A Study on Visual Secret Sharing Scheme using Speech Recognition Method

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ABSTRACT

Visual secret sharing (VSS) scheme and Speech recognition method, both are mainly used for digital security. By using Random grid based technique Visual secret sharing schemes are used for performing decryption. But in many cases, it may be decrypted by applying different methodologies. Actually, VSS allows confidential message to be encrypted into (k, n), (n, n) or different secret scheme. In (k, n) it can define k as threshold and n as some group. So when n ≥ k then the confidential message can be acquired by these participants. Visual Secret Sharing Scheme is interesting because for decryption, even if, there is no knowledge of complex cryptography algorithm then also, it can perform decryption. Hence, based on this scheme, a new method is proposed to examine VSSS that uses speech recognition method, as proposed in this method.

Index Terms: Random grid, Visual Secret Sharing, Image recognition, Cryptography, Speech recognition and Spectrogram.

I INTRODUCTION

In 2007, an idea came to light, if nonphysical subjects project their voices onto tape recording, could they also send pictures with sound. Work was going on for few years and consequently, new idea came   that could recognize image with speech. This method is only known to few and not formally recognized till 2017.

The idea is so simple. As we all know that sound is energy and we are also part of energy. Things not in physical form on this earth are also form of energy. So by saying this, we can say energy can be created; in this way any nonphysical properties can also create energy. If they can mark their energy upon sound wave, then it can receive visual image. In many cases, Robots also sense our emotion via radio wave. One of the techniques for this research is Spectrogram; it is a visual representation of spectrum of frequencies of a signal as it varies with time.   Recognizing image by speech Spectrogram is also known as voiceprints or sonographs. When data is represented in three dimensional (3D) plot then, that is called as waterfalls. Spectrogram can be generated by an optical spectrometer. A common format of this is a graph with 2 geometric dimensions: one axis represents time and other frequency. Spectrometer of light may be created directly using optical spectrometer over time. In this we will see band pass filter is also used for analogue processing to divide input signal into frequency bands. Creating a spectrometer using FFT is a digital process. In below algorithm we will see how the image will be divided into different share and their reconstruction.

Algorithm: Division of image into different Share.
Step 0:   START
Step 1:   Take ASCII code from character say A(i)
Step 2:   input random number r
Step 3:   count value A(i)'= A(i) + rp
Step 4:   for j=1 to n
Step 5:   for i=1 to [length of message]

Step 6:   if count value k (j,i) = A(i)' mod d(j) goto step 7.
                 Else goto step 6.
Step 7:   Reflectionke-1 : k(1,1)....k(1,i)   to Reflection ke-n k(n,1) to k(n,i)
Step 8:   STOP

Digitally sampled data in the time domain is divided into different fragments which usually overlap and Fourier transform to calculate magnitude of the frequency spectrum for each fragment.

During analysis of this research, image will be decoded with two secrecies: first for visual secret sharing scheme with random grid encoded technique and other is speech recognition, so in this way secret of sharing image is more secure. We will also use cryptography techniques in this for providing secret key and that images will be decrypted only with key and speech matching. The algorithm for information sharing is known as Threshold scheme. Using this scheme, image will be divided into n different share in such a way that any m (where m ≤ n) from that may be used to reconstruct the information. This is known as (m, n) threshold scheme.

(a) Visual Cryptography: As the name suggests Visual Cryptography is a cryptographic technique that allows Visual information to be encrypted in such a way that decrypted message will appear as Visual image. That visual information may be image, text etc. In visual cryptography we will study technique developed by Moni Naor and Adi Shamir in 1994[1]. They had proven visual secret sharing scheme: In this method, images are divided into n shares so that only someone with all n share could decrypt the image, while n-1 shares publish no information about the original image. There are many extensions of basic scheme including k-out-of n visual cryptography.

(b) Secret Sharing Scheme (2, N) Visual Cryptography: In this method, images will be shared into N share out of them 2 can decode the secret. it was developed in 1994 by Naor and Shamir [1]. In this method, we will have secret image which will be encoded into N share printed on transparencies. The share appears random and it contain clear information about secret image however if any 2 of the share are stacked on the top of one another than the secret image will be cleared by human eye.

