

INTRODUCTION

TASK

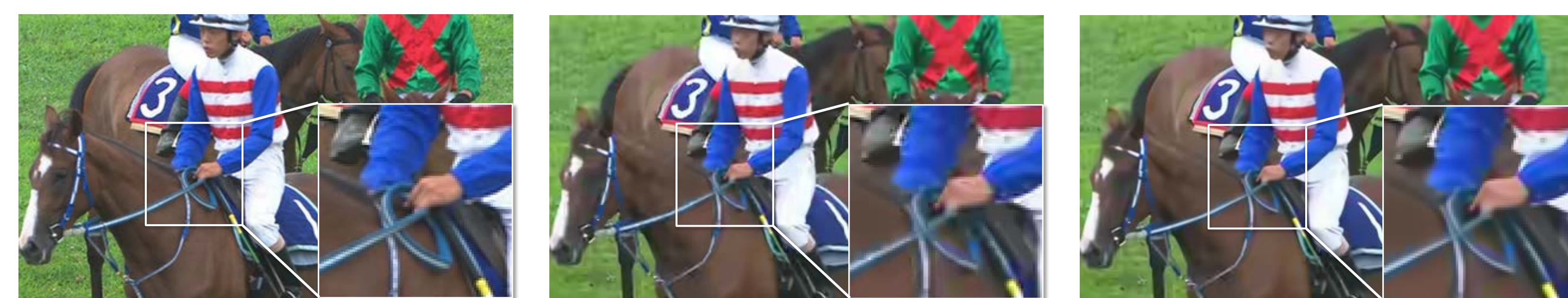


Fig.1 Visual illustration of video frames

- Alleviating *blocking* and *ringing* artifacts derived from coding procedure by deep neural network.

MOTIVATION

Progressive Representative Feature Review

- Progressive refinement by Residual Dense Network^[1]
- Channel dimension compressed at the bottleneck

Hierarchical Side Information

- The coding process is performed block by block with the coding tree unfolding which contains hierarchical side information.

