ISSN NO. 2320-5407

Journal homepage: http://www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH

RESEARCH ARTICLE

National Symposium On Emerging Trends In Computing & Informatics, NSETCI 2016, 12th July 2016, Rajagiri School of Engineering & Technology, Cochin, India

RETRIEVAL OF VISUAL INFORMATION IN MULTIMEDIA SENSOR NETWORK BY ENTROPY CORRELATION COEFFICIENT METHOD

Subhash S[1], Gururaj H L[2] and Ramesh B[3].

1. PG Student, Dept of CSE, MCE, HASSAN, INDIA.
2. Asst. Professor, CSE, MCE, HASSAN, INDIA.
3. *Professor, CSE, MCE, HASSAN, INDIA.*

Manuscript Info

Key words:
source image entropy,
mutual Information,
joint entropy,
ECC,
SIFT.

Abstract

The Wireless Multimedia Sensor Network comprises cameras at the sensor hub in visual information application. These camera sensor gadgets catch their perceptions restricted by the FoV as a picture. There is a connection between's pictures caught by various cameras at a specific territory. This prompts the excess information transmission in the system. As the sensor hub are battery fueled and asset constrained. Subsequently these panic assets ought to be utilized proficiently. This paper concentrates on execution of entropy relationship coefficient model in WMSN for visual information. The usage of entropy, joint entropy and common data is performed to appraise an ECC which portrays relationship attributes of pictures saw by camera with covered detecting territory. Filter calculation is utilized to play out the blending operations between two pictures. Utilizing the RANSAC calculation components are coordinated and the homography between two pictures are found. The outcomes got fulfills the connection amongst ECC and Joint entropy.

Introduction:-

A creating design for the recuperation of video streams, still pictures and distinguishing information from the including environment is the WMSN. A WMSN has broad assortment of employments, for instance, video observation, characteristic checking, and cutting edge strategy control. Appeared differently in relation to the scalar data from remote sensor arranges, the sight and sound sensor framework should transmit their data with certain nature of organization. The imperativeness usage, transmission limit and confined taking care of capacities existing with sensor center points are basic parameters to be considered. Thusly WMSN requires more personality boggling data weight methodology for diminishing the use of imperativeness and information transmission by the sensor center point. Among the WMSN data, visual information is the most telling part. Camera gives picture which is associated clearly to the field of point of view that is obliged by distinguishing bearing. A video separating technique in light of association is proposed in [4], yet this is used for two sensors which don't fluctuate little. In like manner this strategy controls the amount of sensors to two. Thusly the get ready of more than two sensors in WMSN for visual information is the issue. In this setting, the paper shows the use of relationship characteristics of pictures secured by the cameras. In perspective of the association qualities of pictures the photo mosaicing methodology is done to remove the dull data among the photos besides give picture weight.

Single camera passed on in a field can cover only a confined recognition which is dependent on its point of view. In the field if the required application needs the reach to be watched and to the sink more important than that of single

camera FoV, then there exists lost information in the transmission. As the entire field is of incomprehensible when appeared differently in relation to the single camera field of point of view, multiple cameras are joined in the WMSN field for visual information recuperation. Therefore the Wireless Multimedia Sensor Network contains generous number cameras, sent in a field is as showed up in Figure 1.1. It can be seen that there are few picked range which are application subordinate. With the described scope of interest cameras covering the locale are sent their observations to the sink..

