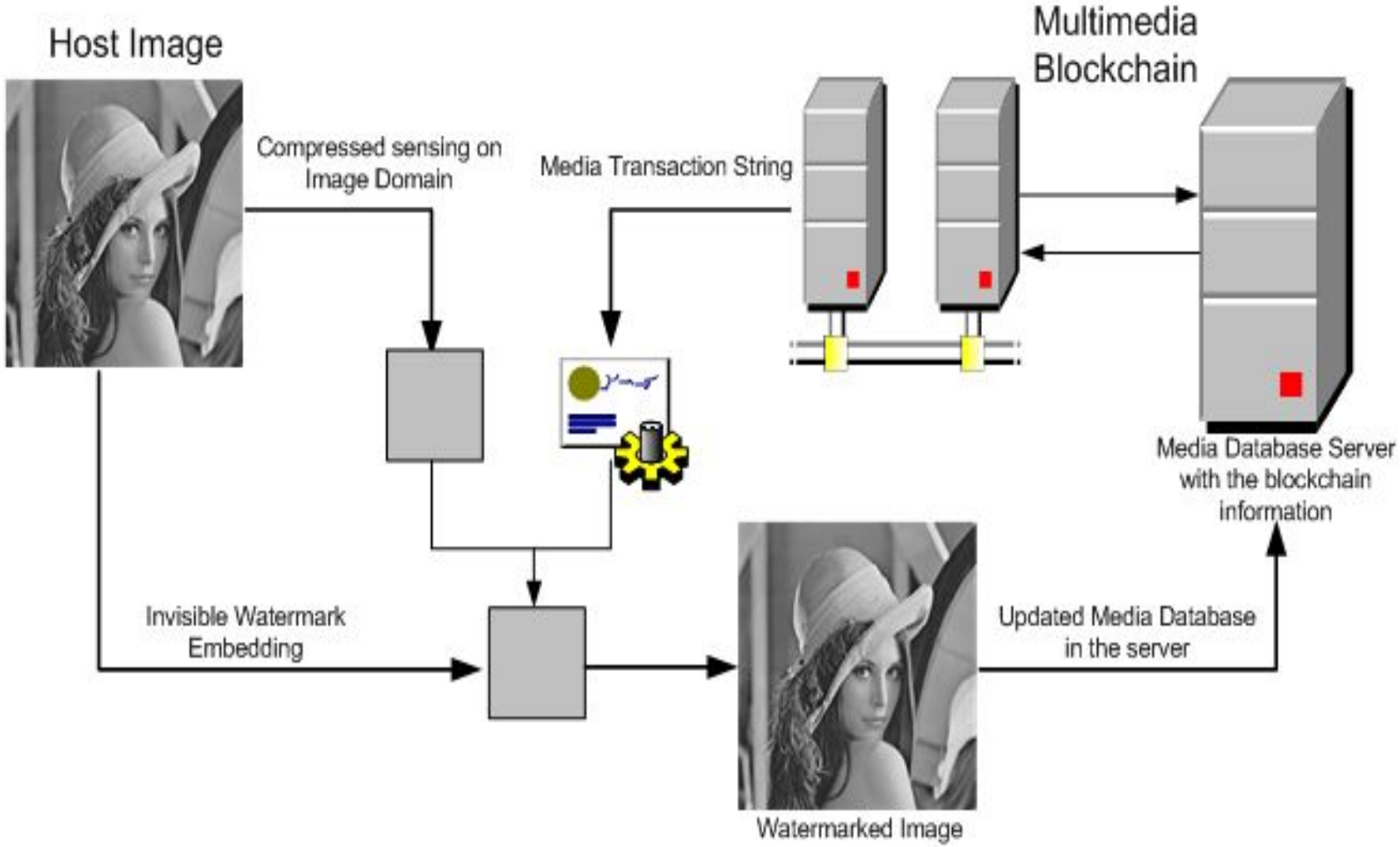
Embedding Process

We apply the DCT to the host image, map the coefficients of DCT in a zigzag order into the all frequencies domain, apply the SVD and then modify the singular values of the host image with the control parameter of the watermark