Voice is the basic thing to communicate and interact with people. Today speech recognition is common but image sharing with voice is little difficult. A secret (2, n) gateway (i.e. threshold) secret scheme consists of algorithm as shown below:

> **(i) Share:** A algorithm that uses random number to decide what next thing will be performed giving information m in terms of s= (s1, s2, ……, sn) share as input and output of a sequence.
>
> **(ii) Reconstruct:** a deterministic algorithm that takes a collection of 2 share as input or output of message.

As we know that problem of key distribution cannot be addressed by Encryption Algorithm, in the same manner the thing who run the share algorithm their address can also not be used by secret share neither with n different user who actually send share securely.

II LITERATURE SURVEY

Presently, Speech recognition is practical concept and It can be applied by different languages. It can also be used in human based application as data recovery (the process of recovery of data). As discussion or speech that is captured by mobile can be easily converted from real voice to set of words that's why image can also not be converted into speech. Therefore, the converted word can either be final result or by applying different random grid share techniques the word can be converted into image which will be the final result. Speech recognition can

be described by way of speaking, signal to noise ratio, transducer, etc.

(a) Types of image processing: There are two basic methods of image processing technique used:
> (i) Analogue.
> (ii) Digital image processing

Analogue image processing is used for hard copies as printout and photograph. Association is another important tools in visual technique. So Analyst gives a merging of own knowledge and auxiliary data to image processing.

While image processing in Digital manner is used for manipulating digital image by using computer. As raw data from imaging sensors from satellite platforms contains deficiencies. To overcome this problem, it has to undergo various phases of processing.

In a secret sharing scheme each person is assigned a certificate issued by certification authority to establish its authority. For importing any file through secret first of all access the certification authority site and create browser certificate, authenticating with credentials. Then import the download certificate into browser, as a certified user it is possible to register in the Framework. In the framework, it is possible to create and join a group of n people with a common interest in sharing information. After this group decides minimum number of people k (threshold) required for information recovery i.e., k ≤ n this is nothing but (k, n) threshold Shamir secret sharing scheme. Upload the information to share. Then check condition for sharing are satisfied or not by all group member in session, threshold agreed and defined, pdf assigned to group. And begin the Distribution Process. In the certificate extension of each person a share part of the secret is added. The pdf is encrypted with the group key now a new certificate with the updated extension is issued for each person. At last access again the certificate authentication site and get the new browser certificate authenticating with credentials. Import the new certificate in browser. To view the shared pdf, it is necessary to recover the secret. To recover the secret at least k people are required.

Begin the recovery process; it is possible to recover the key that encrypt the pdf with k shares. So the pdf can now be viewed by all group members.

In 1994, Naor and Shamir [1] extended the concept of sharing by cryptography shown in figure 1. In this a (k, n) share visual cryptography encodes a black and white secret images into n meaningless shares such that any k-1 cannot show any information about secret image.
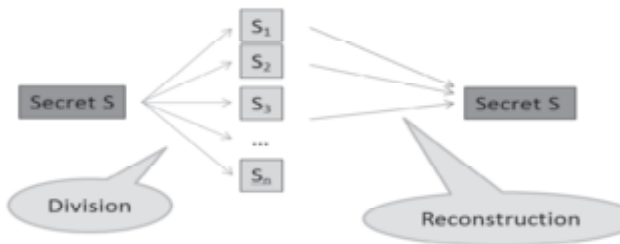
Fig. 1 Secret Sharing with Cryptography

In this paper a new type of cryptographic scheme is considering which can decode image sharing without any cryptographic computation. Visual secret sharing scheme assumes that the message consists of black and white pixel [1] and each pixel is operated separately. Each original pixels is divided into n share one for each Opacity. Every black and white pixel [1] is combining and acts as one share. Structure come out from this can be described by m*n Boolean matrix C=[c$_{ij}$] where c$_{ij}$=1 if and only if jth sub pixel in the ith opacity is black. When opacity i1,i2,....,ij are stacked together in such a way that properly pick the sub pixel, then combined share can be seen whose black pixel are represented by OR Gate in Boolean and their row is i1,i2,....ij in C.