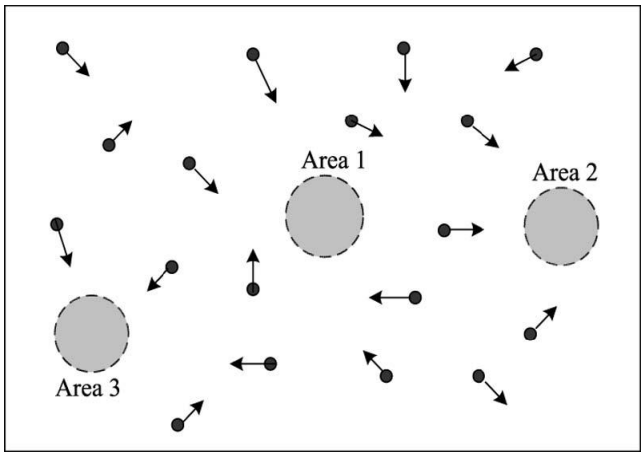


Fig 1.1: WMSN with cameras and areas of interest

Camera sensor center discernments are liable to their field of viewpoint. The Field of View is addressed as a section. Figure 1.2(a) exhibits the camera FoV in which camera point is connoted as P. The identifying breadth is addressed as V. α is the adjusted point between the recognizing course and a scope of the part. Cameras can specify its target actuality inside its Field of View in a manner of speaking.

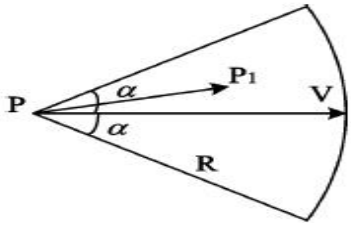


Fig 1.2: (a) camera Field of View

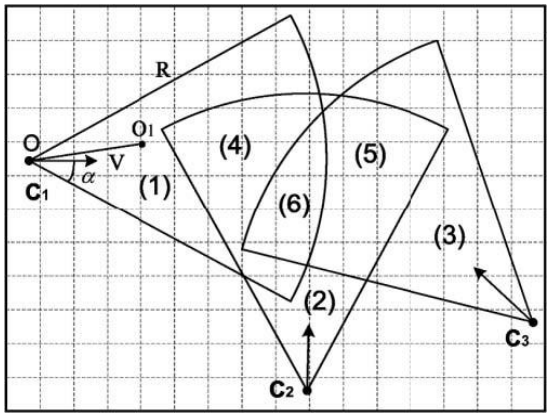


Fig 1.2: (b) Overlapped Field of View

In the field even with extent showed and selecting only the cameras which cover that domain, association between's camera exists. This is in light of the fact that the adjacent camera center points generally speaking shows irregular measures of relationship. This results in data redundancy in the visual information grabbed by the framework.

Camera recognizes a 3-D scene and endeavors it as 2-D picture. The secured FoV for three cameras is as showed up in Figure 1.2(b). It can be watched that all the three cameras are identified with each other. The discernments made by cameras with secured FoV results a secured picture. This translates there exists relationship between's the photos secured by the cameras with secured FoV's. This relationship between's photos addresses the measure of overabundance between the watched pictures from the camera.

In this way with a particular finished objective to abstain from the overabundance in picture SIFT based picture mosaic method is associated. Exactly when the amount of pictures are two this procedure can be associated in a straightforwardness way. Inconvenience rises when number of pictures to be consolidated are more than two. Moreover the case with the progression known SIFT can be on and on associated with join the photos. Nevertheless, when the course of action is dark and this gets the chance to be troublesome. Subsequently to pick which pictures to be used for mixing technique is gotten from the Entropy Correlation Coefficient Model. In this way the out happen to the undertaking gives the response for abundance ejection for the example of different pictures, gained from a WMSN camera discernments.

Related work:-

Cameras utilized as a part of the WMSN for visual Information give their perceptions as a 2-D picture. The preparing at the group head for the expulsion of repetition in the pictures is performed. As the procedure is done on mages the nuts and bolts of picture handling must be managed. The mix of the sensor system and picture handling field is executed in this exposition. In this bearing in the main period of the exposition an incomprehensible audit of literary works accessible in the territory of Wireless Multimedia Sensor Network and picture handling connected to the therapeutic pictures has been directed.

