INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 4.295
(Volume 3, Issue 6)
Available online at www.ijariit.com

A Fast Method to Choose the Reference Frame to Extract Inter- view Redundancy from Multiple Views

Bayyapu Ranjit Reddy
Jawaharlal Nehru Technological University, Anantapur, Andhra Pradesh
ranjitreddib@gmail.com

Dr. Ramana Reddy Patil
Jawaharlal Nehru Technological University, Anantapur, Andhra Pradesh
prrjntu@gmail.com

Abstract: Multi-view video will become one of the most widely used video technology in the future digital video coding. Compression of multiple views to get the advantage of different use cases resulted in a lot of present research. Removal of inter-view redundancy results in the compression of multi-view videos. In this paper, we propose a method to get the relationship between any two views and apply the same relationship to other MacroBlocks prediction. This simplifies the inter-view prediction resulting in better compression by reducing the number of bits used for coding. Quantitative quality is measured by calculating the average PSNR in comparison to standard approaches

Keywords: Multiview, Redundancy, Inter-view, Reference frame, Compression

I. INTRODUCTION

The Advanced Video Coding (H.264/ AVC) standard is widely used in digital video application domains. A multi- view extension, known as Multi- view Video Coding (MVC), has been standardized as an annex to H.264/ AVC. In multi-view video coding, video sequences output from closely placed different cameras corresponding to different views is encoded into one bit-stream. The applications which make use of multi-view video coding are increasing and becoming more popular. So, there is a need for solutions that improve the efficiency and quality of multi-view video coding. Both inter prediction and inter- view prediction use principally the same motion-compensated prediction process. Inter- view reference pictures are fundamentally treated as long-term reference pictures in the different prediction processes.

The proposed methods prove to be improving the speed of prediction by 15% at an ignorable cost of quality. Actual coding of the multiple-views [3-4] can be explored with the standard HEVC or as for how K. Müller et al. proposed in [5].
In [6], K. Müller et al. proposed an intermediate view synthesis based on layer extraction and layer projection. But the direction based inter-view prediction speeds up the compression by at least 20% even when compared to the proposed methods in [7-16].

This paper is organized as follows. Section II describes a novel proposal to choose the reference view after finding a relationship between any two views and extending the same relationship for further predictions. The detailed algorithm steps and MB prediction in the reference view are explained. Experimental results are published in Section III. Conclusion and future scope are covered in Section IV and V respectively

II. PROPOSED METHOD

A relationship is understood from the temporal motions at different views and applied for prediction.

A. Abbreviations and Acronyms

MB: MacroBlock
MVC: Multiview Video Coding
SAD: Sum of Absolute Difference

B. *Algorithm Steps*

1. Store the reference frames 5 each for the current view, left and right camera views. As shown in Fig.1, These reference frames can be stored in the same buffer by ordering the first five frames to be of the current view followed by next five frames from the left camera view and right camera view.
2. Divide the current frame in to MB's. Find the exact match for the Current MB in the reference frames of current camera view, left camera view and right camera view in parallel.
3. If an exact match is found in the left camera's reference frame, attempt the same reference frame for the next sequence of MBs until the SAD crosses a particular threshold. Once the SAD reaches a threshold, repeat the process of bringing the relationship using step2. Fig.2 explains the process of selection of the reference frames.
4. If an exact match is not found in any of the three attempts, mark the MB as Intra.

