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Highlights

- Reversed Image -Support Transcription on Arabic Learning
- Onological Arabic Search Engine
- Adaptive Filtering with Variable

Discovering Thoughts, Inventing Future

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Fusion of Steganography Digital Watermarking Data Hidden in Patient Medical Image using PPC Approach

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Abstract- Privacy is a critical issue when the patient message storage or processing to the medical services. Digital Image processing is the quick emerging area of medical science. The improvement of image processing was given by the technology improvement like digital visualizing, computer processor and large storage devices. Image processing allowed to compute the image in multidimensional within the system. First, the real problem becomes many severe due to the decrease of visual proofs in telehealth applications. A watermark is a protect message that message hidden into a mask message. Digital image watermarks are used for check the approval of the carrier signal for confirmation of the owners. In order to give information honesty, confidentiality and authentication various approaches are accessible like networking side cryptography, image processing side steganography and digital watermarking. To protect the patient message in telehealth, hidden into a mask message is recently used. Patient details are watermark within the cover medical image. The public and personal key cryptography (PPC) is insufficient for providing the trust a patient may attain during a face-to-face service.

Keywords: medical image, public and personal key cryptography method, cryptography, steganography and watermarking.

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Dr. S Santhosh Baboo[α] & V R Sasikumar[σ]

Abstract- Privacy is a critical issue when the patient message storage or processing to the medical services. Digital Image processing is the quick emerging area of medical science. The improvement of image processing was given by the technology improvement like digital visualizing, computer processor and large storage devices. Image processing allowed to compute the image in multidimensional within the system. First, the real problem becomes many severe due to the decrease of visual proofs in telehealth applications. A watermark is a protect message that message hidden into a mask message. Digital image watermarks are used for check the approval of the carrier signal for confirmation of the owners. In order to give information honesty, confidentiality and authentication various approaches are accessible like networking side cryptography, image processing side steganography and digital watermarking. To protect the patient message in telehealth, hidden into a mask message is recently used. Patient details are watermark within the cover medical image. The public and personal key cryptography (PPC) is insufficient for providing the trust a patient may attain during a face-to-face service. Second, telemedical services, such as tele-watching or tele-consultant, normally demand a systematic company of users, roles, assets, and flows of message. Image processing operation can be applied to the digital image processing to taken craved output image. In this paper to provide authentication the hash value that generated applying SHA and the lossless compression rule (Regular-Singular vector) will be allowed to shrink the dimension of an digital image. With the patient message the medical image is secure through Public and personal key cryptography (PPC) in a protectable manner. Compared to the previous technology, the suggested approach is more effective and valuable technology. The original image is fully restored without any loss at the acceptor end.

Keywords: medical image, public and personal key cryptography method, cryptography, steganography and watermarking.

I. Introduction

Steganography word coming from the Greek for masking and essentially means "to hide in plain sight". Easy steganographic methods was used for hundreds of years, but with the increasing use of files in an electronic format new approach es for message embed have become possible. Steganography and inscription two technology used to ensure information confidentiality. The major difference between the two is that with inscription anybody can see that both parties are sharing in undercover. Steganography hides the older of undercover message and in the best case nobody can see that two technology parties are sharing in undercover. This concept makes steganography proper match for some concept for which inscription isn't, like us copyright marking.

Extra incrusted message of a file could easily to delete but hiding it within the file itself can prevent it being easily identified and removed. This paper checks some resent examples of steganography and the general rules behind its usage. This suggested system will discussion of some specific approaches for hiding information in a different of files and the attacks that detecting to steganography. Same time, such process also poses specific challenges to their new idea and design process. A key is often necessary in the embedding system. This key in the format of a public or secret key so you can encode the undercover message with your public key and the recipient can decode it applying your personal key.

In hiding the message this way, you can reduce the chance of a new other party attacker tacking hold of the stego image and extracting it to find out the undercover message. In general the hiding process defuse a mark, M, in an object, I. A key is mansion in the letter K, usually prepare by a random number process is used in the hiding process and the resulting marked object, $\tilde{I}$, is created by the mapping: $I \times K \times M \rightarrow \tilde{I}$. They are passed through the encoder; a stego message will be produced. A message is the real masked object with the undercover message embedded inside of the image. This process should look nearly mentioned to the mask object as otherwise a new user attacker can see hiding message. Having produced the message, then it will be send through some networking channel, such as message, to the intended recipient for decoding. The received message must decode the message in order to find the undercover message. The decoding system is the reverse system of the encoding process. It is the taken of undercover message from a image.

In the decoding process, the image is fed in to the decoding system. The public or secret key that can

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be used for decode the original message that is used inside the encoding process is also necessary so that the undercover message can be decoded. Depending on the encoding process, sometimes the original masked object is also needed in the decoding process. Otherwise, there may be no way of decoding the undercover message from the image. finaly the extracting process is finished, the undercover message hiding in the image can then be decoding and viewed. The generic extracting process again requires a public or personal key, K, this time along with a potentially marked object, Ĩ'. Also required is either the mark, M, which is being checked for or the real object, I, and the result will be either the extracting mark from the object or indication of the likelihood of M being present in Ĩ'. Different types of making systems use different inputs image and outputs image.

In particular, squired is crucial to telehealth message due to the fact that medical services may be critical to patients' health or even life. In this paper, we process two safety measure problems in telehealth process in the context of a medical-health portal system. First, a single trust problem came due to the low of visual proofs in telehealth process. For example, a patient may have doubts in the identity of a doctor at the other end of a telehealth service provided via the Internet. The public and personal key (PPC) can enable a patient in establishing real in the organization's website or telehealth process, which is the very famous of PPC by design. However, PPC is sufficient for giving the same kind of real a patient may attain during a face-to-face identification process. Second, telehealth services, such as tele-measurement, usually in a difficult process that normally demands a systematic process of many users playing different roles in finding exchange assets and flows of message.

Digital Image processing is the fast improved area of medical science. The development of image processing was given by the process development like digital visualizing, computer processor and large storage devices. The image itself has an addition image that is mentioned as region of interest which is used to identify the message in the image. Many fields like medicine, sensing, cinema, safety measure monitoring, photography and automatic sensing which are applying the any type of imaging are changing over to digital image because of its conciliatory and significant cost. There is no need of human being to audit the process of deciding which done by the computer. There are other than two levels of image processing rules. At the low level it message of pixel value, for edge detection and de-noising. With these low level results it proceeds from the middle level for resent process like segmentation. And at the next level, it utilizes some methods to extract the useful message for face detection.

II. Literature Survey

a) Relative Honesty of digital medical image without lossless watermarking

DVENTS of multimedia combined with message and communication technology increasing the potential of medical message handling and exchange with applications ranging from telediagnosis to telesurgery and cooperative operating session. At the similar time, these benefits introduce concomitant difficult for exchange electronic patient records and call for more secure message management. Really devoted to medical document Digital Rights operation [1], watermarking has also advance properties that fixed in to the healthcare domain, although the interests at stake are different[1][2][3]. Watermarking is the insertion of a message, also called content or watermark message, in a host document in some multimedia format. It is required that the watermark message remains hidden to any unwanted user (as for information encoding, a personal key is necessary to access the watermark content).

Two main purposed of watermarking are foreseen in the medical domain [1]: information hiding for the purpose of applying meta-information to render the image many usable and message safety with application like honesty control. Despites its attentive, medical watermarking methods may encounter limitations in medical image. The added watermark message quickly alters the original image in an irreversible manner and may mask subtle details. Consequently, suggested problem finding try to preserve the image diagnosis quality value deleting critical message loss. In this paper, we focused to update watermarking image and its role through a difficult process of recent watermarking process in healthcare.

In today's medical world, many process has got digital around us. Even in medical application the older diagnosis is exchange by e-diagnosis [2][1]. Nowadays, transpose of digitized medical message has become very simple due to the availability and generality of network communication. However the digital form of these images can easily be measure and degraded. The problem of copyright safety and medical safety measure poses a big problem to privacy safety applying watermarking approaches. This paper presents a hole work on digital watermarking as an effective technology to protect property correct and decreasing the distribution of medical information [2][1]. In this exiting paper a CT scan of head is taken as original image in which the patient's message and doctor's message together taken as a watermark and incrusted by coding approach called EBCDIC coding approach to enhance the robustness of suggested method. The scheme is blind so that the Electronic patient record can be taken from the medical image without the need of original

image. In exiting method is useful for telemedicine applications. The performance of different approaches is calculating by considering the correlation factor for exact recovery of watermark and PSNR for perfect reconstruction of watermarked image. High value of PSNR indicates quality reconstruction of output medical image.

b) Related process of Existing system

Message hiding embeds the information in a masked text. It is also known as message hiding. Information hiding approaches consists of cryptography, steganography and watermarking. To provide information honesty, confidentiality and authentication these process are used [2]. Cryptography is the study of message safety measure [4].It changes the plain text or a word in to cipher text in a form of a code. Steganography is the art of hiding the message in other message. For hiding the undercover message several steganographic approaches are accessible. Watermarking has more leverage than steganography. It makes the message imperceptible and more robust. Watermarking in medical image is used for storage, transposal and telediagonsis[3][12].

Watermark embeds the confidential information in the text, image, audio and video. Watermark is the visible image imprinted on the paper and added digitally to the image. It may be company logo, name of the person or copyright symbol. It ensures copyright protection [8][20]. Watermark is visible only for the owner and the people who know the key message [21][22]. Comparing to analog format digital image are more secure [16]17].One of the most important approaches in watermarking is digital image watermarking. Digital image embeds and transfers the information in to host image. In other words digital watermarking can be viewed as message hiding or steganography [3][23].

Woo et al [13] introduced wavelet convert for medical image. It consists of physician signature and the message of the patient. This message is diffused into wavelet convert. kobayashi et al[14] upgrade the safety measure of medical image. With the honesty and authenticity stronger link is provided between image and message. Digital Image And Communication In Medicine image are used for development is an added advantage. Kannamal et al [18] exiting medical image with the fragile watermarking rules. Selective bit plane is used and the performance is analyzed. The rule is differentiated with DWT and ICA (Independent component Analysis) methods.

With the limited scope Zain et al [9] suggested reversible watermarking approaches. Zhou et al [11] presents a method for encrypting digital signatures. This method has better authentication and honesty. Coatrieux et al [7] suggested watermarking rule for medical image. In most of the papers embedded message is in the non-ROI region. Eggers et al [6] suggested the symmetric methods with the combination of public detectors. In this approach the watermark is removed simultaneously or it made as unreadable. The secret keys ensure the safety measure.

Hartung and Girod[15] suggested the asymmetric watermark with the spread spectrum of watermarking. Secret Key is used for watermark embedded process. Watermark is verified applying public key and the redundancy made with the secret key.With the Legendre sequences the method is suggested by schyndel et al [5]. Legendre sequences combines with the Fourier convert. Legendre sequences are used as a secret key to embed the watermark image. The sequence length is made as a public key. This method has N-2 Legendre sequences. Some malicious attacks are preferred in this approach.

The integer wavelet convert is used with medical image for information hiding [24].The disadvantage of this fact is it is match only for gray scale image not for color image. Our suggested system overcomes this problem. Mohamed et al [1] suggested that Patient id, hash value and the compression process are concatenated to form a watermark and it is incrusted applying AES inscription approach. The Same key is used for both inscription and decoding. So it is less secure. In the suggested system the watermarked image is incrusted applying public key cryptography and Riyest,Shamir And Adleman rules to enhance the safety measure during transposal.Riyest,Shamir And Adleman rule are one of the widely used public key rules. In Riyest,Shamir And Adleman rule the image is incrusted applying acceptor public key and decoded applying the secret key. The public key is known to everyone and the secret key is kept undercover. To protect medical image LSB watermarking methods are used for inscription[25].Due to LSB the hidden message is identified easily.