Pu wang et al. [2] have proposed an information theoretic picture weight model with an objective to help the general weight of the visual data accumulated in a WMSN. The work includes an entropy-based uniqueness measure (EDM) plan to gage the viability of weight for the joint coding on the photos assembled by spatially associated cameras. This arrangement consider only the camera course of action as inputs without requiring properties of honest to goodness pictures. The thoughts are exceedingly related to the broadband exploration focus organized use. Hereafter the theoretical thoughts from this work on the spatial association of cameras were gotten for the study on relationship qualities of cameras.
Rui Dai et al.[1] have proposed a speculation of spatial association model for visual data in WMSNs. With the help of camera distinguishing strategy and its utilization, a spatial relationship limit is obtained to delineate the association characteristics of visual data saw by cameras with secured field of points of view. In this paper the Joint effect of various related cameras and an entropy-based structure to gage the measure of visual data gave by different cameras in the framework is delivered by relationship demonstrate the camera determination count is similarly arranged.

Devarajan et al.[5] have proposed appropriated estimation for camera change with the customized, external, metric arrangement of an arrangement of cameras with no united processor. With eagerness for calculation of association considering cameras, estimation of each cameras focal length, territory and recognizing bearing in a framework is a certain necessity. Hereafter the study within and outside parameter is expelled from this paper.

Wu et al.[?] have proposed a group arranged picture coding and transmission plan to minimize the effort for data transmission. In this paper Size planning strategy to coarsely enroll pictures for finding most prominent spread to abuse the spatial association between's photos got from near to sensors is presented. A lightweight and successful establishment subtraction technique is used to perceive centers in this suggestion. Simply the ranges of target and their spatial territories are transmitted to the checking center. From this paper study on Spatial and transient relationship is performed.

Wiegand et al.[6] have proposed an a graph of the specific characters of H.264/AVC, Based on examination of video coding advancement is done considering this paper.

Wu et.al [7] have proposed a procedure for compelling weight and transmission of pictures in a benefit obliged multinodes remote framework. This can be refined by scattering the workload of pressing a photo over various bordering sensor devices. In this manner, these plans don't examine the association of the watched pictures among bordering sensors. This paper gives study on the abutting center points and multihop correspondence in WMSN's.

Wang et.al [8] have used assistant equivalence as an alternative convincing strategy for the framework of picture quality measures. In this paper the standard approach for picture quality evaluation considering affectability of screw up was completed to show its limitations. Major thoughts on picture quality measure was examined from this paper.

Puri et al.[9] have proposed the measures of lossy appropriated weight from multiuser information theory for PRISM which is a video coding. Precious stone enables trade of the computationally expensive video encoder development look module to the video decoder. In this arrangement passed on video coding was proposed to abuse the abutting layout relationship. Notwithstanding, the exactness was not get for association technique among resulting video diagrams, it prompts compelled encoding capability of circled video coding. Casing touching was thought about to difference it and the camera center point continuity.

Pluim et al.[10] have proposed an a portrayal of entropy and shared information for the application in therapeutic field. The paper presents the verifiable background of Entropy, Joint Histogram and shared information. With the history presented, the paper depicts the utilization of these stray pieces for picture enlistment based shared information for remedial pictures. The possibility of regular information, Entropy and joint Entropy associated for picture is used to for the utilization of individual source Entropy, Mutual information and Joint Entropy of camera pictures.

Studholme et al.[11] have made robotized 3D multi-system therapeutic picture course of action. This system is basically depend on upon entropy. In this application where misalignment can be significant concerning the imaged field of point of view, invariance to cover estimations is a basic thought. Current entropy measures are explored and an institutionalized measure is proposed which is basically the extent of the entire of the fringe entropies and the joint entropy. This paper gives the information about the institutionalized association coefficient termed in like manner as Entropy Correlation Coefficient. This Entropy Correlation Coefficient shapes the root work of this composition.

Manjunath et al.[?] have proposed the usage of Gabor wavelet highlights for surface examination and give an exhaustive trial appraisal. Connections with other multi-determination surface characters using the Brodatz piece database demonstrate that the Gabor characters give the best case recuperation exactness. This paper basically deals on the photo get ready system and particularly using surface information for skimming and recuperation of tremendous picture data. The idea for utilization of highlight based distinguishing proof for the endeavor is isolated from this paper.