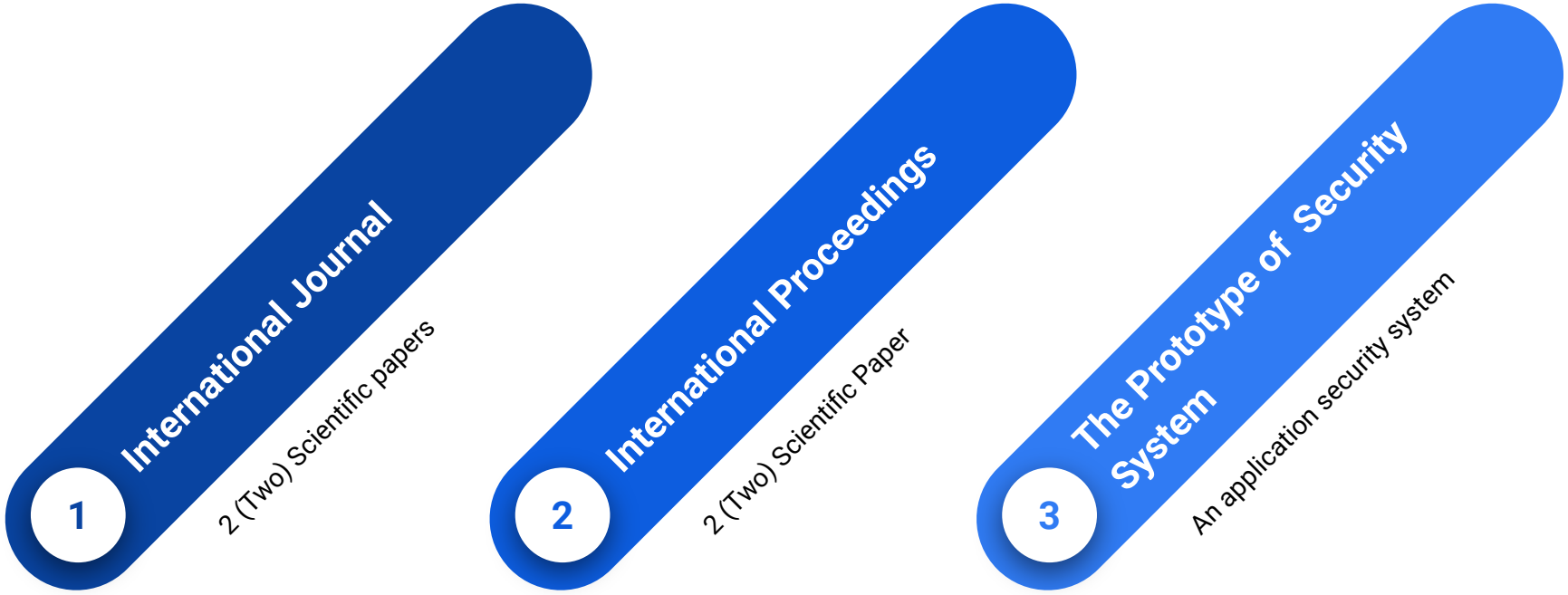
The Experiment Result

The experiment results show that the performance of the proposed scheme outperforms those of existing schemes.

The Multimedia Blockchain Process



Targets and Implementation



The Research Method

Literature Study	Analysis	Design	Simulation
Literature study is done to obtain corresponding information on Digital Image Watermarking, DCT, SVD method and Blockchain Model	Analysis Process consists of grilling the users about what the current system does, what extra features they want in their new system and what constraints the new system must satisfy.	Design process is done to get a Robust DCT-SVD Watermarking Scheme based on Blockchain Model	Simulation process is done to obtain the performance of the watermarking proposed scheme by the DCT-SVD method based on the Blockchain Model.

Hybrid DCT-SVD

Discrete Cosine Transform (DCT) is a technique for converting a signal into elementary frequency components [11]. The two-dimensional DCT transformation for converting a signal $f(x, y)$ into frequency domain is stated in Eq. (1)

$$c(r,s) = \alpha(r).\alpha(s)\sum_{x,y=0}^{N-1}\sum \left\{ f(x,y).\cos\left[\frac{(2x+1)\pi r}{2N}\right].\cos\left[\frac{(2y+1)\pi s}{2N}\right]\right\} \quad \text{……………………………….. (1)}$$

Then, the inverse DCT is stated in Eq. (2).