III. Proposed System

a) Digital Watermarking Image Processes

This suggested groundwork for finding the image pattern choosing a given image applying an interpolator that is trained in advance with training information, based on **Regular and single vector** approach for determining the optimal and compact support for valuable image expansion. Experiments on test information show that learned interpolators are compact yet superior to classical ones. To derived an valuable learning procedure for its parameters on the basis of variation approximation. When plenty of computational assets is accessible, or when the observation process is too severe to recover by mere linear filtering, the complicated image expansion methods will be preferred. In this method, at first we find out the interpolator of the given image. Then replace the low resolution pixel by the interpolator (high resolution

pixel).After expanding the image does not scattered. We aim to resolve the tradeoff between high quality and low cost. The process involved in PPC approach consists of the coming steps.

i. In the PPC approach, all users have the key pair of public key and personal key.
ii. The two users, one is transmitter and another one is the acceptor. Transmitter provides the copy of the public key to acceptor.
iii. Acceptor's trust the handler's public key and use it to encrypt the information in the medical image hiding message.
iv. Acceptor sends incrusted information hidden medical image to handler.
v. Handler decrypts the message in the hidden copy of medical image. Secret Key is used.

b) Digital imaging and communication in medicine image and Regular and single vector Compression

Watermark is embedded with the use of public key. For the safety measure purpose, in this module the Riyest,Shamir And Adleman rule is used. Riyest,Shamir And Adleman is one of the widely used Public key rules. In RIYEST,Shamir And Adleman rule the image is incrusted applying public key. Digital Imaging and Communications in Medicine is the univeriyest,shamir and adlemanl standard communication for secured medical image.

Digital image are obtained from x-ray, digital radiography, ultrasound and the hospital message system. The original image are completely restored with the digital image. Digital Image and Communication in Medicine file consists of header and the image information. The header associated with the patient name, dimensions of the image and type of the scan. The information elements consist of patient message and hospital message. When the Digital Image and Communication in Medicine file has to be authenticated the pixel values must be extracted. Convertation is used to recover the real pixel values. The hidden details of the image are appeared. Digital Imaging and Communications in the Medicine is the univeriyest, shamir and adlemanl standard communication for secured health check image. Digital image are obtained from x-ray, digital radiography, ultrasound and the hospital message system. The original image are completely restored with the digital image. Digital Image and Communication in Medicine file consists of header and the image information. The header associated with the patient name, dimensions of the image and type of the scan. The information elements consist of patient message and hospital message. When the Digital Image and Communication in Medicine file has to be authenticated the pixel values must be extracted. Converiyest,shamir and adlemantion is used to pick up the real pixel values.

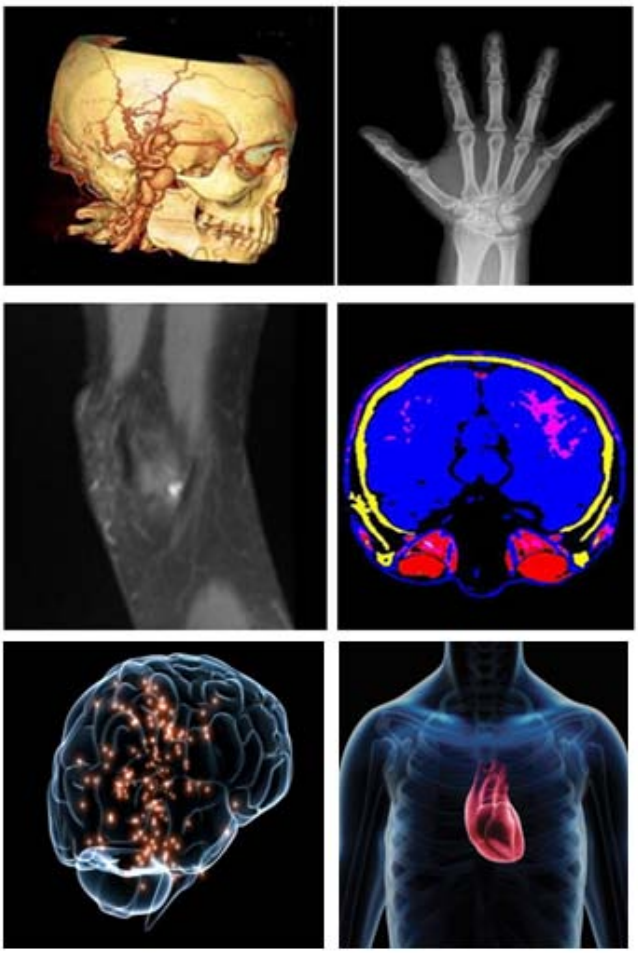


Figure 1: Digital Image and Communication In Medicine image

Fig 1 shows the Digital Image and Communication in Medicine image. This image is compressed applying Regular and single vector. Hash value, Regular and single vector are embedded in the image matrix and it is written again according to the Digital Image and Communication in Medicine standard. For authentication of Digital Image and Communication in Medicine, the image file is extracted then the Regular and single vector, hash value are extracted. The R–S-Vector consists of a stream of bits (zeros and ones). Symbols 4 and 8 are used in the compression process. Each association of pixels has a single value: 1 for R (Regular association), 0 for S (Singular association) and -1 for U (Unused association).

c) Building Hash value of an digital Image

Hash value mainly used for message honesty and password validity. Hash value of the image is regulated applying SHA hash function.SHA produces image honesty and patient authentication more advanced than MD5.The SHA hash value, patient id and the compressed Regular and single vector are concatenated to form watermark and it is incrusted applying Riyest,Shamir And Adleman rule be justified,

not ragged. The R–S-Vector consists of a stream of bits (zeros and ones). Symbols 4 and 8 are used in the compression process. Each association of pixels has a single value: 1 for R (Regular association), 0 for S (Singular association) and -1 for U (Unused association).It provides sufficient space for hiding the watermark. The compression process depends on the symbols. For compressing the Regular and single vector it must have lossless compression. Then it must contain binate information and random information. The range of hiding the watermark can be findingd by applying R.[18].

$$R=S_R+S_S-|R| \quad (1)$$

Where S_R is the sum of regular association in the image and S_S is the sum of singular association in the image. $|R|$ is the length of the Regular and single vector. The main aim is to maximize the hiding capacity with the $|R|$ of compressed Regular and single vector.

$$-S_R(S_{R/}S_{R+}S_s)-S_S\log(S_s/S_{R+}S_S)\text{bits} \quad (2)$$

From equation (1) and (2) the real range values($R^{'}$) can be findingd according to[19].

$$R^{'}=S_{R+}S_{S+}S_R\log(S_{R/}S_{R+}S_S)+S_S x\log(S_{S/}S_R+S_S) \quad (3)$$

Two middle pixels of the association(N_R+N_S) increase the value. These are the unique association belong to LSB of both association.

d) Hiding Process

In the hiding process the watermark is deffused into medical image. The watermark message is incrusted applying Riyest, Shamir And Adleman rules to enhance the safety measure during transposal. In Riyest, Shamir and Adleman rule the image is incrusted applying acceptor public key and decrypt the incrusted message applying the acceptor secret key. The public key is made accessible to everyone and the secret key is the undercover key remains confidential. Riyest, Shamir And Adleman rule protects the watermarked image from tampering and eventually applies compression to reduce the size of incrusted watermarked image. Fig 2 shows the watermark hiding process. Then the watermark image is incrusted. The watermark hiding consists of coming steps.

i. The image is partitioned into association. Each association has four pixels with a single value. The state of the association is identified for Regular and single vector.
ii. Regulate and compress the Regular and single vector.
iii. Finding the SHA value of the image. Add the SHA value to the compressed Regular and single vector and patient id to form a watermark.
iv. Encrypt the watermark applying public key.
v. In hiding process the rule achieves image honesty and authentication.

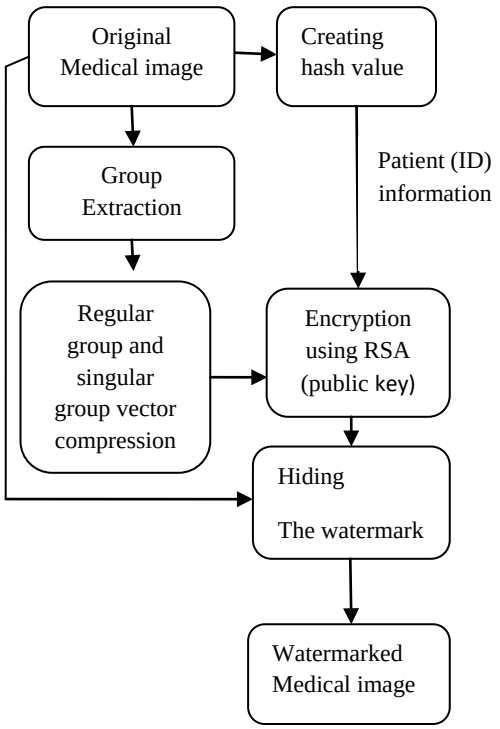


Figure 2 : Hiding Process

i. *Inscription Applying Riyest, Shamir and Adleman*

The watermark message is incrusted applying Riyest, Shamir And Adleman rules to enhance the safety measure during transposal. In Riyest, Shamir And Adleman rule the image is incrusted applying acceptor public key and decrypt the incrusted message applying the acceptor secret key. The public key is made accessible to everyone and the secret key is the undercover key remains confidential.Riyest, Shamir And Adleman rule protects the watermarked image from tampering and eventually applies compression to reduce the size of incrusted watermarked image. The process consists of the coming steps. In Riyest, Shamir And Adleman rule the key is generated as follows.

Random prime numbers are selected such as a and b.

i. Check a!=b
ii. Evaluate Modulus n=axb
iii. Evaluate z=(a-1)x(b-1)
iv. Select public exponent e,1<e<z
v. Evaluate secret exponent (dxe)modz=1
vi. {n,e}is the public key, d is the secret key.
vii. $C=m^e \bmod n$(m-message,c-incrusted message)

Therefore incrusted form is described as number m,0<m<n-1.e and n are the public keys which is to be transmitted.

e) Extraction Process

In Extraction process the image is retrieved and the process consists of the coming steps:

i. Extract the incrusted watermark.

ii. Decrypt the watermark image applying acceptor secret key .It remains confidential
iii. Extract the hash value, patient id and Regular and single vector of the watermark image, and then finding the hash value with extracted original image.
iv. If the hash values are equal the image is authenticated else image is discarded. The process for extracting the watermark is shown in fig 3.

f) Decoding Applying Riyest,Shamir And Adleman

Decoding involves the reverse process of inscription. In case of RIYEST,SHAMIR AND ADLEMAN rule, the image is decoded applying acceptor's secret key. Secret Key d is used to decrypt messages. m is the original message.

$$c^d \bmod n = m$$

Finally the watermark image is formed. This watermarked image provides safety measure and authentication. The reversible watermark cannot be retrieved by an unauthorized person. This provides the major safety measure in the Human Management System.