Jain [12] has proposed a substitute figuring's for gathering. Different leveled gathering portrayed in this paper as min-linkage or full-linkage or ordinary linkage is inspected. The relationship coefficient between one get-together and another social affair can be gotten. The different leveled packing arrangement exhibits the merged pictures as a representation the gathering structure. In the endeavor to gain the relationship between's on picture and alternate different leveled grouping is performed.

A.Annis Fathimaa et al.[13] have proposed an adjusted kind of SIFT computation for picture sewing. This methodology is completed using reliable minutes merged with SIFT characteristics is shown to diminish the time and computational diserse quality. It is watched that solitary a little part of the adjacent perspective pictures are secured. Subsequently, It focuses in recognizing covering part to separate organizing centers. The covering regions are determined using slant based winning edge extraction and invariant minutes. In the finished up territory, the SIFT (Shift Invariant Feature Transform) characters are isolated to choose the organizing components. The enlistment is proceeded with RANSAC (Random Sample Consensus) figuring and last yield mosaic is gotten by misshaping the photos. The proposed approach results in reduced time and computational right when appeared differently in relation to existing strategies. From this paper the SIFT based picture mosaic is removed to complete for the endeavor.

In light of the above review of composed works, this proposition hopes to concentrate on and execute ECC model in WMSN for visual information. The execution of Entropy, Mutual information and Joint Entropy is gotten from strategy proposed in [10].Implementation of association coefficient using the procured entropy and shared information is as given by [11]. Dependent upon the ECC regard two picture joining prepare necessities to happen.

This utilization uses SIFT highlight extraction procedure as given from [13]. The joined work upto this stage is presented in the computation from [1]. The camera decision in perspective of the association coefficient is executed as given by the estimation in [1].

Methodology:-

This section deals about the significance of Joint Entropy and ECC in WMSN for Visual information. If Yi is the covered image transmitted to the sink by a camera sensor Si, then the amount of information gained at the sink is H (Yi). If there is a group of sensor S = S1; S2; ; SN and their transmitted images are Y1;Y2; ;YN to the sink, then the amount of information gained at the sink will be the joint entropy H(Y1;Y2; ;YN). Thus the joint entropy of the images has to be estimated.
Entropy correlation co-efficient model for excess expulsion in WMSN for visual data comprises of the taking after stages.

1. Execution of Entropy, Mutual Information and Joint Entropy connected for two source pictures.

(a) The Shannon source entropy model is actualized for the picture source entropy estimation.
(b) Mutual data as an element of the individual entropy and joint entropy is figured. The idea of joint histogram is utilized to locate the contingent likelihood of the pixel levels in two pictures.
(c) Joint entropy is evaluated as an element of individual picture entropy and shared data.

2. Execution of Entropy relationship co-proficient as an element of individual picture source Entropy and Mutual Information got for two source pictures.

3. Usage of picture mosaic in light of SIFT highlight calculation is actualized.

The procedure includes the accompanying strides:
(a) Implementation of SIFT highlight calculation to separate the Local elements of the two picture.
(b) Implementation to coordinate comparable elements between two pictures.
(c) Implementation of Homography framework utilizing RANSAC calculation.
(d) Based on the homography framework got play out the required change what's more, wrap the two pictures.

4. Execution of Mutual Information and Joint Entropy connected to numerous source pictures which results as a network.

(a) Implement the joint entropy and shared data of all N pictures taking two pictures at once and structure the qualities in the shared data grid and joint entropy network which are of size [NXN].
(b) comparatively process an ECC grid of size [NXN].
(c) Merge two pictures in view of the most connected worth got by ECC framework.
This lessens the estimation of N as N-1.
(d) Repeat the strides 1 2 and 3 for N-1 cycles with the new N esteem came about because of step 4.