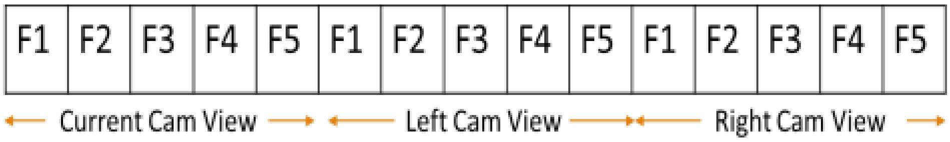
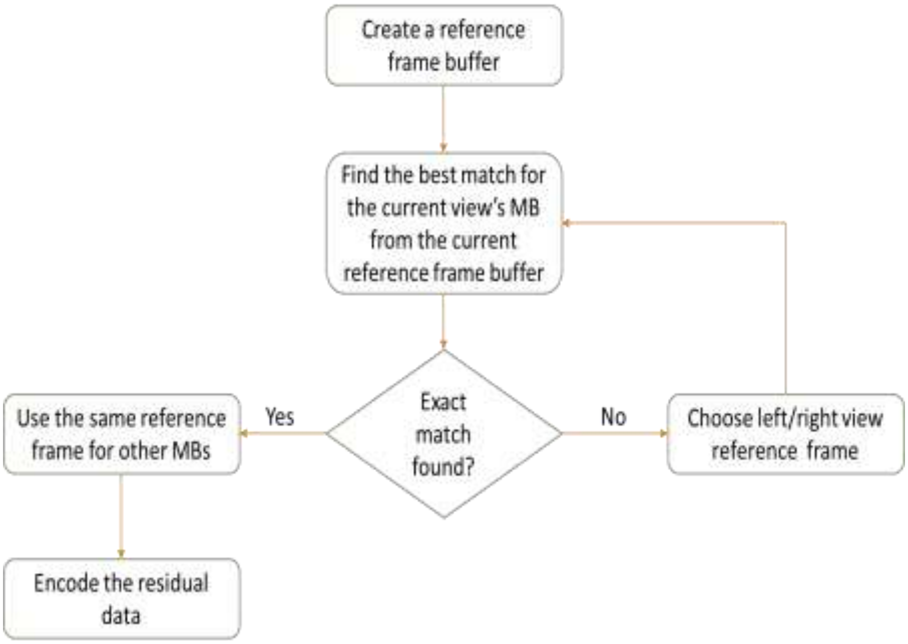


Fig. 1. Reference Frame Buffer



.

Fig. 2. Fowchart for Choosing the Reference Frames

III.EXPERIMENTAL RESULTS

Table.1. Test Sequences Considered for Experimenting

Sequence	Object Motion	Frame Size	Frame Rate (fps)	GOP Length	No. of Frame
Ballroom	Medium	640x480	25	4	250
Flamenco2	Low	640x480	25	4	250

JMVC software is the reference software for the MVC project of the JVT. Among six tools provided by JMVC, this paper uses the encoder, the decoder, and the PSNR tools. The standard JMVC encoder, reference software version 8.5 is used to test the sequences with the same encoder parameters as shown in Table 1 above.

a) **Test inputs**

Considered two sequences for the test purposes. The sequence, Ballroom, and Flamenco2 are medium motion sequences with both of VGA resolution and 250 frames each. 7 views from Ballroom sequence and 4 views from the Flamenco2 sequence are considered as input to the JMVC encoder.

b) **PSNR Comparison**

The experimental results are given in Figure.3 and Figure.4. It is observed that the proposed fast method algorithm is not so better in comparison to the standard mentioned method. But the subjective quality was negligible.

a) **Compression Comparison**

The experimental results are given in Figure.5 and Figure.6. It is observed that the proposed fast method is better and increases the number of frames considered per video sequence.