IV. Experiential Results

The experiential results of the suggested approach for authentication of medical image based on watermarking approach are discussed in this section. An application is programmed applying C#.NET language to implement this approach. For authentication and honesty, Riyest, Shamir And Adleman is a potential method for medical image. The performance parameters that are represented to measure the performance of the suggested approach are:

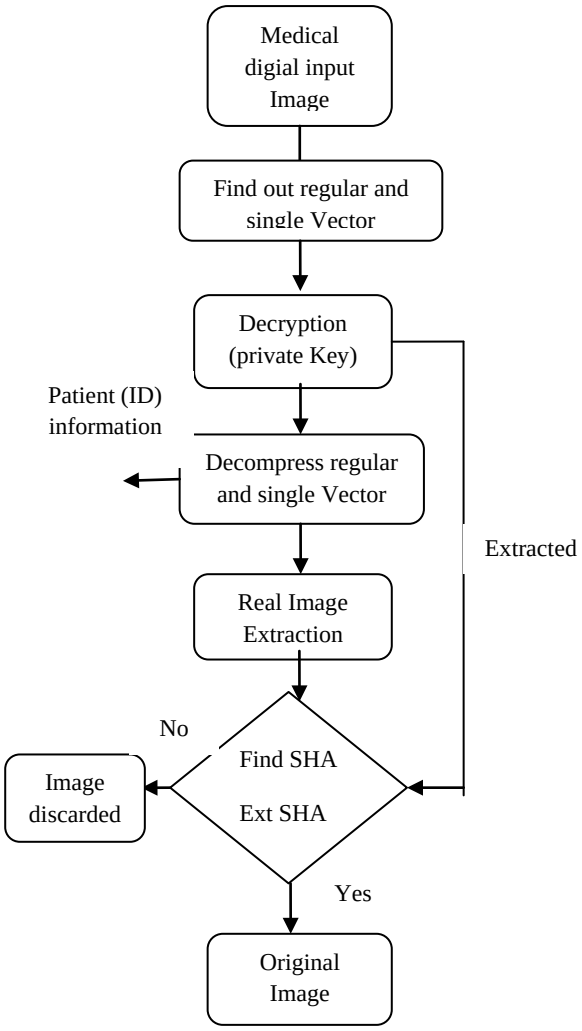


Figure 3 : Extraction Process

Signal to Noise Ratio (SNR), Peak Signal to Noise Ratio (PSNR), Mean Square Error (MSE), and Bit Error Rate (BER).The original image before hiding the watermark and the authenticated image after hiding the watermark is displayed in Fig 4.

Experiential results shows that PSNR has high range values and it is consistent and the MSE has a least values therefore the quality of the image is not affected.BER is equal to zero for all the four Digital Image And Communication In Medicine image.SNR also has large values. The values predicted in Table 1.

Table 1: Output results of Digital Image And Communication In Medicine grayscale and color medical image

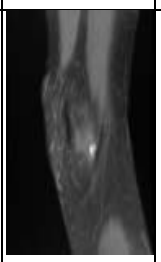
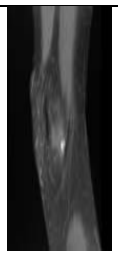
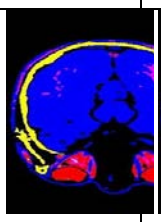
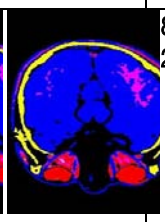
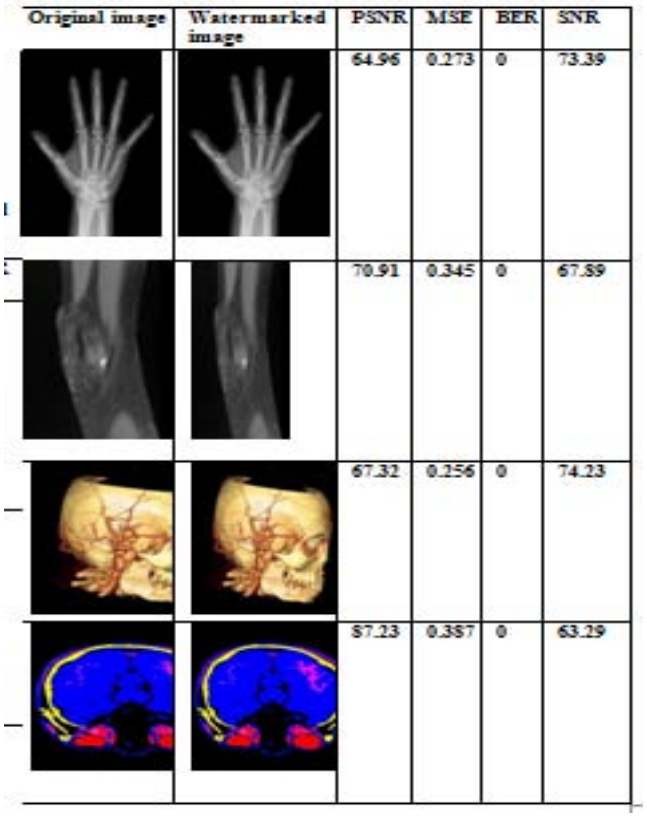
S No	Original image	Watermarked image	PSNR	MSE	BER	SNR
			64.96	0.273	0	73.39
			70.91	0.345	0	67.89
			67.32	0.256	0	74.23
			87.23	0.387	0	63.29

Table 2 : Output results of grayscale and color test image



The results prove that the suggested approach is totally revertible, and the original image can be retrieved at the acceptor side without any distortion because of the R–S-Vector is extracted without errors. In table 1 and table 2 gray scale image and color medical image are compared with test image of color and grayscale. PSNR and SNR have higher values. In[1] the grayscale and color medical image is similar to the test image of grayscale and color watermark image. In the suggested approach the grayscale and color medical image is different from the test image. Therefore by applying symmetric inscription the performance measurements are consistent. Even though the Public key Inscription has its own undercover key and it is secure they are not consistent in the performance measurements.

V. Conclusion

Based on the Digital Image and Communication in Medicine image the watermarking approach is suggested. This approach is tested with color and grayscale of medical image as well as test image. The hash value based on SHA is regulated from the image. With the patient id, hash value and the compressed Regular and single vector watermark is formed and incrusted applying public key cryptography. Riyest, Shamir And Adleman is a secure public key inscription rule provides message safety measure. The quality measures such as PSNR, SNR, MSE and BER estimates

the safety measure of rules. Concluded results shows that BER equals 0, SNR and PSNR has a high consistent values.MSE have a low bit rate for all grayscale and color image. As in future work public key cryptography with SHA hash value can be in performed in convert domain for enhancing the safety measure.

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Effectiveness of Our New Right-to-Left English Transcription on Arabic Learning Using the Reversed Image -Support in Arabic E-Learning System for the Beginners-

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Abstract- Arabic language differs from other languages in some features such as right-to-left writing, unfamiliar letters and sounds, using one of the letter's forms depending on the letter's position in a word, and attaching a diacritical mark to a letter to show how it is pronounced. It is important to provide a new transcription that follows Arabic direction and to help non-Arabic speakers to locate the letters corresponding to Arabic letters and their attached diacritical marks to read them. We invented a new transcription system for Arabic in which we transcribed every Arabic unit (an Arabic letter with an attached diacritical mark) by an English unit (an uppercase with a lowercase letter); we reversed the images of all English units horizontally. The new reversed transcription matches the direction of the Arabic writing. Our main aim is to apply this transcription in our new Arabic e-learning system as an on-demand support which let the learners read Arabic text itself at their own pace. This paper shows how our reversed image transcription works, especially for the beginners.

Keywords: *reversed image, arabic learning, transcription, e-learning.*

GJCST-H Classification: *K.3.1 I.2.6*

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Ahmed MOSA[α] & Katsuhiko KAKEHI[σ]

Abstract- Arabic language differs from other languages in some features such as right-to-left writing, unfamiliar letters and sounds, using one of the letter's forms depending on the letter's position in a word, and attaching a diacritical mark to a letter to show how it is pronounced. It is important to provide a new transcription that follows Arabic direction and to help non-Arabic speakers to locate the letters corresponding to Arabic letters and their attached diacritical marks to read them. We invented a new transcription system for Arabic in which we transcribed every Arabic unit (an Arabic letter with an attached diacritical mark) by an English unit (an uppercase with a lowercase letter); we reversed the images of all English units horizontally. The new reversed transcription matches the direction of the Arabic writing. Our main aim is to apply this transcription in our new Arabic e-learning system as an on-demand support which let the learners read Arabic text itself at their own pace. This paper shows how our reversed image transcription works, especially for the beginners. We compared the effectiveness of using our reversed transcription with that of using a conventional left-to-right transcription, through a workshop and questionnaire. The results show that our reversed transcription helps the participants of the workshop in locating the English unit in the transcription correctly for any Arabic unit in any word in a feasible time. Moreover, the participants read the reversed transcription correctly and they preferred the reversed transcriptionthan the conventional one. The participants reported that the reversed transcription is helpful, convenient and easy in self-training. The results suggest that the reversed image transcription is a helpful support for the beginners to start reading Arabic text in a short time compared with the conventional transcription.

Keywords: reversed image, arabic learning, transcription, e-learning.

I. Introduction

Any learning system of Arabic has the great challenge to let the learners get used to Arabic script, read Arabic letters one by one with it sattached diacritical mark, and read Arabic words. Arabic, as a matter of fact, differs from other languages especially in its script.

The Arabic way of text is as follows. There are 29 letters and 10 diacritical marks. A sentence is a sequence of words arranged right-to-left. A word is a sequence of letters with attached diacritical marks arranged right-to-left and connected to each other. Each Arabic letter has four forms. One form is an independent, original or single form and the other three forms are dependent. Dependent forms change according to the position of a letter in a word, as exemplified in Table 1withletter "س" which is pronounced "s".

Each letter shows a syllable with an attached diacritical mark. Basically each letter itself designates the leading consonant of a syllable. An attached diacritical mark indicates how to read a syllable with the leading consonant: (1) the consonant with a vowel, (2) the consonant only, (3) the consonant twice with a vowel, and (4) leading consonant with a vowel ending with "n", as shown in Table 2. There are three vowels "a", "i" and "u" used in Arabic language [1, 2, 3 and 7].

Table 1 : Example of the four forms for the letter "س"

Dependent form-positions			Independent form
End form	Middle form	Beginning form	
ـس	ـسـ	سـ	س

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Table 2 : Example of the diacritical marks with letter"س"

	سٌ	سٍ	سً	سُّ	سِّ	سَّ	سْ	سُ	سِ	سَ
Transcription	sun	sin	san	ssu	ssi	ssa	s	su	si	sa

Fig. 1 shows the Arabic greeting " السلام عليكم" which means "Peace be upon you" or simply means "Hello". This text is as an example of the informal Arabic text in which there are no diacritical marks attached to the Arabic letters. Fig. 2 shows an example of the formal Arabic text in which diacritical marks are attached to the Arabic letters. This form is used in the Quran book. And this form is basically used in the Arabic learning text books, since beginners in Arabic learning cannot read Arabic syllables without attaching diacritical marks.