5. Execution of connection based camera choice calculation.

(a) Implement the joint entropy and shared data of all N pictures taking two pictures at once and structure the qualities in the common data network and joint entropy lattice which are of size [NXN].
(b) also register an ECC lattice of size [NXN].
(c) Merge two pictures taking into account the slightest corresponded esteem got by ECC framework.
This decreases the estimation of N as N-1.
(d) Decrement the estimation of M.
(e) Repeat the progressions from 1 to 4 till the estimation of M is 1. For reiteration of steps the new estimation of N and M must be considered.

A. Joint Entropy for two images:-

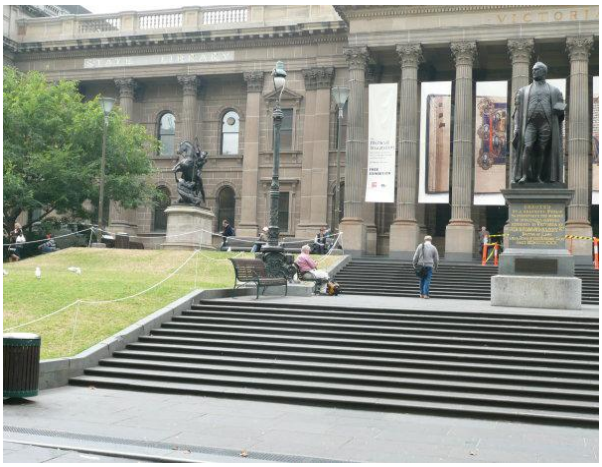
Consider that two camera sensors A and B cover the required area of interest in WMSN. Let each camera captures one image of it field of view, denoted as image A and image B. The measure in the amount of information obtained when a single source is considered (image A from camera A or image B from camera B) in the form of individual entropy will be less when compared to the joint entropy of both the images A and B (both camera observations considered). If the complete seen covered by both the cameras have to be sent to the sink then the joint Entropy of the two images is sent rather than individual entropies. Hence, the joint entropy is more likely to be transmitted instead of single source. For the estimation of joint entropy between two images A and B in WMSN is used.

B. Entropy correlation coefficient (ECC):-

The entropy correlation coefficient (ECC) provides the correlation degree between two images A and B. The value of ECC ranges from zero to unit. When the source A and B are different the value is zero and when the ECC value is unit it indicates that source are same. The increase in the ECC value implies that the two sources are more correlated. The amount of information obtained together by the two images i.e., the Joint Entropy of two images depends on the ECC. If the correlation degree is more between the two images A and B, the joint entropy gained from the two images A and B is less.

C. Implementation:-

(a) Image A



(b) Image B

Table 3.1: Simulation results for two overlapped input images

Figure	Result from the simulation
Individual source Entropy for Image A, H(A)	7.5607
Individual source Entropy for Image B, H(B)	7.7227
Mutual information between image A and image B, I(A,B)	0.2002
Mutual information between image B and image A, I(B,A)	0.2002
Joint entropy matrix, H(A,B)	JE =7:5607 15:0832 15:0832 7:7227
Entropy correlation co-efficient (ECC) matrix	ECC = 1 0:0262 0:0262 1

D. Image feature detection:-

SIFT ALGORITHM

SIFT feature detection consists of four main stages.

Stage 1: Scale-space extrema detection

This stage computes all scales and image locations. By using Difference of- Gaussian function it can be implemented efficiently. which identifies the potential interest points that are invariant to orientation and scale.

Stage 2:. Key point Identification

At each estimated location , a detailed model is fit to determine scale and location. Key points are selected on basis of measures of their stability.