Shamir and Blakely [2] proposed (k, n) threshold scheme in 1979. In (k, n) k is threshold and n is group size. In this scheme each bit of any share carry at most [k/n] bit of secret. While in (n, n) sharing scheme the information carries per bit share is [1/n] bit of the secret. One of the main goal of this paper [3] is to apply neural network for speech recognition. Spectrogram is a method which use discrete Fourier transform for translating one dimensional time sequence more frequently but not on a Mandatory basis segment of audio into 2 D images containing the same information but organized in a way that makes locality meaningful in 2 D rather than just one [3].

Speech recognition is primary mode of communication between human being. When human communicate with computer than it is called as human computer interface. The goal of speech recognition area is to develop speech input to machine. So today automatic speech recognition finds prevailing application in task that require human machine interface such as automatic call processing. The goal of machine recognition technique is to get information by hearing and act upon spoken information. The speech recognition may be viewed as working in four stages [4]:

- Analysis
- Feature extraction
- Modeling
- Testing.

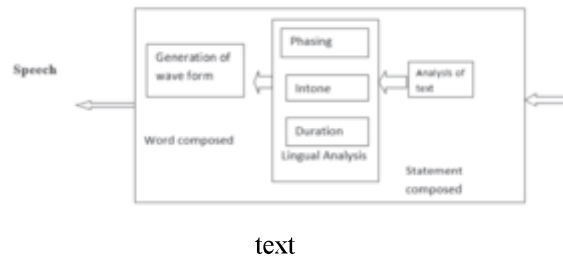Text to Speech Analysis technique shown in figure 2:

text
Fig. 2 Conversion from text to speech.

Conversion of text to speech contains into two parts [5] one is front end other is back end. Frontend is used for solving two major tasks. One for converting raw text like numbers and abbreviation into words. This process is commonly called as text standardization or lexical analyzer. Every word is having phonographic transcription assign by front end, that divide and grade the text into prosodic unit like any sentence. The term which assign phonographic transcription to words is called text to phoneme (small unit of sound) conversion. Phonographic transmission and pingal information combined with each other and make up the symbolic linguistic representation which is output by the front end.

The back end is rarely referred as synthesizer. It converts the symbolic language notation into sound shown in figure 3. In some system this parts include the computation of target pingal[21] which is imposed on output speech.
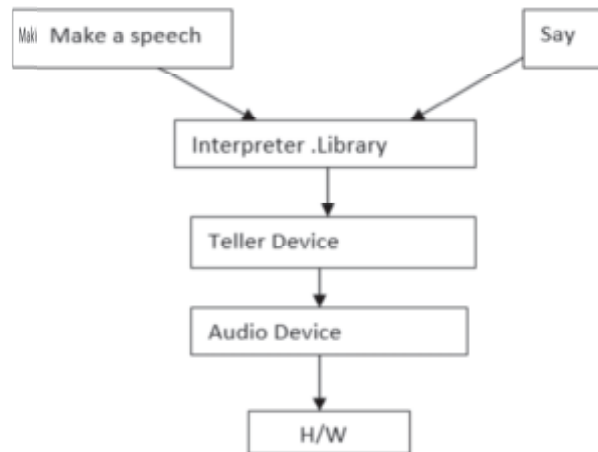
Fig. 3 Transfer of symbolic notation into sound.

Smartest method for generating properties and features from face and movement of body is called as Active Shape Model (ASM).

The original ASM was develop by Cootes et al [22] suffer from factor such as poor model initialization. Here each frame is divided into reasonable points which don't have any static position so because of non-static that can be changed to other position, because of dynamic behavior it can be design for shape of each frame. In medical field each text message from patient includes a set of frame based on these set of frame, distinctive frame is divided into particular points. It can be assumed that frames number is "j" in first equation and the number of

points is represented by 'P' and 'r' has an responsibility between Zero and 'P'.

Image recognition, Lip movement and body parts are included feature issue and classification of data set. Active Shape Model (ASM)[6] can fulfill our needs in future issue and summarized valuable data by dividing images into different points which are related to lip, image recognition or other parts of body by finding out sketch is a complex step in image recognition and by area based calculation is quite good compare to edge based; by using this displacement of movement of points can be calculated, and that can be saved as a chain of states for specific action like Lip motion and receive data set for training data, in next coming step this data is check in mobile phone that are available in patients, this work happen in both way i.e. automatically or manually in front of camera. It is the best way to record patient information. This result (Speech and motions) then compared with data base by matching each frame from patient with each frame from set of data then best result will be selected and give decision about them.