Fig. 1 : Arabictext without diacritical marks

السلام عليكم

Fig. 2 : Arabic text with diacritical marks

اَلسَّلامُ عَلَيْكُمْ

Each Arabic letter and its attached diacritical mark look as a unit of script. Fig.2 shows that Arabic text is written in units. There is a property that once the beginner can identify, read and remember every Arabic unit one by one, he/she can read any Arabic script. In Arabic learning for children, usual way is repetitive lessons to read and remember every Arabic unit, but it is not good for the adults. It is not endurable for them to repeat pronouncing lessons only for remembering Arabic units. Arabic learning for the adultsshould start with teaching sample sentences, phrases, and expressions until they get used to Arabic text and start readingit. Transcription should be used to help the learners to read Arabic units. Transcription must have a property of locating the letter(s) that is corresponding to every Arabic unit in a word.

Currently, English transcription is the most common one all over the world for Arabic in textbooks, dictionaries and e-learning systems, since English is used and learned worldwide. In English transcription, as shown in Fig. 3, letters are arranged left-to-right [5, 19, 20, 21, 23 and 24]. There is a conflict in direction between Arabic text and its transcription. Learners tend to read the transcription itself left-to-right as they read English text and rarely take care of Arabic script.

Fig. 3 : Example of conventional transcription for Arabic

اَلسَّلامُ عَلَيْكُمْ

assalamualykum

Moreover, the number of English letters in the transcription is not equal to the number of Arabic units in a word, as shown in Fig. 3, for various reasons. Some consonantsin the Arabic units are transcribed bya single English letter and others are transcribed by two English letters. Also, some diacritical marks in the Arabic units are transcribed bya single English letter, others are transcribed by two English letters and one diacritical mark is not transcribed by English letters. Moreover, both Arabic letters and their attached diacritical marksin the units are transcribed by lowercase letters [6, 8, 15, and 16].This difference in the numbers makes beginners find difficulty to locate the English letter(s) in the transcription corresponding to the Arabic unit [11].

We invented a new transcription system for Arabic script. It uses English letters because English letters are familiar to learners worldwide. We chose some English letters from the IPA transcription system and others from the LC system [22].

Our transcription consists of units; a unit transcribing an Arabic unit consists of two English letters: one in uppercase that corresponds to the Arabic letter, and the other in lowercase that corresponds to the attached diacritical mark.

In our transcription, we reversed the image of all English units horizontallyas "Through the Looking-Glass" and connected them to each other [4, 9 and 12]. Reversing the image of all English units shows the whole transcription as it is arranged right-to-left to match Arabic direction, and shows each English unit itself in reversed form to match its Arabic unit in direction. Reversed transcription allows readers' eyes to move in the direction of Arabic script, lets readers read each transcription unit automatically right-to-left, and make them remember how to read the Arabic unit. When we showed our reversed English units to some non-Arabic speakers, they understood that these reversed units are arranged right-to-left and they read it in that order without any explanation [13].

Table 3 shows an example of the Arabic word "بَـــيْـــتُ". It means "Home" and it is pronounced as "ba-y-tu". It consists of three units. These units, in independent form, are "بَ", "يْ" and "تُ" right-to-left. Each of these units is transcribed by our English unit as "Ba", "Y." and "Tu". Note that "Y." means "Y" without avowel. The English units are "BaY. Tu" left-to-right, and learnersread them left-to-right, since English letters are used in this direction. Learners find it difficult to locate the transcription unit for a given Arabic unit because of the conflict of direction especially when a word consists ofmany units. If we arranged the English units right-to-left, transcription became "TuY.Ba" and learner might read it left-to-right as "tuyba" [13]. Thus, we decided to

reverse all the images of English units and connected them, as shown in the table.

Table 3 : Developing the reversed image transcription system

Arabic word of three units right-to-left	بَـيْـتُ
Three Arabic units right-to-left English units left-to-right	بَ يْ تُ BaY.Tu
Three Arabic units right-to-left English units right-to-left	بَ يْ تُ Ba Y. Tu
Three Arabic units right-to-left Reversed image of all English units	بَ يْ تُ ɒB .Y uT
Arabic word of three units right-to-left Reversed image right-to-left English transcription	بَـيْـتُ ɒBY.uT

We call our reversed image right-to-left transcription system "RIT". RIT reflects the mechanism of the Arabic unit and the direction of the Arabic script. When we used RIT, we found that non-Arabic speakers did not need training to read the units of RIT, they became accustomed with RIT, and they welcomed it [11, 12, and 13].Our expectationis that RIT supports the beginners to start reading Arabic units in a short time, and that therefore, beginners read Arabic text easily.

II. Objectives

We will show, by data, how RIT supports the non-Arabic speaking begin nerstoread Arabic text by locating the transcription unit for any Arabic unit in a wordeasily and correctly, and supports them in reading the located unit correctly. We will show also how the beginners preferred RIT.

III. Workshop and Questionnaire

It is important to compare the results of using RIT with the results of using one of the traditional left-to-right English transcription systems. Therefore, we chose BATR (Bikdash Arabic Transliteration Rules) [19].BATR does not use any special marks and it is expected that the beginners read BATR script easily.

We designed a workshop to compare how well the beginners read an Arabic unit by locating and reading an English unit corresponding to it in the transcription. Either in RIT or in BATR.

And we designed a questionnaire to ask the beginners which transcription they prefer in reading Arabic units, RIT or BATR. We asked volunteers for our workshop and questionnaire. We conducted the workshop and the questionnaire with some of those volunteers; we call them "participants". All participants had no experience in Arabic.

a) The participants

The participants were non-Arabic speaking beginners in Arabic learning. Most of them were students in the YUAI School for Arabic language learning in Tokyo. They were of different nationalities. They covered a wide range of profiles, including cultural backgrounds, ability of foreign languages learning, age, gender, studying majors, jobs, and experience in Arabic, as shown in Table4. Some of them were students of high school, students of university, or graduates of university. We tested all the participants before applying the workshop and they did not read Arabic units,. There were two groups of the participants, group1 was of 14 participants: $G_1=\{G_1, G_2, ..., G_{14}\}$ and group2 was of 20 participants: $G_2=\{G_{15}, G_{16}, ..., G_{34}\}$. All participants were 34: $G=\{G_1, G_2, ..., G_{34}\}$.

Table 4 : The participants

Number of participants		G_1 14	G_2 20
Nationalities	Bangladesh	-	2
	China	-	1
	India	-	2
	Indonesia	-	1
	Japan	14	13
	USA	-	1
Foreign languages	No foreign language	2	6
	1 foreign languages	7	10
	2 foreign	2	3

	languages		
	3 foreign languages	2	1
	5 foreign languages	1	-
Ages	11 - 20 years	-	3
	21 – 30 years	-	7
	31 – 40 years	9	5
	41 – 50 years	2	5
	51 – 60 years	2	-
	61 – 70 years	-	-
	71 – 80 years	1	-
Gender	Male	4	7
	Female	10	13
Interested in Arabic	Yes	13	20
	No	1	-

b) Preparing word sets for the workshop

We prepared two sets of Arabic words: $\boldsymbol{X} = \{X_1, X_2, \ldots, X_5\}$ and $\boldsymbol{Y} = \{Y_1, Y_2, \ldots, Y_5\}$, as shown in Table 5. Hereafter we write the index set as $I = \{1, 2, \ldots, 5\}$. Each word in X and Y has a designated Arabic unit in it. This unit is called a sample unit for the word. In Table 5, each sample unit is marked red. For convenience of readers, each Arabic word in Table 5has a transcription in BATR and RIT. In eachtranscription, colored red are English units correspond to the sample Arabic units.

The number of Arabic units in a word w is called length of the word and denoted by $l(w)$. Each Arabic unit in a word is numbered starting from 1 right-to-left. The number given to the marked unit in a word w is called the Arabic sample position of $w$and denoted by$p(w)$. Note that $1 \leq p(w) \leq l(w)$ holds by definition. We chose words as $l(X_i)=l(Y_i)=L(i)$ and $s(X_i)=s(Y_i)=S(i)$ hold for $i \in I$ where L and S are defined by the Table 6.We chose those length values because Arabic words are of a single unit of different lengths up to 10 units in the usual Arabic learning materials for beginner [1, 2, 3 and 6]. Note that both of X_1 and Y_1 is special case indicating a single Arabic unit.

It was difficult to ask the participants to locate, read, and show their preference in all positions in all words. We decided to ask the participants about only one sample position for an Arabic unit in each word of X and Y.

Table 5 : $X$and Yword sets

Words sets			BATR	RIT
X_i	X_1	رُ	ru	ʁu
	X_2	قُفْلٌ	qeflu	uJ.ɟiϴ
	X_3	كَتِيبَةٌ	kateepate	uTɒBiYiTɒK
	X_4	مَنْظُومَاتٌ	manzuumaatun	uTɒÅɒMuWuZ.NɒM
	X_5	إِلَكْتُرُونِيَّاتُ	ilekturuuneyaatu	uT ɒÅ ɒY iN ʁu T. K Li Il
Y_i	Y_1	كُ	ku	ɒK
	Y_2	كُنْزٌ	kinzu	uZ.NiK
	Y_3	كَثِيرَةٌ	katheeratu	uTɒʁiYiθɒK
	Y_4	مَقْطُوفَاتٌ	maqtuufaata	uTɒÅɒɟuWuT.ϴɒM
	Y_5	مُسْتَخْلَصَاتُهُمْ	mostakhlassaatahum	.MuHɒTɒÅɒƧ ɒ.J.K ɒT.SuM

Table 6 : Functions L and P

I	1	2	3	4	5
$L(i)$	1	3	5	7	10
$S(i)$	1	2	4	5	8

Table 7 shows Arabic letters of the sample units of X words and Y words. Y words are slightly more difficult than Xwords in some points. Xcovers 15 letters and Y covers 18 letters. There are same 12 letters included in both X and Y. X contains only 1 letter of Arabic specific sound; whereas Y contains 3 letters of Arabic specific sounds. Each of $X$and Ycontains most of the 10 diacritical marks. Table 8 lists all the sample Arabic units in X and Y. No Arabic letters of Arabic specific sound is included there and anybody can read those transcriptions easily.

Table 7 : States of words in X and Y

	Letters	Transcription	X	Y
Usual Sounds	ت	t	4	3
	م	m	2	3
	ر	r	2	2
	إ	i	1	2
	ف	f	1	2
	ك	k	2	1
	ل	l	2	1
	ن	n	2	1
	و	w	2	1
	ي	y	2	1
	ة	t	1	1
	ق	q	1	1
	ا	a	2	
	ب	b	1	
	ز	z		1
	س	s		2
	ه	h		1
Specific Sounds	ظ	zz: like "z" sound but stronger	1	
	خ	kh: no similar English sound		1
	ص	ss: like "s" sound but stronger		1
	ط	tt: like "t" sound but stronger		1

Table 8 : Sample units of X and Y

Sets		Arabic letter	Transcription	
			BATR	RIT
X	X_1	رُ	ru	uR
	X_2	فْ	f	.F
	X_3	بَ	pa	aB
	X_4	مَ	ma	aM
	X_5	يَ	ya	aY
Y	Y_1	لُ	lu	uL
	Y_2	نْ	n	.N
	Y_3	سَ	sa	aS
	Y_4	فَ	fa	aF
	Y_5	تَ	ta	aT

c) *Preparing card sets for the work shop*

We prepared two sets of cards: $\boldsymbol{B} = \{B_1, B_2, \ldots, B_5\}$ and $\boldsymbol{R} = \{R_1, R_2, \ldots, R_5\}$, as shown in Fig.4. B_i contains X_i with its transcript in BATR for $i \in I$ and R_i contains Y_i with its transcript in RIT for $i \in I$. Words on cards are marked red on their designated position. We apply functions l and s to those cards by defining $l(B_i)=l(R_i)=L(i)$ and $s(B_i)=s(R_i)=S(i)$ for $i \in I$. Each word has its transcription printed below it. Each sample unit is marked by red color, as shown in Fig. 4. We write all the cards as $\boldsymbol{C} = \boldsymbol{B} \cup \boldsymbol{R}$.

d) *Applying the workshop*

We started the workshop by telling the participants the aim of the workshop. We explained the introduction of the Arabic to the participants. We showed an example of the Arabic text with the transcription in BATR and in RIT by a panel like Fig. 5 to tell them how each transcription is used to locate the English unit corresponding to an Arabic unit and to read it.