MULTI-SCALE MEAN VALUE OF CU

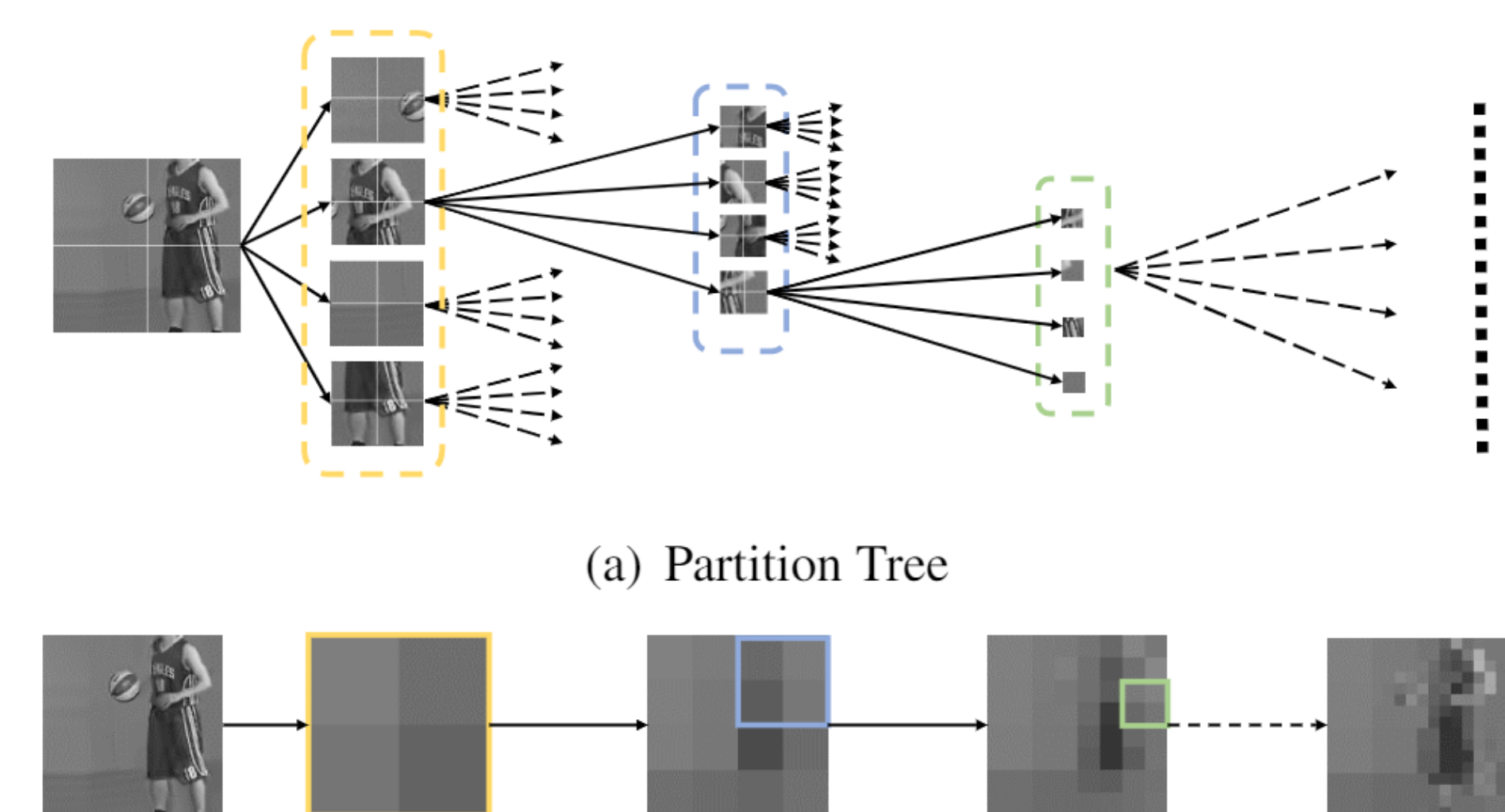


Fig.2 Multi-Scale mean value of CU generation

- Calculate the mean value of a CU (M-CU) each time it has been partitioned
- Coarse-to-fine way recurrent processing for generating the multi-scale mean value of CU.

PROGRESSIVE RETHINKING NETWORK

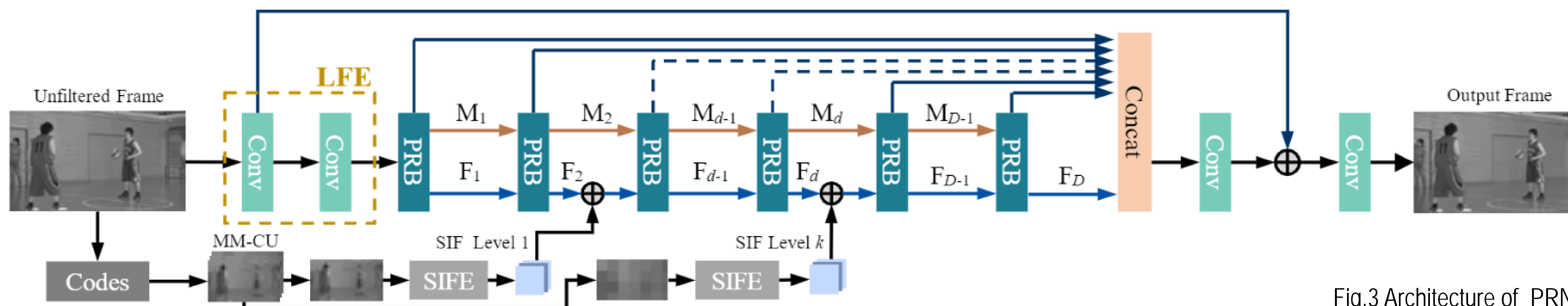


Fig.3 Architecture of PRN

PROGRESSIVE RETHINKING BLOCK

- An inter-block connection is proposed based on RDB.
 - Compensating the information loss at bottleneck