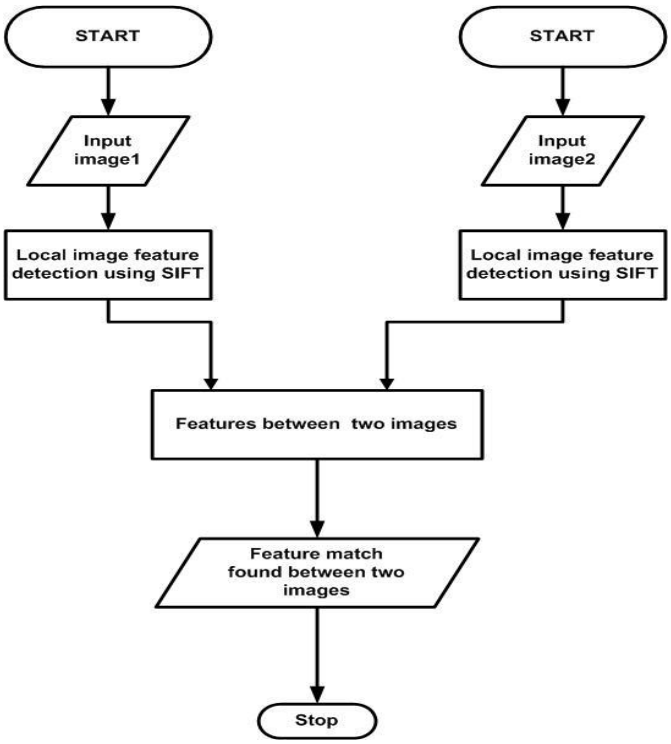
Stage 3: Orientation assignment

Based on local image gradient directions multiple orientations are allocated to each key point. All further operations are performed on image information that has been transformed relative to the assigned scale, orientation, and location for each character, thereby providing constant values to these transformations.

Stage 4: key point descriptors development

After identification of key points, based on scale and orientation, image gradients are measured. These gradients are transformed into a representation which admits significant levels of local change in illumination and shape distortion.

Flowchart for SIFT based match between two images:-



E. Homography using ransac algorithm:-

RANSAC stands for ”RANdom SAmple Consensus”. RANSAC is a robust method to estimate parameters of a mathematical model from a set of observed data which contains outliers by an repetitive process. This method generates a reasonable result only with a certain probability. With this probability the repetition increase is allowed. The algorithm was first developed by Fischler and Bolles at SRI international in 1981. Even though the method is old its robustness has made it useful in many applications. The algorithm is performed for a set of points detected or

pre-computed. In our implementation RANSAC is applied for the points set for the image which are obtained using SIFT feature detection algorithm.

The steps for the RANSAC estimation is as follows:

1. Obtain n points (in this case this value is from the matched features from two images).
2. Initialize the number of points, iterations, threshold inliers.
3. Compute for best fit using random points (fit using 2 random points)
4. Count the inliers, if more than threshold Inliers, refit else iterate
5. Choose the coefficient with the most inliers

Result analysis:-

Figure 4.1(a) and 4.1(b) are the two overlapped input images. The number key points for Figure 4.1(a) is found to be 1400 and for Figure 4.1(b) is 995. The similar features found between Figure 4.1(a) and Figure 4.1(b) is 259. The SIFT match between two images is as shown in Figure 4.2. The transformation is obtained for image B with respect to the image A. This transformation of image is as shown in Figure 4.3(a). The transformation obtained is based on the homography matrix which is as given in Table 4.1. The wrapped image with redundancy removed using the implementation method described so far is as shown in Figure 4.3(b).

Fig 4.1: (a) Image A (b) Image B

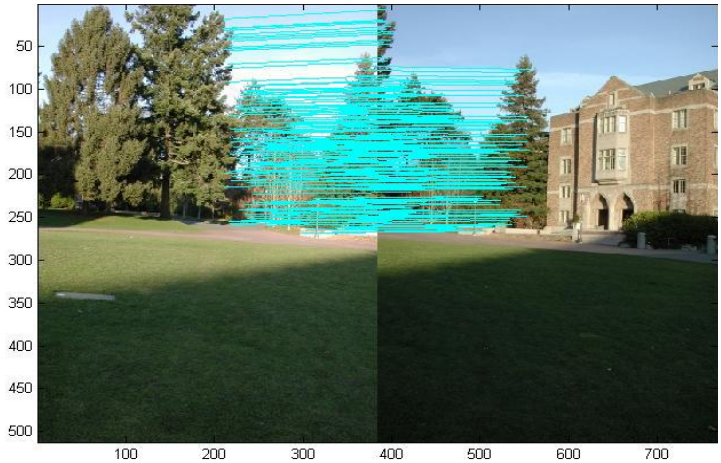


Fig 4.2:SIFT feature matched between two images

Table 4.1: Simulation results for two overlapped input images.