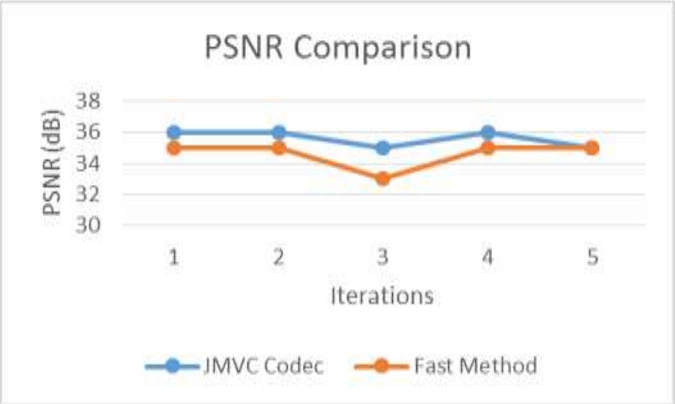


Fig. 3. Ballroom Sequence PSNR Comparison

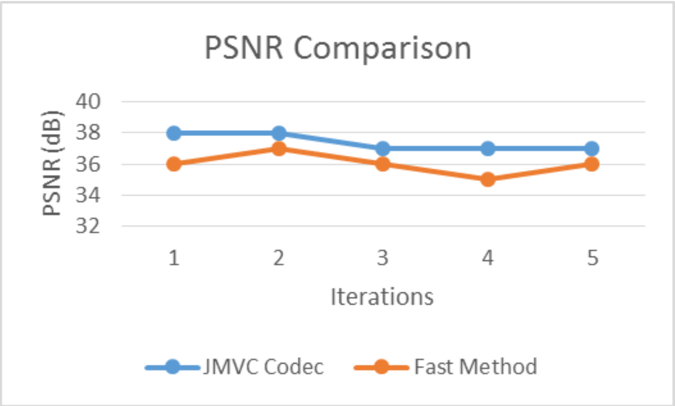


Fig. 4. Flamenco2 Sequence PSNR Comparison

Fig. 5. Ballroom Sequence Compression Comparison

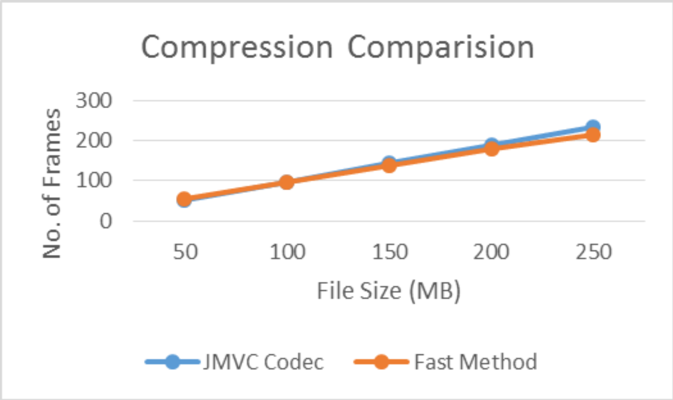


Fig. 6. Flamenco2 Sequence Compression Comparison

IV. CONCLUSION

There are many methods which are successful in extracting the inter-view redundancy but a great extent of research is ongoing to meet the demand of application which needs further compression. The proposed method does a simpler prediction by bringing in the relationship between views and mapping to further predictions. The proposed method is proved to be a better choice for the low to medium motion pictures with a 10% reduction in the number of bytes a file occupies with almost negligible subjective degradation. Our current proposal can be combined with other researches going in the area of faster prediction of multiview video coding.