$$f(x,y) = \sum_{x,y=0}^{N-1}\sum \left\{ \alpha(r).\alpha(s).c(r,s).\cos\left[\frac{(2x+1)r\pi}{2N}\right].\cos\left[\frac{(2y+1)s\pi}{2N}\right]\right\} \quad \text{……………………………….. (2)}$$

In linear algebra, SVD is an important factorization of a complex matrix, and it can be applied to many applications in signal processing and statistics

$$Av_i = \sigma_i u_i \quad \text{……………………………….. (3)}$$

$$AV = U\sum \quad \text{……………………………….. (4)}$$

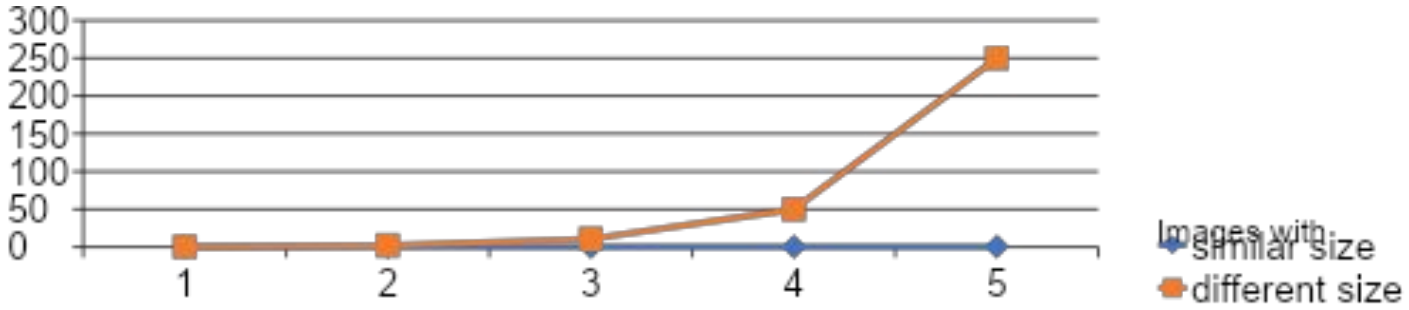
$$A = U\sum V^T \quad \text{……………………………….. (5)}$$

Optimized Hybrid DCT-SVD Computation over Extremely Large Images

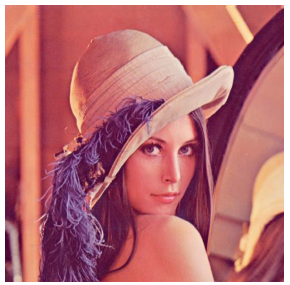
(submitted to jurnal teknik elektro, universitas negeri semarang)

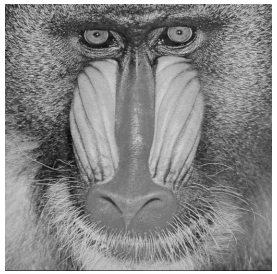
Finding: the proposed computation will be extremely faster than the conventional for the extremely images

Time computation (seconds)



"The time computation will continue to rise with approximately 5 times faster than the conventional when the resolution increased two times"

		Original Images		
		1	2	3
				
		Size: 512×512	Size: 1024×1024	Size: 2048×2048
Time computation (seconds)	**Conventional**	**2.547371**	**12.918915**	**57.942025**
	Proposed	**2.145800**	**10.865629**	**47.151266**

No	Original images with size 512×512	Time computation (seconds)	
		Conventional	Proposed
2.	 Zelda	2.550163	2.158441
3.	 Boat	2.523884	2.126979
4.	 Barbara	2.477470	2.094580
5.	 Baboon	2.459073	2.072076

Leveraged Resources and Participants

Budget Explanation

		Vol	Cost (US $)	Total Cost (US $)
Equipment				
	Server for Media Transaction String and Media Database	3	4,750	
	Data for Recruiting Host Image	1	1,500	
	Laptop for mobile activities (presentation, simulation, etc)	1	1,263	
Travel				
	Attend in an international conference on data security and computer science in Europe	2	3,000	
	Attend in an international conference on data security and computer science in Asia	2	1,900	
Joint workshop				
	Workshop in Malaysia for scientific forum	1	7,000	
	Workshop in Indonesia for scientific forum	1	6,000	**27.700**
	Workshop in Brunei for scientific forum	1	4,000	

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Thank You