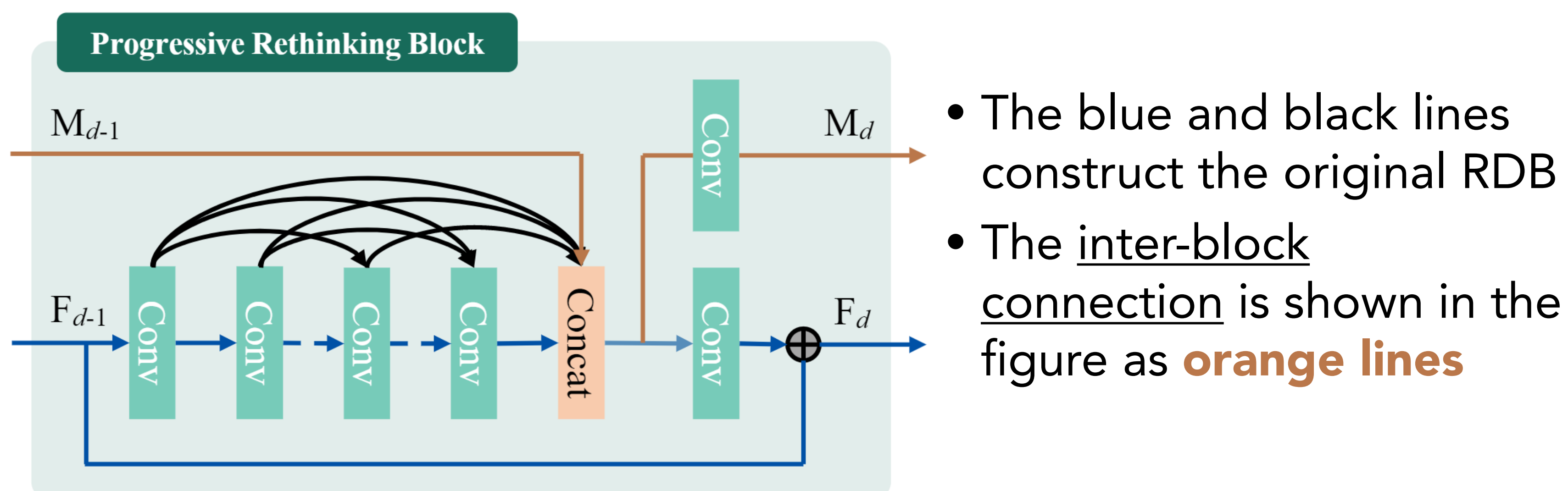


Fig.4 Architecture of PRB

- The blue and black lines construct the original RDB
- The inter-block connection is shown in the figure as **orange lines**

FUSION OF MM-CU

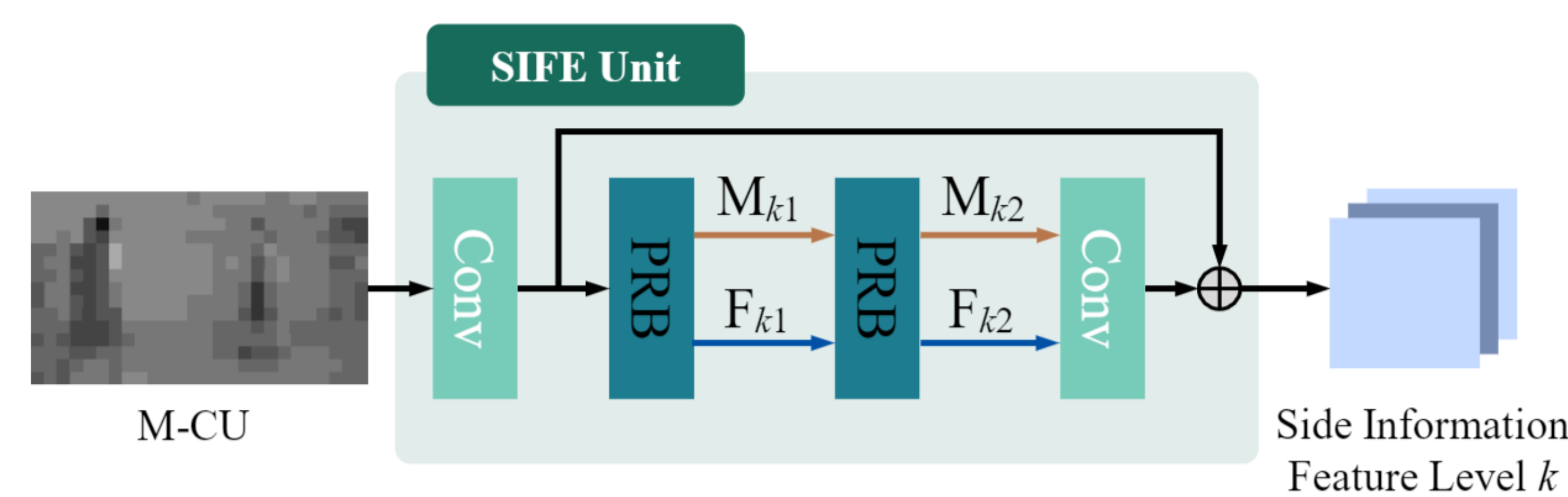


Fig.5 Architecture of SIFE

- Extracting the feature map by a shallow CNN (SIFE Unit)
- Element-wisely adding the feature map to the main branch
 - Feature map of coarser M-CU added to deeper layer

QUANTITATIVE RESULT

- Setting: AI configuration | HM 16.15 | QP=(22, 27, 32, 37)

Table 1 BD-rate results compared to existing methods

CLASS	VRCNN ^[2]	DCAD ^[3]	DRN ^[4]	PRN+M
B	-4.3%	-3.4%	-3.8%	-6.6%
C	-5.0%	-4.6%	-7.5%	-10.7%
D	-5.4%	-5.2%	-7.3%	-9.6%
E	-6.5%	-7.8%	-10.7%	-13.3%
Average	-4.7%	-5.0%	-6.9%	-9.6%

[1] Y. Zhang *et al.*, "Residual dense network for image super-resolution," *CVPR* 2018.
 [2] Y. Dai *et al.*, "A convolutional neural network approach for post-processing in HEVC intra coding," *MMM* 2017.
 [3] T. Wang *et al.*, "A novel deep learning-based method of improving coding efficiency from the decoder-end for HEVC," *DCC* 2017.
 [4] Y. Wang *et al.*, "Dense Residual Convolutional Neural Network based In-Loop Filter for HEVC," *ICIP* 2018

LINKS

- For more details & codes, scan QR code or navigate to <https://github.com/Dezhao-Wang/PRN>

- Interested in our team STRUCT? Navigate to <http://www.wict.pku.edu.cn/struct/struct.html>