After feature extraction, classification is next step and the best solution is Fuzzy c-means [7](allow one piece of data to belong to two or more cluster). Mostly Fuzzy Clustering Means (FCMS) used in pattern recognition and it is having soft and flexible behavior. Due to soft and flexible manner in comparison of models from one side and frame which are collected from camera.

The minimization of feature vectors can be solved by adding PCA (Principal Component Analysis) and Fisher Linear Discriminant (FLD) [8] and their after we use projection for feature vector integration. Then classification is important issue, there are two choices for exact recognition, one is Hidden Markov Model (HMM) [9] while other is Recurrent Neural Network (RNN) [10], in first method each word will be stated by chain of states from left to right, during time the number of states will be increased while in second method is used for learn new condition and data will be saved by its reverse ability.

First of all, face or body will be dividing in few parts that can use for transforming valuable message to us. In this we will study Property of each part. For this purpose, face contains important role and it is divided into lip, eye, eyebrow, head and mouth and their properties are their movement and color. Body can be categorized into head, hands and feet their properties are movement and color these parts can help us to have a better perception of patient's situations.

It was argued that the meaning of an image did not become apparent until it is accompanied and explicated by text. Pictures were ambiguous and their work was dependent on words to specify and focus their multiple and uncertain meanings. However, it was also apparent that in context between texts and images might be in different forms. Furthermore, for the development of visual secret sharing scheme

using speech recognition the scientists mediate the meanings of pictures come in two different forms and contexts. There were the words of respondents – captured by interviews, questionnaires and other research devices – and those of different science theory and analysis. Similarly, images might be generated by respondents, by researchers or derived from secondary sources by respondents or researchers. [11] Alan F. et al., (2004).

It was a qualitative with a mix of interviews and focus groups and a new experiment of a visual secret sharing scheme using speech recognition method generally used inside design and fashion environments. It was a study based on the contrast of a growing trend towards sustainability and the rise of fast provision in which consumers are demanding cheaper items completely. It was also determine in two or more research where the comparison of data emanating from different cultures and languages presents specific dilemmas for researchers. [12] Lindsey C. et al. (2014).

It was described that a visual secret sharing scheme using speech recognition method and then relates them in detail in the abstract and analyses the exemplar as a verbal text. After this visual one show the way that analogy between the words and images reiterates the confederacy between the brand advantage and the images used to dispatch it. Ends with a call for maximize visual literality in order to advertising from a humanistic perspective. [13] Barbara B. S. et al., (1994).

It was argued that social network platforms were not social utilities, but, in fact, clarification utilities. They were programmed to be necessarily brand users by extracting and filtering identifications to be easily consumed by advertisers, just as micro celebrities promote specific, "authentic" aspects of self that could be easily consumed by fans. Through a discourse analysis of Facebook's functionalities and in-depth interviews with 45 emerging adults, I found that by using visual secret sharing scheme using speech recognition for self-branding but were instead compelled by the site's inherent design to unintentionally brand – they unknowingly align with corporation-like mission statements; ignore multiple, dynamic selves; and discard their right to anonymity. [14] Angela M. Cirucci, (2018).

The 'brain speech' involves visible and local terms that results in a particular kind of objectification of the organ of the self. The overbearing presence of visual media (i.e., magnetic resonance imaging, computed tomography, angiographic studies) further gave rise to particular forms of interactions with patients and physicians where the 'image able' (i.e., the image on the screen) became the 'imaginable' (i.e., the metaphor). Furthermore, It was informed compassion for concrete representations and especially for the patient, these representations redefined an ungraspable situation for visual secret sharing scheme using speech recognition will be

proposed, where a tumor – an object – can so easily affect the organ of their subjectivity, into something comprehensible through the materialistic, often mechanistic actions of most mundane objects [15] Sky Gross, (2011).