To each participant, we showed $\boldsymbol{B}$ cards one by one and then we showed $\boldsymbol{R}$ cards one by one, and on each card, we asked him/her to locate the English unit corresponding to the marked Arabic unit, point to the located English unit, and read the located English unit. For G_1, we showed the cards sequentially in the order of Fig. 4, but for G_2 randomly.

The time spent for both locating the English unit and pointing to it in each card was measured by seconds using a wrist watch and there is a measuring error of -0.5 to +0.5 second. We call this measured time "locating time". The accuracy of the pointing out in each card was judged as 1 if it is correct and as 0 if it is wrong. We call this value "locating accuracy". The accuracy of reading the pointed unit in each card was

judged as 1 if it is correct and 0 if it is wrong. We call this value "reading accuracy".

Fig. 4 : Workshop cards B and R

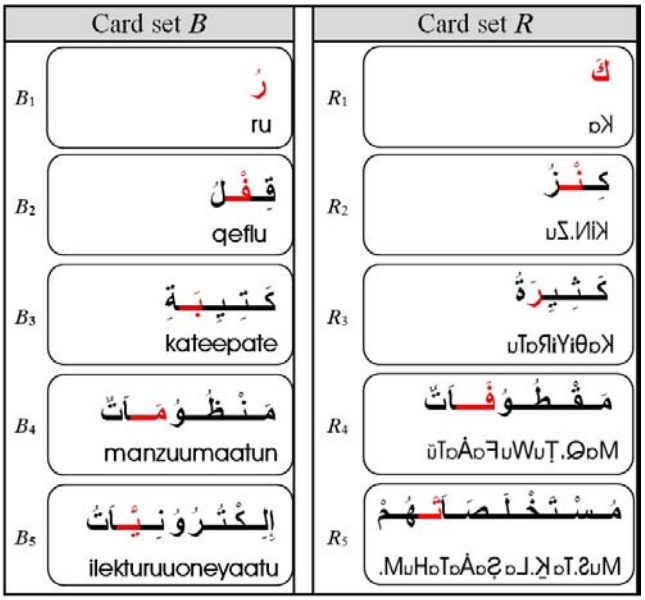
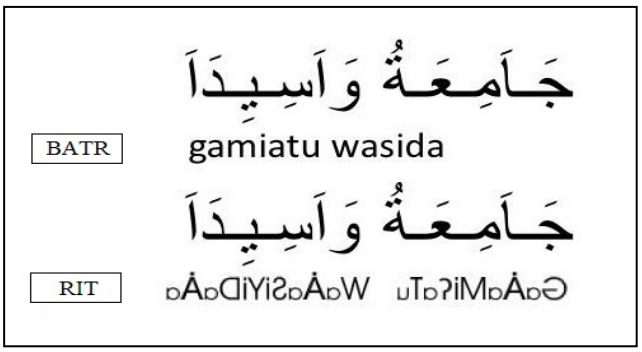


Fig. 5 : An example of BATR and RIT



e) Applying the questionnaire

We applied the questionnaire after the workshop. At first, we told the participants the aim of the questionnaire. To each participant, we showed a card pair (B_i, R_i) for $i \in \boldsymbol{I}$ in order. During showing every card pair, we pointed out the correct English unit. Then, we asked him/her "which one do you prefer, RIT transcription or BATR transcription, to locate the English unit for the marked Arabic unit?".We recorded each preference as 1 if R_i is preferred and 0 if B_i is preferred.We call this value "preference".We write the card pair as $\boldsymbol{D} = \{D_1, \dots, D_5\}$and $D_i = (B_i, R_i)$for $i \in \boldsymbol{I}$.

IV. The Results

Data obtained are (1) locating time $t(c,g)$ for $c \in \boldsymbol{C}, g \in \boldsymbol{G}$: integer, (2) locating accuracy $a(c,g)$ for $c \in \boldsymbol{C}, g \in \boldsymbol{G}$: 1 or 0, (3) reading accuracy $r(c,g)$ for $c \in \boldsymbol{C}, g \in \boldsymbol{G}$: 1 or 0, and (4) preference $f(d,g)$ for $d \in \boldsymbol{D}, g \in \boldsymbol{G}$: 1 or 0. We may consider all the data and subsets of them. We write the name t, a, r or f itself to represent all the data, and subscripted names to represent subsets of the data. For example, $t_{\boldsymbol{B}}$for $\{t(c,g) | c \in \boldsymbol{B}, g \in \boldsymbol{G}\}$, a_{R_2} for $\{a(R_2,g) | g \in \boldsymbol{G}\}$ And $r_{\boldsymbol{R},\boldsymbol{G}_2}$ for $\{r(c,g) | c \in \boldsymbol{R}, g \in \boldsymbol{G}_2\}$.

We ascertained statistically that, on each measurement item, the data obtained from $\boldsymbol{G}_1$ and the data obtained from $\boldsymbol{G}_2$ share a common population. We applied Mann-Whitney test on $t_{c,\boldsymbol{G}_1}$ vs. $t_{c,\boldsymbol{G}_2}$for $c \in \boldsymbol{C}$ and Pearson's chi-squared test on $a_{c,\boldsymbol{G}_1}$ vs.$a_{c,\boldsymbol{G}_2}$for $c \in \boldsymbol{C}$,$r_{c,\boldsymbol{G}_1}$ vs. $r_{c,\boldsymbol{G}_2}$for $c \in \boldsymbol{C}$ and $f_{d,\boldsymbol{G}_1}$ vs. $f_{d,\boldsymbol{G}_2}$for $d \in \boldsymbol{D}$. All tests failed to deny the null hypotheses with $p<.01$. And we decided to merge the data into a group of 34 participants, namely as $\boldsymbol{G}$, and then investigate it.

There are two cases that have rather small p-value, whereas $p>0.18$ in the others. One case is $t_{B_3,\boldsymbol{G}_1}$ vs. $t_{B_3,\boldsymbol{G}_2}$ at $p=.086$, and another $t_{R_4,\boldsymbol{G}_1}$ vs. $t_{R_4,\boldsymbol{G}_2}$ at $p=.013$. It looks rather delicate to say that the hypnosis seems to hold for the latter case, which we will look into in 5.

a) Locating time (t)

B_1 card and R_1 card contains a special word that consists of a single Arabic unit, and basically there is no need for long time to locate the English unit corresponding to the single Arabic unit. Table 9 summarizes stats of $t_{B_1}$and t_{R_1}.

Table 9 : t_{B_1} and t_{R_1}

	Minimum	Maximum	Average
t_{B_1}	1	2	1.9
t_{R_1}	2	3	2.3

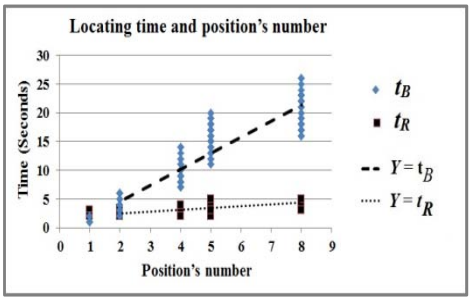
We consider the general cases, namely, the subsets of the data $\breve{\boldsymbol{B}} = \{B_2, \dots, B_5\}$ and $\breve{\boldsymbol{R}} = \{R_2, \dots, R_5\}$ to investigate how locating time $t_{\breve{\boldsymbol{B}}}$and $t_{\breve{\boldsymbol{R}}}$ changes depending on the sample position by the linear regression and obtained are the equations (1) and (2) by taking x for sample position and y for locating time.

$$y = -1.2 + 2.8x \quad (1) \text{ for } t_{\breve{\boldsymbol{B}}}$$

$$y = 1.8 + 0.3x \quad (2) \text{ for } t_{\breve{\boldsymbol{R}}}$$

The correlation coefficient is $+0.96$ with $p<.001$ for $t_{\breve{\boldsymbol{B}}}$, and $+0.70$ with $p<.001$ for $t_{\breve{\boldsymbol{R}}}$. On Fig. 6, plotted are the data $t_{\boldsymbol{B}}$ and $t_{\boldsymbol{R}}$, and drawn are the lines of Equation (1) and (2).

Fig. 6 : Locating time on Arabic sample position



b) Locating accuracy (a)

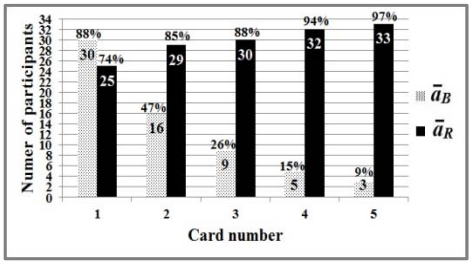
On each cardof $\boldsymbol{B}$and $\boldsymbol{R}$, we count the participants who located correctly as follows.

$$\bar{a}_{\boldsymbol{B}}(i) = \sum_{g\in\boldsymbol{G}} a(B_i, g) \text{for } i \in \boldsymbol{I},$$

$$\bar{a}_{\boldsymbol{R}}(i) = \sum_{g\in\boldsymbol{G}} a(R_i, g) \text{for } i \in \boldsymbol{I}.$$

We call them "locating accuracy count" or "accuracy count" for short. The results of accuracy counts are shown in Fig.7.

Fig. 7 : Accuracy counts



c) Reading accuracy

On each card in $\boldsymbol{C}$, we count the participants who read correctly the English units that they located, no matter correctly or not. All the participants read the located units on all cards correctly except those located units on R_2, on which 30 among 34 participants read the located units correctly.

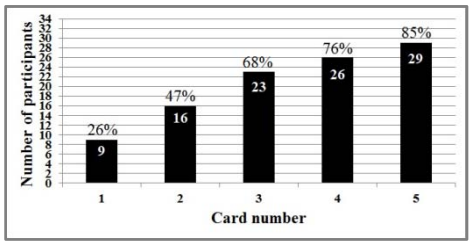
d) Preference (f)

For each card pair in $\boldsymbol{D}$, we count the participants who preferred RIT, namely who got preference value 1, as follows.

$$\bar{f}(i) = \sum_{g\in\boldsymbol{G}} f(D_i, g) \text{for } i \in \boldsymbol{I}.$$

We call them "preference count". The results of preference counts are shown in Fig. 8.