FIGURE	RESULT FROM THE SIMULATION
Key points for image A	1400
Key points for image B	995
Matched key points between two images	259
Homography matrix estimation between two images, H	H=0.8789 0.0212 203.6143 -0.0865 0.9713 10.3302 -0.0003 0.0000 1.0000

(a) Image A transformed with respect to Image B

(b) Mosaiced output image

Fig 4.3: Transformation and Mosaic output.

Conclusion:-

The connection coefficient measures the measure of covered locales between all N pictures. The outcomes give a [NXN] connection framework to N pictures. Joint entropy is utilized to gauge the measure of data got when two pictures are consolidated. For combining process on account of different pictures, SIFT based picture mosaic

strategy is executed. In absolute it can be reasoned that Entropy Correlation Co-effective model for excess evacuation in WMSN for visual information is accomplished.

References:-

1. Dai and Akyildiz, "A spatial connection model for visual data in remote sight and sound sensor systems," IEEE TRANSACTIONS ON MULTIMEDIA, vol. 11, Oct 2009.
2. Dai and Akyildiz, "A spatial connection based picture pressure structure for remote media sensor systems," IEEE TRANSACTIONS ON MULTIMEDIA, vol. 13, April 2011.
3. Lowe, "Particular picture highlights from scale-invariant key points," International Journal of Computer Vision, vol. 60.
4. Ma and Liu, "Relationship based video preparing in video sensor systems," IEEE Int. Conf.Wireless Networks,Communications and Mobile Computing, vol. 2.
5. D. Devarajan, Z. Cheng, and R. J. Radke, "Aligning circulated camera systems," Proc. IEEE, vol. 96, Oct 2008.
6. Wiegand, Sullivan, Bjntegaard, and A. Luthra, "Diagram of the h.264/avc video coding standard," IEEE Trans. Circuits Syst. Video Technol., vol. 13, July 2003.
7. Wu and Abouzeid, "Vitality proficient circulated picture pressure in asset compelled multihop remote systems," ELSEVIER, Computer Communications, vol. 28, Sep 2005.
8. Wang, Bovik, Sheik, and Simoncelli, "Picture quality evaluation: From blunder perceivability to basic closeness," IEEE Trans. Picture Process., vol. 13, April 2004.
9. R. Puri, A. Majumdar, and K. Ramchandran, "Crystal: A video coding worldview with movement estimation at the decoder," IEEE Trans. Picture Process., vol. 16, Oct 2007.
10. Pluim, . Maintz, and Viergever, "Common data based enlistment of restorative pictures: A review," IEEE Trans.Med. Imag., vol. 22, no. 8, 2010.
11. Studholme,. Slope, and Hawkes, "A cover invariant entropy measure of 3d restorative picture arrangement," Pattern Recognition, vol. 32, no. 1.
12. Jain, Murty, and P. J. Flynn, "Information grouping: An audit," ACM Comput. Surv., Sep 1999.
13. A. Fathimaa, R.Karthikb, and V.Vaidehic, "Picture sewing with consolidated minute invariants and filter highlights," Pattern Recognition, vol. 32, no. 1.
14. C. E. Shannon, "A numerical hypothesis of correspondence," The Mathematical Theory of Communication, 1949.
15. R. Szeliski, “Image alignment and stitching,” in JA Tutorial1, Microsoft Re-search, Microsoft Corporation, (http://www.research.microsoft.com), 204.