Normally for money-producing organization has been traditionally applied by Business concept comes under Knowledge management for aim of maximized and Enhancing operations to rise Emulative advantage and maximize profit. Knowledge management can also have applied for nonprofit such as government and legal boards. It can also be used for improving communication between Staff and higher management. Knowledge management will help to drop a culture of sharing and implement a reward based on performance for its employees. For enabling company to be competitive and profitable in its sector, knowledge management mixing a complex process of regulate the company mission statement with best practice. It also demands to show how knowledge management can effectively be applied to the visual secret sharing scheme using speech recognition. It had a mission to deliver a world class library system, which is easy, obtainable and useful to the people of Singapore [16]Seeman, P. (1999).

It was given an in depth view of the strategies by the world's leading chief executive officers in an attempt to provide guidance to new chief executives of today. Marketing strategies employed by chief executives of today applied to any product for taking decision can help this theory. Uses anecdotal evidence to formulate a number of theories which could be used to compare your company with the best in the world. By this several manipulations and choices can be survived through best strategies and using visual secret sharing scheme using speech recognition will improve [17] George K. Chacko, (1999).

It was understood the facets of the human thought process and apply their results to the creation of machines which "can learn from experience", "understand and speak a natural language", and "assess situations". The visual secret sharing scheme using speech recognition will be used to produce a tool with "Common sense", initially work will be carried out in vision capabilities [18]Seeman, P. et al. (1985).

It can also be seen that by similarity Aware greedy algorithm in which we can see how to determine sub modular function f(S). here greedy algorithm is used for generating unique image subset using greedy algorithm as shown in below algorithm that has been developed by P Zuo, Ya Hua, Y Sun, X Liu [24]: Algorithm: The Similarity aware greedy algorithm.

Input: Sub-modular Function f (), The weighted graph V= {G, L, w}, the remaining energy is $L_{bat.}$
Output: O_k, where k is number of Iteration.
Step1: calculate threshold T_w based on L_{bat};
Step2: Partition graph V using T_w;
Step3: get the number of partition subgraphs b;
Step4: choose u1 arbitrarily;

Step5: R1 ← u1;
Step6: while mod Ri ≤b do
Step7: choose $ui \in argmax_{ui} \in G\ _{Ri} f(Ri \cup \{u1\})$;
Step8: $R_{i+1} \leftarrow R_i \cup \{u1\}$;
Step9: i ← i+1;
Step10: End while

The role of information within management was in a state of dramatic transformation. Managers might grasp and act on the implications of this change if they were to maintain their competitive position both corporately and as individuals. Scenario of Exponential rate can improve Information Technology. But this was only an Built Up of what had Preterit before, It should be understood and used in this light. Much more information similar to managers was now approachable than ever before, particularly here-with the use of electronic databases and networks. A major information of database such as List was provided. Specifically managers, whatever their function, might learnt to take full advantage of the information resources available to them, and do so continuously as part of their management techniques. This Organization will apply the VSS scheme using speech recognition method to develop an information strategy and corporate structure which ensures the fullest use of internal and external resources. [19] Bob N. et al. (1989).

Neologisms took on a life of their own, losing the associations that they were intended to have with other ideas, and shedding their embedment in a body of theory. For a new term to successfully project a meme, its proponent might enthuse a critical mass of early adopters to apply it, and to generate a further round of adopters. Concepts were seldom tracked over time. The visual secret sharing scheme using speech recognition will show that a new term and its associated body of theory require more than publications in top-level journals if they were to have significant impacts on academic research and industry practice [20] Roger Clarke, (2014).

The feature extraction algorithm can be seen by below mention algorithm which summaries one binary feature matrix from each natural image as input say I. Steps 3 to 5 gives feature value of each pixel in the form of block. Here Stabilization process is performed in Steps 6 & 7. Noise will be added in steps 8 to 11 based on given parameter $A_{noise.}$ And last steps i.e. 12 gives output [23].

Algorithm:
Feature Extraction Algorithm (FE):
Algorithm FE ()
Input: I, a, Noise
Output: F
Steps 1: Divide I block into blocks into a x a pixel.
Steps 2: For each block repeat steps 3-11.
Steps 3: $\forall$ x1 $\leq$ x $\leq$ x_a calculate $H^{x,y}$by equation $H^{x,y}=A^{x,y}_R+A^{x,y}_G+A^{x,y}_B$.
Steps 4: calculate M.