Fig. 8 : Preferencecounts



e) Looking into personal behavior

We have treated the participants only as a group and we have not looked into the personal behavior in 4.1 - 4.4. Now we look into some of the properties that may depend on personal difference.

i. *Accuracy score*

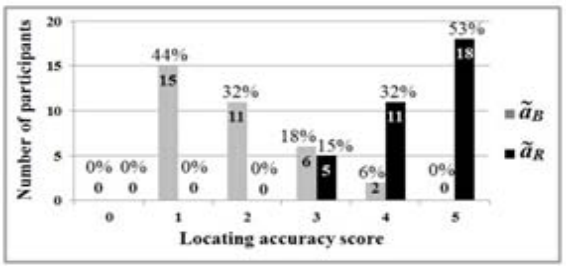
For each participant$g \in \boldsymbol{G}$, we count how many cards he/shegot locating accuracy value 1 as follows.

$$\tilde{a}_{\boldsymbol{R}}(g) = \sum_{c\in\boldsymbol{R}} a(c, g) \text{ for } g \in \boldsymbol{G},$$

$$\tilde{a}_{\boldsymbol{B}}(g) = \sum_{c\in\boldsymbol{B}} a(c, g) \text{ for } g \in \boldsymbol{G}.$$

We call them "locating accuracy score", or "accuracy score" for short, for $\boldsymbol{R}$ and $\boldsymbol{B}$, By definition $0 \le \tilde{a}_{\boldsymbol{R}}(g) \le 5$ and $0 \le \tilde{a}_{\boldsymbol{B}}(g) \le 5$for $g \in \boldsymbol{G}$. Fig. 9 shows the histograms of participants on their accuracy score.

Fig. 9 : Histogram of participants on accuracy score



We count the participants on each pair of accuracy scores for $\boldsymbol{B}$ and $\boldsymbol{R}$. Table 10 shows these counts.

Table 10 : Number of participants on each pair of accuracy scores

Accuracy score for *B* \ Accuracy score for *R*	0	1	2	3	4	5
0						
1				2	5	8
2				1	5	5
3				1	1	4
4				1		1
5						

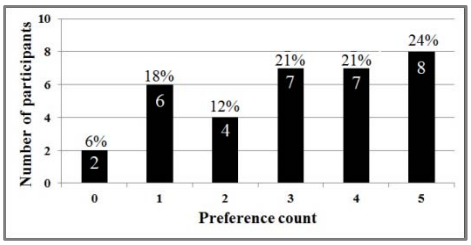
ii. *Preference score*

For each participant $g \in \boldsymbol{G}$, we count how many card pairs he/she got preference value 1 as follows.

$$\tilde{f}(g) = \sum_{c\in\boldsymbol{D}} f(c, g) \text{ for } g \in \boldsymbol{G}.$$

We call them "preference score". By definition, $0 \le \tilde{f}(i) \le 5$. Fig. 10 shows the histogram of participants on their preference score.

Fig. 10 : Histogram of participants on the preference score



iii. *Accuracy scores and preference score*

For each participant $g \in \boldsymbol{G}$, we consider the difference of the two accuracy scores for $\boldsymbol{R}$ and $\boldsymbol{B}$ as follows:

$$z(g) = \tilde{a}_{\boldsymbol{R}}(g) - \tilde{a}_{\boldsymbol{B}}(g) \text{for } g \in \boldsymbol{G}$$

We call them "accuracy score difference". The difference $z(g)$ ranges -5 to 5 by definition, but actually it ranges only $-1 \le z(g) \le 4$ for $g \in \boldsymbol{G}$.

We count participants on each pair of their preference score and accuracy score difference. Table 11 shows those counts.

Table 11 : Number of participants on each pair of preference score and difference of two accuracy scores

		accuracy score difference					
		-1	0	1	2	3	4
Preference score	0					2	
	1		1	1	2	1	1
	2				3	1	
	3				1	3	3
	4	1		1	4		1
	5			1	1	3	3

We count participants on each pair of their preference score and accuracy score for *R*. Table 12 shows those counts.

Table 12 : Number of participants on each pair of preference score and accuracy score for *R*

		Accuracy score for *R*					
		0	1	2	3	4	5
Preference score	0					1	1
	1				2	2	2
	2					3	1
	3					1	6
	4				3	1	3
	5					3	5

V. Discussion

Though G_1 and G_2 were different groups of participants, and showing the cards were applied in different orders, sequentially and randomly, the results showed that there were no significant differences detected by the statistical testing between the data obtained from G_1 and the data obtained from G_2. So that, we merged the data of G_1 and G_2 to gether and we analyzed them as data of one group. These results also showed that the difference of showing the cardsis regarded as having a little effect on the measured data.

We will discuss the results based on the standpoint that the differences between *R* cards and *B* cards are due to the differences between RIT and BATR. As mentioned in 3.3, the workshop was applied by using *B* cards including *X* Arabic words with BATR and using *R* cards including *Y* Arabic words with RIT. So that *X* and *Y* are similar to each other and differences between them could not affect the results of the workshop. Therefore, only the difference between RIT and BATR affected the results.

a) Locating time

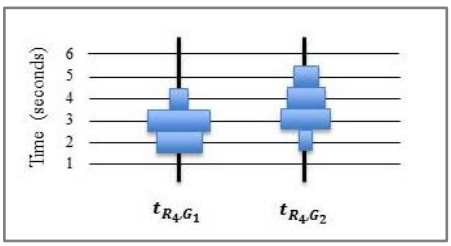
We designed RIT considering that reversing the image of all English units as a whole results in that the transcription units run right-to-left along with the Arabic units. The beginners in a previous trialeasily knew, by onlyan example like Fig. 5, how they could locate an English unit in RIT that corresponds to a given Arabic unit, namely, it is only to look at the English unit just below that Arabic unit [12]. We expected, therefore, that the beginners take just a short time in locating English units in RIT. And we measured, by sampling, how long the participants take for locating English units in RIT, to see that it is really a short time.

Fig. 6 shows that locating time on *R* cards, or cards transcribed in RIT, remains short even when cards contain longer words. Equation (2) tells us that locating time increases linearly on the Arabic sample unit position, and its increment is about 0.3 sec. per position, and, for example, the expected time in locating for the 10th Arabic sample positionis still less than 5 sec., which is surely said short or feasible to know how to read an Arabic unit either for first time or learned before but not recalled.

For locating time on *B* cards, or cards transcribed in BATR, Fig.6 shows that locating time increasesrapidly along with the Arabic sample position especially when cards contain longer words. Equation (1) tells us that the expected time is more than 25 sec. for the 10th Arabic sample position, which is far beyond a feasible time for finding out how to read a single Arabic unit.

We reported in section 4,that the test on the data of t_{R_4,G_1} and t_{R_4,G_2} resulted in $p=.013$. The actual data distributions are shown in Fig.11, on which blocks on each horizontal line have width proportional to the number of the participants who spent the time indicated for the line.

Fig. 11 : Distribution of t_{R_4,G_1} and t_{R_4,G_2}



Though the tow distributions look different, the difference is something at most 1 second. Our time measurements have errors of ± 0.5 second, and the results obtained thereof should be considered having the precision of 1 digit. Yet, the results clearly show the advantage of RIT in locating time. The difference of t_{R_4,G_1} and t_{R_4,G_2} does not affect this conclusion.

We conclude that in RIT, the beginners can easily locate each English unit for an Arabic unit in a short time, i.e. in a feasible time, but in BATR, they cannot do so.

b) Locating accuracy

We designed RIT considering that reversed units appear right-to-left in the direction of Arabic units, and then each Arabic unit has its English unit just under it. We expected, therefore, that the beginners can locate the correct English unit in RIT for an Arabic unit

regardless the Arabic unit position in a word. And we measured how surely the participants locate the correct unit in each card transcribed in RIT and confirmed that they were reasonably sure to locate correctly.

Fig. 7 shows that more than 74% of the participants correctly located the English unit on all the ***R*** cards, and more than 85% of the participants did so except for R_1 card containing a word of length 1. The participants are, therefore, expected to locate each English unit in RIT correctly in reasonably high success rate.

For locating accuracy on ***B*** cards, or cards transcribed in BATR, Fig. 7 shows that the percentage of the participants who located correctly rapidly decreases from 88% to 9% along the card number.

We conclude that in RIT, the beginners can locate each English unit correctly in reasonably high rate, but in BATR, they cannot do so.

c) Personal results on locating accuracy

According to the results of the locating accuracy, we expected that beginners can locate correctly in RIT in relatively high success rate, in another words, it is not the case that the beginners would be divided into two groups: onewhose members can locate correctly in very high success rate and the others whose members fail to do so in high failure rate. We studied on the obtained data of each participant to know how many ***R*** cards he/she located correctly, and how many ***B*** cards as well.

Fig. 9 shows that on ***R*** cards, all the 34 participants succeeded in locating correctly on 3 or more cards and more than half of them succeeded on all 5 cards. Fig. 9also shows that on ***B*** cards, only 8 among 34 participants succeeded on 3 or more cards, and no one succeeded on all cards.

We studied further on the difference of the two accuracy scores on each participant. Table 10 shows that almost all of the participants scored higher for ***R*** than for ***B***, one scored the same for both, and only one scored higher for ***B***. This result shows that RIT provides better support, than BATR, for the participants to locate the English unit and find how to read out an Arabic unit. We conclude that RIT supports the beginners to locate correctly in high success rate, but BATR does not.

d) Reading accuracy

We designed RIT considering that the reversed units are of English letters and then RIT is easy to read out. We expected, therefore, that the beginners can read out correctly the located units in RIT.

All the participants read out all the located English units on cards ***B*** as well as ***R***. Only the exception is the card R_2, on which 4 (12%) of participants did not read out correctly the located English unit.

R_2 is transcribed in RIT, and its English unit is "N." that represents to read only as "N" without any vowel. The participants must judge how to pronounce it, since it might be the first time to see "." in transcription. Others could guess it correctly but the 4 participants failed. This is good news for RIT that many of the participants could find how to pronounce it.

We conclude that in RIT, the beginners can read out each English unit correctly as they can do so in BATR, which is essentially transcription in English.

e) Preference

We expected that the beginners prefer RIT to BATR when they recognize that RIT is a good support for locating the English unit to find how to read out any Arabic unit in text. And we studied their preference through the questionnaire.

Fig.8 shows that the preference of RIT was expressed by more than two thirds of the participants on every card pair No.3-5, by a half of them on the card pair No.2, and by only a quarter of them on the card pair No.1. The card pair No.1 contains a word of length 1, No.2 a word of length 3, and No.3-5 words of long length. Taking into account of Fig.7, it suggested a possibility that the more participants succeeded in locating on a card, the more of them expressed the preference of RIT.

We studied further the data on each participant. First study is on the preference score that is the number of card pairs on which a participant expressed his/her preference for RIT. Fig. 10 shows that the participants scattered over preference score values, or in other words that there were participants who definitely preferred RIT on every card pair, and at the same time there were those who definitely refused to prefer RIT, or equivalently, who definitely prefer BATR to RIT.

Second study is on each participant preference score for RIT and his/her accuracy score difference between RIT and BATR. Table 11 shows that the participants can be categorized into two groups, one enclosed in an oval, the other in a rectangle. The oval group consists of those who got low preference score for RIT, or unconsciously hate to read the reversed images, though they could get higher accuracy score in RIT than in BATR. The rectangle group consists of those who got high preference score for RIT on their getting high accuracy score difference.

We studied further and summarized the results in Table 12. Table 12 shows more clearly than Table 11 that the participants can also be categorized into two groups. The oval group consists of those who seem to dislike RIT, or unconsciously hate to read the reversed images, though they could locate well in RIT. The rectangle group consists of those who seem to express their preference for RIT straightly on their successes in RIT.

In discussion with those participants who did not prefer RIT, we asked them "why do not you prefer RIT even you can use it correctly?". They replied that they know that RIT works well, but they are not familiar with RIT.

