Convolutional Neural Network based Fast Intra Mode Prediction for H.266/FVC Video Coding

Ting-Lan Lin*, Kai-Wen Liang+, Jing-Ya Huang+, Yu-Liang Tu+, and Pao-Chi Chang+

*National Taipei University of Technology
1, Sec. 3, Zhongxiao E. Rd.,
Taipei City, 10643, Taiwan
tinglan@ntut.edu.tw

+National Central University
No.300, Jhongda Rd.,
Jhongli Dist., Taoyuan City 32001, Taiwan
{ jyhuang.vaplab, yltu.vaplab, kwistron }@gmail.com
pcchang@ce.ncu.edu.tw

1. Introduction

The next-generation video compression standard H.266/Future Video Coding (FVC) [1] provides high compression efficiency in terms of the cost of computing the optimal intra mode from 67 modes with high complexity. Studies carefully considering the intra mode decision to reduce the computational complexity of intra coding were developed.

2. Proposed method

We propose an intra mode prediction method based on a convolutional neural network (CNN). The CNN architecture comprises two convolutional layers and a fully connected layer. Only 16 × 16 blocks with the deep learning methodology were tested by JEM 7.0 in the simulations [2]. Eighteen video sequences categorized into five classes (A to E) were tested using the Intra_main_10 encoding configuration, and each sequence was encoded 4 times with different quantization parameters (QP) equal to 22, 27, 32, and 37. Compared with the default fast search method doFastSearch in JEM 7.0, the proposed method can achieve averagely a 0.033% decrease in Bjøntegaard delta bit rate (BDBR) with only a slight increase in time. Furthermore, the proposed method gains much improvement achieving a 0.097% decrease in BDBR over the default method when the tested videos are with moderate frame size such as classes B, C, D, E. Figure 1 shows the block diagram of the proposed method.

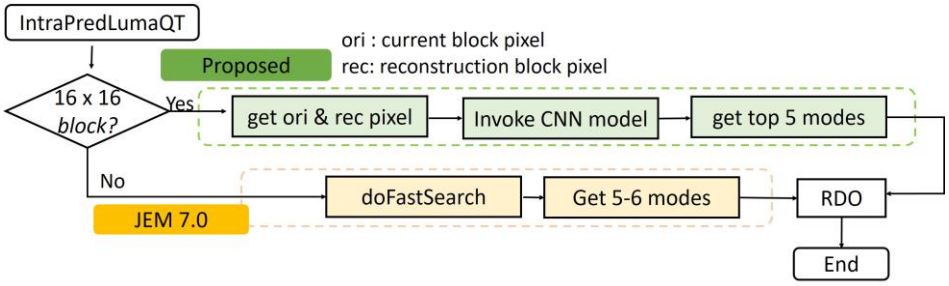

Figure 1: Overview flowchart of proposed method.

References

[1] J. Chen, E. Alshina, G. J. Sullivan, J. R. Ohm, and J. Boyce, "Algorithm description of joint exploration test model 7 (JEM7)," *Joint Video Exploration Team (JVET) of ITU-T SG 16 WP 3 and ISO/IEC JTC 1/SC 29/WG 11 7th Meeting, Doc. JVET-G1001*, 2017.

[2] JEM reference software, https://jvet.hhi.fraunhofer.de/svn/svn_HMJEMSoftware/.

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