Steps 5: $\forall$ x1 $\leq$ x $\leq$ x$_a$ calculate f^{x,y} by equation f^{x,y}= f (H^{x,y}) ={^{1,} H^{x,y}$\geq$M, 0 otherwise.

Steps 6: calculate Q$_s$ by Q$_{s=}$($\forall$ x1 $\leq$ x $\leq$ x$_a$, $\forall$ y1$\leq$y$\leq$y$_a$ f^{x,y}) $-$b^2/2.

Steps 7: randomly select Q$_s$ where f^{x,y}=1 and H$^{x,y=}$ M, let f^{x,y}$<$-0.

Steps 8: calculate Q$_c$ by Q$_c$ = b^2/2 x A$_{noise.}$

Steps 9: randomly select Q$_c$ candidate pixel where f$^{x,y=}$ 1

Steps 10: randomly select Q$_c$ candidate pixel where f^{x,y}= 0

Steps 11: Alter all values of f^{x,y}that were selected in step 9 and 10

Steps 12: Output F.

III CONCLUSION

Visual secret sharing scheme with speech recognition exploit human eyes to decrypt secret image with no computation but highly secure manner. As input will be divided into many visual encrypted parts as share with key as speech also. So the given input image can be divided into secret sharing parts with speech key which can be used in future for encryption. We can use different algorithm technique with speech recognition method for implementation of this encryption technique. This paper suggests sharing information but we would be developing as it is more secure and robustness algorithm for image encryption. This paper exploits the technique of spectrometer also. The proposed scheme declared good security due to encryption with cryptography and speech recognition technique.

IV FUTURE SCOPE

This study will improve security for sharing image and it will also improve E health precision in telemedicine by smart phone or other automatic system. The analysis of Speech Recognition with Visual Secret Sharing Scheme also have effects on face, lip and other parts of the body in an efficient manner and specially on emergency medical situations for best treatment of patients.

Also in normal secret sharing image can be share by different secret key. Now in this scheme image can have secret key as well as speech pattern so for decrypting image they should have encryption key and speech pattern.

In many cases Robot also sense our emotion via radio wave. One of the techniques for this research is Spectrogram; it is a visual representation of spectrum of frequencies of a signal as it varies with time. For recognizing image by speech Spectrogram is also known as voiceprints or sonographs. When data is represented in 3d plot than they called as waterfalls. Spectrogram can be generated by an optical spectrometer. A common format of this is a graph with 2 geometric dimensions: one axis represent time while other frequency. Spectrometer of light may be created directly using optical spectrometer over time. In this we will see band pass filter is also used for analog processing to divide input signal into frequency bands. Creating a spectrometer using FFT is a digital process.

REFERENCES

[1] M. Naor and A. Shamir. Visual cryptography. In Proceedings of Advances in Cryptology (EUROCRYPT 94), volume 950, pages 1–12. LNCS, Springer-Verlag, 1995.

[2] S. Kumar and R. K. Sharma. "Secret image sharing for improving contrast in random grid based visual secret sharing" (Jan 2012), International Journal of Security and its application, volume 1, No.1.

[3] R Klevansand R. Rodman "voice recognition" Artech House, Boston London 1997.

[4] Santosh K.G, Bharti W.G and Pravin.Y "A Review on Speech recognition" (2010). IJCA 0975-8887.

[5] Van Santen, J. (April 1994). "Assignment of segmental duration in text-to-speech synthesis". Computer Speech & Language. **8** (2): 95–128. doi:10.1006/csla.1994.1005.

[6] Cootes. T.F; Taylor. C.J; Cooper. D.H; Graham. J," Active shape models-their training and Application", Computer Vision Image Understanding, Vol. 61, (1995), pp. 38-59.

[7] Wang. S.L; Leung. S.H; Lau. W.H, "lip segmentation by fuzzy clustering incorporating with shape function", Proceedings of IEEE Int. Conf. on Acoustics, Speech and Signal Processing, Vol. 1, Orlando, May 2002, pp. 1077-1080.