We applied the questionnaire with 8 volunteers who have experience in Arabic and who did not join in the workshop. All of those 8 volunteers preferred RIT to BATR in all card pairs, since they found that RIT is helpful for the beginners to just locate English units corresponding to Arabic units in the text.

In discussion with the volunteers and the participants who preferred RIT, we asked them "why do you prefer RIT?". Most of them reported that although RIT is not familiar for them, RIT is convenient, helpful and better than BATR in locating English units corresponding to Arabic units in text.

We conclude that it does not necessarily hold, at least on personal level, that whenever a participant succeeds in locating and reading the English unit in RIT, he/she prefers RIT, though we see a general tendency that in a situation where many participants succeed in locating and reading out in RIT, many of them are expected to express their preference for RIT.

This result is a good news to RIT, since it means that RIT do not lure the participants to stay in its transcription and unconsciously pushes them to read out Arabic text directly without help of RIT. In this sense, RIT is a good support for the beginners to learn Arabic text reading.

f) Characteristics of the participants

The participants had a variety of the general characteristics, as indicated in Table 4, in terms of nationality, age, gender, and experience in Arabic. We assume that they are good representatives for almost all beginners who are grown-ups. The number of the beginners was rather small. We hope to conduct another workshop with a large number of beginners with an appropriate experimental design.

VI. Conclusion

RIT, our new system of reversed image English transcription supported the non-Arabic speaking beginners more than the conventional English transcription. Through the workshop, almost all the beginners used RIT to identify the units in the English transcription for the Arabic units correctly at any unit position in different words in a feasible time. They also read the located units correctly. Through the questionnaire, most of beginners who have no experience and those who have experience in Arabic language preferred RIT to the conventional transcription to identify the English unitsfor the Arabic units in Arabic words.

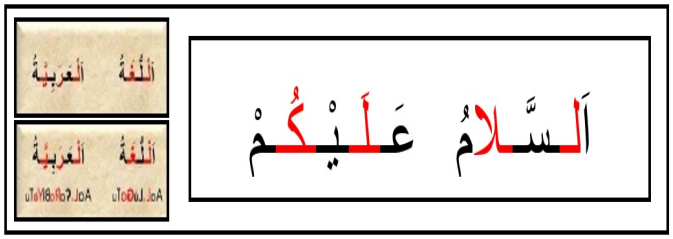
These results mean that RIT is ahelpful support for the beginners to read and/or remember any Arabic word in the text. RIT assists the beginners to read the Arabic text in a feasible time and correctly. And that therefore, the beginners are encouraged to read the Arabic textitself directly and avoid reading RIT even it appears with the Arabic text.

Therefore, RIT is the best support for the beginners to get accustomed to read Arabic text itself at their own pace. We need to conduct a long run workshop to confirm that RIT is a helpful support for the beginners to read Arabic text directly, especially in the e-learning system for the Arabic language.

a) Future work

We worked on a new version of RIT. In which, we colored the Arabic units and the reversed units in different two colors. Colored version relates to one of our previous works [14].Our aim is to apply RIT as an on-demand support in our new Arabic e-learning system, as shown if Fig. 12 [10 and 18]. This e-learning system shows our transcription only when the learner demands it, but that transcription will be hidden in an adequate time automatically. Then the learner has to train himself/herself to read the Arabic text at his/her own pace. We are in the process of testing how RIT supports the learners as an on-demand support in our new Arabic e-learning system (ETaJWa) to identify and read Arabic units/words/expressions and to recall them. The results will be reported in other paper.

Fig. 12 : Applying RIT in ETaJWa



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Using E-Mind Mapping in Learningat IBRI College of Applied Sciences

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Abstract- The purpose of this study was to investigate the impact of Software based Mind Mapping (SMM) performed by tablets, mobiles, desktop, and web school work. The study determined the outcomes by using Electronic Mind Mapping (EMM) and the positive change in the students' responses. The research was performed on 29 randomly chosen first year students from Ibri CAS during the academic semester year 2014-2015. The research took ITDR1101 as a random course as an application for the study. Three sets of groups were: self-selected study technique, paper and pen based MM and software based Mind Map(MM). The three groups were exposed to one of the presentations of the course ITRDR1101 course lessons for a 45-minute period. All the three groups were given a 30-minute time period to review and study the lesson materials using their own technique. They were requested to answer four structured open questions based on their technique for remembering the information presented in the class lesson.

Index Terms: electronic mind mapping, digital mind mapping, software-based mind mapping, web-based mind mapping, computer aided mind mapping, smart phone mind mapping, dmm, emm.

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Abstract- The purpose of this study was to investigate the impact of Software based Mind Mapping (SMM) performed by tablets, mobiles, desktop, and web school work. The study determined the outcomes by using Electronic Mind Mapping (EMM) and the positive change in the students' responses. The research was performed on 29 randomly chosen first year students from Ibri CAS during the academic semester year 2014-2015. The research took ITDR1101 as a random course as an application for the study. Three sets of groups were self-selected study technique, paper and pen based MM and software based Mind Map(MM). The three groups were exposed to one of the presentations of the course ITRDR1101 course lessons for a 45-minute period. All the three groups were given a 30-minute time period to review and study the lesson materials using their own technique. They were requested to answer four structured open questions based on their technique for remembering the information presented in the class lesson.

In this research a qualitative research methods was used. Content analysis was made for the answers of the students.

Results of the research show that there was remarkable difference between the three methods used by the three groups to answer the questions. On one hand, MM is a more effective study technique than the self-selected study technique. On the other hand, although MM is more direct technique, EMM is more preferred by the students compared to MM.

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I. Introduction

There are several methods and learning strategies: the preparation, presentation or organization, understanding and accommodating used by learners in different learning environment.

Changing the tools for implementing these strategies depends on the change of the strategies. This research focuses on Electronic Mind Maps (EMM) or Software based Mind Map as a tool to conducting such strategies. This study compares the three samples of learners using 3 different tools: the classic traditional tool, Mind Map designed by hand and Mind Maps created by mobile or desktop applications. This paper gives clear definition of Mind Mapping and the importance of it in learning through literature and previous studies. Then it explains the difference between normal and electronic Mind Maps.

According to Wenstein et al. (1983) good teaching includes teaching students how to learn, remember, think, and motivate themselves. Teachers enter the classroom with two distinctly different kinds of goals which are teaching students "what" to learn and teaching students "how" to learn. There are many new methodologies and strategies for classroom learning highlighting the role of the learner in organizing, observing, and controlling a suitable learning environment. Some real classifications of learning methods are (1) rehearsal strategies such as copying, underlining, or shadowing; (2) elaboration strategies such as paraphrasing or summarizing; (3) organizational strategies such as outlining or creating a hierarchy; (4) comprehension monitoring strategies such as checking for comprehension failures; and (5) affective strategies such as being alert and relaxed.[1] Our research subject focuses on (Electronic) Mind Mapping as a tool for achieving rehearsal strategies, elaboration strategies, and organization strategies and leaves comprehension monitoring strategies for future consideration.

In a journal with a title *The effects of note taking in science education through the mind mapping technique on student's attitudes*, *academic achievement and concept learning*, Akinoglu et al. (2007) state that there was a significant positive difference in students' concept learning, overcoming misconceptions, academic achievement and attitudes towards science courses by taking notes through the mind-mapping method.[2]Differentiation between the normal MM done by hand and digital map or electronic MM designed by software is not only expected but also exciting because of the following reasons:

1) Normal MM will not be used in the digital or electronic world of technology. Therefore EMM is essential in the IT field.
2) There are technical principles for EMM which is not for regular maps. For example, there is a clarity and type of color, contrast, resolution and some other standards for image and digital design. These standards control the quality of EMM which is totally different from the standards that exist in MM-designed by pen and hand.
3) There are some threatens in security and challenges affecting the transfer of EMM when it moves from

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one device to another. In the same context, there are specifications related to the bandwidth of internet, and networks protocols. On the other hand, these standards are not in MM.

4) Learning and E-learningby using MM and EMM is similar. There is no different between regular MM and EMM in terms of main objective. The only difference is the special environment to be used and the way and the tools are designing in each of them.
5) EMM or digital MM design tools are always available. It is enough for the user to have a smart phone supported with a small program to design EMM.
6) The general trend today for most of the learners is to use technology such as smart phones, PDAs and Lap tops. According to Hwang (2014), the evaluation of smart learning systems with new mobile and sensing technologies will be the main focus for researchers from the fields of computer science and educational technology.[3] Therefore, EMM is best suited and more appropriate for that.
7) The design of EMM in terms of quantity, quality, and memory capacity is better compared to MM.

Using the maps digitally is different than normal maps. In pen-based mind mapping the learner is touching what he performs. On the other hand, in the digital-based mind mapping the touching is virtual.

In Digital based mind mapping the output is a software file (PDF, image file, and html) while pen-based is a paper. Therefore, it much easier to export the software file to any other software. Also, a supporting advantage is sharing this mind maps with other if it is needed. In addition, Digital-based Mind Maps can be linked with some other files i.e. Office files, Multimedia Files or Hyperlinks. For these reasons and others, it is clear how EMM or Digital MM are linked to the pen-based MM. From one point of view, the DMM is MM designed by either computer programs or smart phones applications or Web sites to be used in the digital or electronic world. From a different of view, they are the same in terms of the results and the concept of the creation process.

Mahmud (1999) claims that "Mind Mapping enhances the learning capacity in terms of number of ideas generated as well as improves presentation focus". [4]

In the same context, the study lists the technical requirements to be fit in the systems that use EMM. Also it exposed the most important programs and applications available for designing MM. Finally, the results of the study shows that the students prefer to use EMM compare to the other three tools. That is because it the fastest tool and it available anywhere any time in their hands.

II. Literature Review

EMM is another extendable concept for MM. To understand the terminology of EMM or software based MM or web based MM or any other synonyms of EMM such as digital mind maps, web based mind maps, and software based mind maps the study will clarify define Mind Mapping and then the reader can extend the meaning of it into the digital or electronic atmosphere of technology. However, the peculiarity of digital field should be taken in account.

Anthony J. Mento et al.(1999) defines the Mind Maps as "a revolutionary system for capturing ideas and insights horizontally on a sheet of paper. This paper illustrates the technique of mind mapping, and highlights its specific applications in a variety of contexts based on our work in executive education and in management development consulting". [5]

In the introduction of Davies (2011)paper, *Concept mapping, mind mapping and argument mapping: what are the differences and do they matter,*he argues that these concepts are a verity of tools that take different names. Following this further, the overriding objectives of these mapping tools are similar. However, there are differences in their application. First, Mind mapping allows students to imagine and explore associations between concepts. Then, concept mapping, allows students to understand the relationships between concepts and hence understand those concepts themselves and the domain to which they belong. Also, Argument Mapping allows students to display inferential connections between propositions and contentions, and to evaluate them in terms of validity of argument, structure and the soundness of argument premises. [6]

Mind maps use more visual aids than outlines i.e colors, size, fonts, images border styles and additional lines that display relationships according to Guerrero et al. (2015). They emphasis that MM almost 50% of learner brain is focused on visual processing. Also, they found that additional research that color visual increases the willingness to create by 80%. Following this further, if information is displayed visually, individuals are 17% more productive and need use 20% fewer mental resources. [7]

Wickramasinghe et al. (2011) pointed out that there is no statistical important difference between the two groups of medical students; one of them using MM and other using traditional learning techniques. However, all the participants using MM realized that it was a helpful way of memorizing information. Almost all (97%) from that group perceived the technique as a useful method of summarizing information and wanted to follow the technique for their future studies. [8] Pursuing this further, Mind Tools are a computer application that when used by learners to represent what they know, engages them in critical thinking about

the content they are studying. Mind software cannot be separated from critical thinking and efforts of the learner himself. Jonassen et al. (1998). demonstrate the concept "students cannot use Mind tools as learning strategies without thinking deeply about what they are studying."[9]The concept of EMM is not new in education and the learning environment. Hwang (2014) explores Jonassen (1998) defined Mind tools as "a way of using a computer application program to engage learners in constructive, higher-order critical thinking about the subjects they are studying". Mind mapping software is to some extent a matter of personal taste. The user likes the interface. Others like how to create branches and some likewise the look of the final output. Naturally, the new trend is making these tools available to iPhone, iPad and Android mobile platforms. There is even freer mind mapping software available online. According to Devin (2013), internet marketer, the following are the top 13 Totally Free Mind Mapping Software Tools:

1) Bubble.us

Bubble. us is a great place to start. Simple and easy, there is plenty of free training available, too. The designer can start creating right off the bat. No need even to create an account.