REFERENCES

1) L. Meesters, W. A. Ijsselsteijn, P. J. H. Seuntiens, A Survey of Perceptual Evaluations and Requirements of Three-dimensional TV, IEEE Tr.On CSVT, vol 14, No 3, pp 381-391, 2004
2) A. J. Woods, D. Offszanka, G. Martin, A PCBased Stereoscopic Video Walkthrough, SPIE Vol 3639, pp 306-312, 1999.
3) J-C. Grossetie, Computer-assisted method and device for restoring three-dimensional images, US Patent 6,621,605. 2003
4) N. Hur, C. Ahn, C. Ahn, Experimental Service of 3DTV Broadcasting Relay in Korea, SPIE vol4864, 2002
5) M. Starks, History of 3DTV, http://www.3dmagic.com/3dtvpicweb/index.htm
6) D. A: Monroe, Virtual Video Conferencing System, US Pat No 6,545,700, 1997. [16] N. Hur, G. Lee, W, You, J. Lee, C. Ahn, An
7) HDTV-Compatible 3DTV Broadcasting System, ETRI Journal, vol 26, No 2, pp. 71-82, 2004.
8) C. Fehn, P. Kauff, M. Op de Beeck, F. Ernst, W. Ijsselsteijn, M. Pollefeys, L. Vangool, E. Ofek, and I. Sexton, “An Evolutionary and Optimised Approach on 3D-TV”, Proc. of IBC 2002, Int.Broadcast Convention, Amsterdam, Netherlands, Sept. 2002.
9) ITU-T Recommendation H.264 & ISO/IEC 14496-10 AVC, “Advanced Video Coding forGeneric Audio-Visual Services”, 2003.
10) T. Motoki, H. Isono, and I. Yuyama, Present Status of Three-dimensional Television Research, Proceedings of IEEE, vol 83, no 7, pp 1009-1021,1995.
11) M. Wojciech and H. Pfister, 3D TV: A Scalable System for Real-Time Acquisition, Transmission and Autostereoscopic Display of Dynamic Scenes, Mitsubishi Electric Research
12) Zisserman, A., Fitzgibbon, A., Cross, G.: VHS to VRML: 3D Graphical Models from Video Sequences. In IEEE International Conference on Multimedia and Systems, Bd. 1, S. 51–57. 1999.
13) D. Vlasic, H. Pfister, S. Molinov, R.Grzeszczuk, W. Matusik, “Opacity Light Fields: Interactive Rendering of Surface Light Fields with View-dependent Opacity”, Proc. of 2003 symposium on Interactive 3D graphics, pp. 65-74, 2003
14) S. Würmlin, E. Lamboray, and M. Gross, “3D video fragments: dynamic point samples for realtime free-viewpoint video”, Computers and Graphics 28 (1), Special Issue on Coding, Compression and Streaming Techniques for 3D and Multimedia Data, pp. 3-14, Elsevier Ltd, 2004.
15) G. Alregib, Y. Altunbasak, J. Rossignac, "Error-resilient transmission of 3D models," ACM Transactions on Graphics (TOG), Volume 24 ,Issue 2, Pages: 182 - 208, April 2005.
16) B. Tari, Y. Yemez, Ö. Özkasap, R. Civanlar, "Progressive View-Dependent Transmission of 3D Models over Lossy Networks", Proceedings, EUSIPCO-2005, Antalya, Sept. 2005.
17) J. Kwon, M. Kim, C. Choi, "Multiview Video Service Framework for 3D Mobile Devices" Intelligent Information Hiding and Multimedia Signal Processing, IIHMSP'08, 15-17 Aug. 2008.
18) A study on the relationship between depth map quality and the overall 3D video quality of experience Banitalebi-Dehkordi, A.; Pourazad, M.T.; Nasiopoulos, P.
19) A transcoding framework with error-resilientvideo/depth rate allocation for mobile 3D videostreaming Yanwei Liu; Song Ci; Hui Tang; Yun Ye Communications (ICC), 2012 IEEE International Conference on Digital Object Identifier: 10.1109/ICC.2012.6363901
20) Publication Year: 2012, Page(s): 2038 - 2042 Cited by Papers (1) IEEE CONFERENCE PUBLICATIONS
21) Stereo video compression for mobile 3D services Merkle, P.; Brust, H. ; Dix, K. ; Müller, K. ; Wiegand, T.
22) Demo paper: Real time 3D video streaming: A mobile approach Zerman, E. ; Akar, G.B.
23) Multimedia and Expo Workshops (ICMEW), 2013 IEEE International Conference on

24) Digital Object Identifier: 10.1109/ICMEW.2013.6618231 Publication Year: 2013, Page(s): 1 – 2 IEEE CONFERENCE PUBLICATIONS
25) Real time streaming of 3D video from embedded platforms to mobile devices Bugdayci, D.; Zerman,E. ; Akar,G.B. Signal Processing and Communications Applications Conference (SIU),2012 20th Digital Object Identifier: 10.1109/SIU.2012.6204802 Publication Year: 2012, Page(s): 1 – 4 IEEE CONFERENCE PUBLICATIONS
26) Adaptive stereoscopic 3D video streaming Gurler, C.Goktug; Bağci, K.T. ; Tekalp, A.M.
27) Image Processing (ICIP), 2010 17th IEEE International Conference on Digital Object Identifier: 10.1109/ICIP.2010.5651035 Publication Year: 2010 , Page(s): 2409 - 2412
28) Cited by: Papers (4) IEEE CONFERENCE PUBLICATIONS
29) A user-driven interactive 3D video streamingtransmission system with low network bandwidth requirements Zhenli Zhou; Li Zhuo ; Jing Zhang ; Xiaoguang Li
30) Advanced Communication Technology (ICACT), 2012 14th International Conference on
31) Publication Year: 2012 , Page(s): 1113 – 1116 IEEE CONFERENCE PUBLICATIONS
32) Peer-to-peer system design for adaptive 3D video streaming Gurler, C.G. ; Tekalp, M. Communications Magazine, IEEE Volume 51 Issue 5
33) Quality of experience for 3D video streaming Hewage, C.T.E.R. ; Martini, M.G. Communications Magazine, IEEE Volume 51 Issue 5
34) Adaptive multiview video streaming: challenges and opportunities Chakareski, J. Communications Magazine, IEEE Volume 51 Issue 5