[8] Er. M.J; Wu. S; Lu. J; Toh. H.L,"FaceRecognition With Radial Basis Function (RBF) Neural Network", IEEE Trans. neural networks,Vol. 13, no. 3, May 2002, pp. 697-709.

[9] Matthews. L;Cootes. T.F; Bangham. J.A;Cox. S; Harvey. R, "Extraction of Visual feature for lipreading", IEEE Trans. on Pattern Analysis and Machine Intelligence, Vol. 24, no. 2, February 2002, pp. 198-213.

[10] Rabi. G; Lu. S.W, "Visual Speech Recognition By Recurrent Neural Networks", Proceedings of IEEE Int. Conf. on Signal Processing, Canadia, (2001), pp.55-58.

[11] Alan F. et al., (2004), IMAGES, INTERVIEWS AND INTERPRETATIONS: MAKING CONNECTIONS IN VISUAL RESEARCH, in Christopher J. Pole (ed.) Seeing is Believing? Approaches to Visual Research (Studies in Qualitative Methodology, Volume 7) Emerald Group Publishing Limited, pp.105 – 121.

[12] Lindsey C. et al. (2014) "Ethical fashion dimensions: pictorial and auditory depictions through three cultural perspectives", Journal of Fashion Marketing and Management, Vol. 18 Issue: 4, pp.483-506, https://doi.org/10.1108/JFMM-11-2012-0067

[13] Barbara B. S. et al., (1994) "Interpretative Methodology from Art and Literary Criticism: A Humanistic Approach to Advertising Imagery", European Journal of Marketing, Vol. 28 Issue: 8/9, pp.114-132, https://doi.org/10.1108/03090569410067659

[14] Angela M. Cirucci , (2018), Facebook and Unintentional Clarification, in Crystal Abidin , Megan Lindsay Brown (ed.) Micro celebrity Around the Globe, pp.33 – 45

[15] Sky Gross, (2011), A Stone in a Spaghetti Bowl: The Biological and Metaphorical Brain in Neuro-Oncology, in Martyn Pickersgill, Ira Van Keulen (ed.) Sociological Reflections on the Neurosciences (Advances in Medical Sociology, Volume 13) Emerald Group Publishing Limited, pp.99 – 119

[16] Seeman, P. (1999), A Prescription for Knowledge Management: What Hoffmann-Laroche's case can teach other available at www.businessinnovation.ey.com/journal/issue1/features/apresc/body.html (accessed 14 September 1999). [Google Scholar]

[17] George K. Chacko, (1999) "Survival strategies of high-tech corporations: applicable insights from executive narratives", Asia Pacific Journal of Marketing and Logistics, Vol. 11 Issue: 2/3, pp.1-312, https://doi.org/10.1108/13555859910764606

[18] Seeman, P.et al.,(1985) "Contemporary Cybernetics", Kybernetes, Vol. 14 Issue: 3, pp.139-149, https://doi.org/10.1108/eb005711

[19] Bob N. et al. (1989) "Information: The Key to Effective Management", Library Management, Vol. 10 Issue: 2/3, pp.2-55, https://doi.org/10.1108/EUM0000000000817

[20] Roger Clarke, (2014) "Persona missing, feared drowned: the digital persona concept, two decades later", Information Technology & People, Vol. 27 Issue: 2, pp.182-207, https://doi.org/10.1108/ITP-04-2013-0073

[21] Van Santen, J. (April 1994). "Assignment of segmental duration in text-to-speech synthesis". Computer Speech & Language. 8 (2): 95–128. doi:10.1006/csla.1994.1005.

[22] Mohammad H. Mahoor, Mohamed Adbel-Mottaleb, A-Nasser Ansari Published in Journal of Multimedia 2006. DOI: 10.4304/jmm.1.4.21-28.

[23] K-H. Lee et al (January 2014) ."Digital Image Sharing by Diverse Image Media, IEEE TRANSACTIONS ON INFORMATION FORENSICS AND SECURITY, VOL. 9, NO. 1, JANUARY 2014 pp. 88-98.

[24] P Zuo, Y sun, J Wu, S Cao Et. (January 2019) "Bandwidth and Energy Efficient Image Sharing for Situation Awareness in Disaster" IEEE Vol. 30 No. 1 pp 15-28.