2) Mindomo.com

Mindomo comes in a free and paid version. The free version limits the number of private mind maps to three and sharing is disabled. The output looks terrific, though. The mobile app is free.

3) Mind42.com

Why do the desingers love Mind4.It's free, it's fun and it's fully featured. Publish, collaborate, brainstorm, import, export and revise.

4) Labyrinth

Labyrinth is a simple basic easy to use mind mapping software for Linux and Windows. Widely available, it's small in size, automatically saves your work, makes it easy to add images and offers a simple way to add notes (not all mind mapping software offers this). It's a great free way to the user brilliant thoughts a bright colorful new visual dimension.

5) WiseMapping.com

WiseMapping is another cool tool in the mind mapping arena. It is one of the newer players. It is open source and unlimited.

6) TheBrain.com

This is another offering with a free and paid version. Some sources say it is the most intuitive of all the mind mapping software today. Plus it enthusiastically asserts that user can organize and manage his entire business and personal life with one of their mind maps. Intriguing stuff, to be sure. Available for Windows, Mac and Linux. This software was previously called Personal Brain.

7) Blumind.org

Blumind for Windows is another fully featured mind mapping software with all the basic stuff you need. It has been around for awhile and has many fans.

8) Freemind.Sourceforge.net

FreeMind describes itself as the "premier free mind-mapping software written in Java." Even if the user has never mind mapped before, he has almost certainly seen somebody presenting live or on a webinar with a FreeMind mind map. More than 4,000 people download FreeMind every day. It's hard to argue with that kind of popularity. Plus people who use mind maps are smart to begin with.

They've been around for ages in Internet years and are still going strong. FreeMind was a finalist for a 2009 Community Choice Award in the category "Most likely to change the way the designers do everything."

9) XMind.net

Open source and ready for Windows, Mac and Linux, XMind may be the best looking of the crew. While there is a paid version, the free version should be robust enough for all desingers needs. XMind and FreeMind are the top dogs of the free mind mapping software kingdom.

10) MindMeister has free and paid options but like most of the others, the free version is adequate for all but high voltage power users. It verges on being too simple, but that is its advantage. The controls are minimal.

11) ExamTime.com

Exam Time is a 100% free online mind mapping tool that is loaded with a ton of useful features including the ability to access your mind maps from various devices such as tablet & mobile device. ExamTime also has sharing options to easily share maps with your fiends via URL, social media, etc. This free mind mapping platform has many great features.

12) MindGenius

MindGenius is the leading business mind mapping software for brainstorming and planning all tasks, activities and projects. Includes a free 30 day trial.

13) LucidChart

LucidChart is a web-based mind map platform that allows the user to make not only mind maps, but also allows him to make floor plans, wireframes for software, UI mockups and many other things.[10]

In order to make smart phones which are a combination of PDAs and mobile phones suitable for education in general and for EMM in specific, they should have some features. Writing in the journal: Lifelong-learning support by m-learning example scenarios, Holzinger et al.(2005)argue that Mobile Learning Engine (MLE) has been developed by using

the Java 2 Micro Edition (J2ME) and runs on a broad variety of mobile phones.
Its platform-independency enables the handling of:

- Different operating systems (Symbian OS, Microsoft MS Pocket PC, Palm OS, etc.)
- A variety of different screen resolutions
- Different input possibilities (keypad, keyboard or pointer device). [11]

There are some software automation which can create mind maps automatically for users. Herbst (2008)points out, the system may display the subtopics to the user. The user may select one of the subtopics, in response to which the system may apply the same or different rules to the subtopic to identify one or more additional subtopics. This process may be repeated to any depth to create and explore an outline, mind map, or other representation of topics related to the original topic.[12]

III. Methodology

Holand et al. in 2004 performed an investigation into the concept of mind mapping and the use of mind mapping software (MindManager) to support and improve second year Digital Media students from the School of Art and Design (SAD) and first year students on the History of Computing module from the School of Computing and Information Technology (SCIT) academic performance.[13]However this study left the choice of choosing the Digital Based mind mapping technique to the learner. He or she was free to choose either, smart phone, desktop or web. Also, it was up to him or her to choose the kind of the software.

This study uses a qualitative experimental design. Its aim to develop better understanding why learners choose EMM as the best technique for their learning. It will use observation and content analysis as a method for data collection. Within this context on the first day, ITDR1101 students at Ibri CAS were given a practical introduction in a lab on how to use the top ten free applications and Mind Manager. Also, the learners knew the concept of MM from a short presentation given to them. The next day, a random lecture was chosen, the students were asked to organize the content of the lesson and memorize the key points. The students were free to use their own technique, pen-based mind mapping or any of the software-based mind mapping. The third day we asked them some questions regarding the same content. On the final day, a comparison of the results were conducted. The sample included 50 ITDR1101 course students selected for this study. There were 15 students in self-selected technique group, 20 in the pen-based MM group and 15 in the EMM group. Students were first year students. Students in all groups were taught by the same teacher. Students who did not have a smartphone device or tablet used desktop or internet during the study.

IV. Findings

After analysis, the first findings reflected the differencesbetween the three groups in terms of timeconsumption, the quality of organizing and the accuracy of the answers across the four days of the study among the three groups. The students were given one hour to organize the content and make the material ready for memorization. Fig. 1 shows that the software-based MM group spent less time preparing the materials into MM while in the self-based technique students consumed more time.

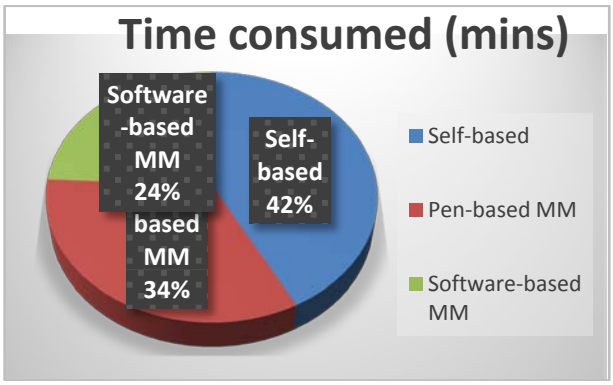

Figure 1: Time Consumed to organize the contents

The study chose four levels to figure out the quality of organizing the contents. They were: very bad, bad, good, and very good. Three qualified teachers evaluated the 3 groups of the students.

In Fig. 2 the most "very good" in preparing the materials of the contents was "software-based" MM group. This group covered all the topics mentioned in the lecture, put necessarily details, main and sub main subjects, detentions, numbers, drawings, and dates. None of the students organizing in this group were very bad while one student was bad. Both "self-based" students group and "pen-based" MM group were good in organizing the contents used.

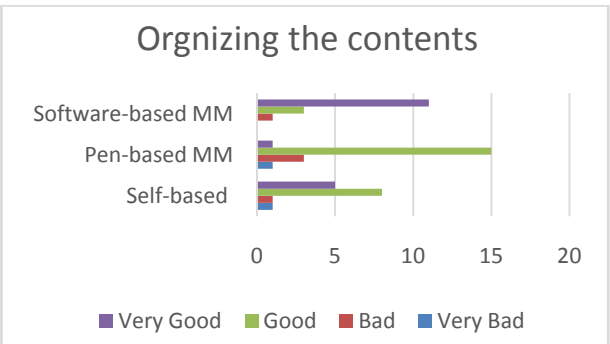

Figure 2 : The Quality of the organization for the content

Fig. 3 shows that all three groups were corrected but by different accuracy percentages.The percentage of accuracy for software-based MM is the highest amount the other two techniques is located between (90-to 100) %. However, 67% of self-based students answers were (50-69) % corrected.

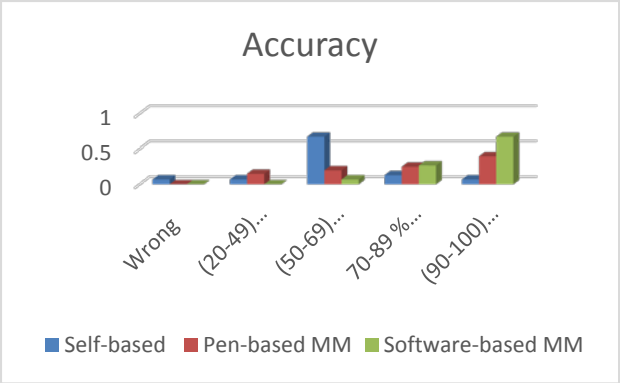

Figure 3 : The Accuracy of Students Answers

V. Discussion

The software-based tools were supported by wizard and ready templates which meanless time consumption. On the other hand, the slowest technique was the self-based one. The logical reason might be the students have too many choices to start with in this kind of tool. Therefore, they spend more time to choosing the best orthe easiest. A lot of time for choosing between them is taken up. By analyzing the students answer papers we can see some students wrote one choice then they deleted it and selected another choice.

The reason that the Software-based MM aremore effective in designing the contents, are because of some extra tools facilitate the mission of organizing as stated by Holland et al. (2004).

A study for Swan (2011) found that three significantly influenced students' satisfaction and perceived learning are: clarity of design, interaction with instructors, and active discussion among course participants. It is clear that the factor; clarity of design were the best represented in software-based MM environment. This can lead to the following summary: clear design may lead to more accuracy and affect student's satisfaction and perceived learning positively. [14]

VI. Concusions

There is an increasing reliance on rapidly changing new technologies into the learning environment. With this situation, EMM is more convenient for such environment. The study noted that recent trends have imposed the use of (Electronic) Mind Mapping in learning environment. The research categorize and labels these maps as "Electronic", "Digital", "Software-based", "Computer Aided" and "Web-based" Mind Mapping. While useful, the study asserted that both approaches are sufficient to meet the current needs of the field. However, based on research findings the study proposes EMM to be used because of its superior features compared to the "self-based" technique or "pen-based" Mind Mapping in learning.

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Note :

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- In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.
- In case, the chairperson needs to be replaced then consent of 2/3rd board members are required and they are also required to jointly pass the resolution copy of which should be sent to us. In such case, it will be compulsory to obtain our approval before replacement.
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1. General,

2. Ethical Guidelines,

3. Submission of Manuscripts,

4. Manuscript's Category,

5. Structure and Format of Manuscript,

6. After Acceptance.

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27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

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Key points to remember:

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Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

Please carefully note down following rules and regulation before submitting your Research Paper to Global Journals Inc. (US):

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Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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