#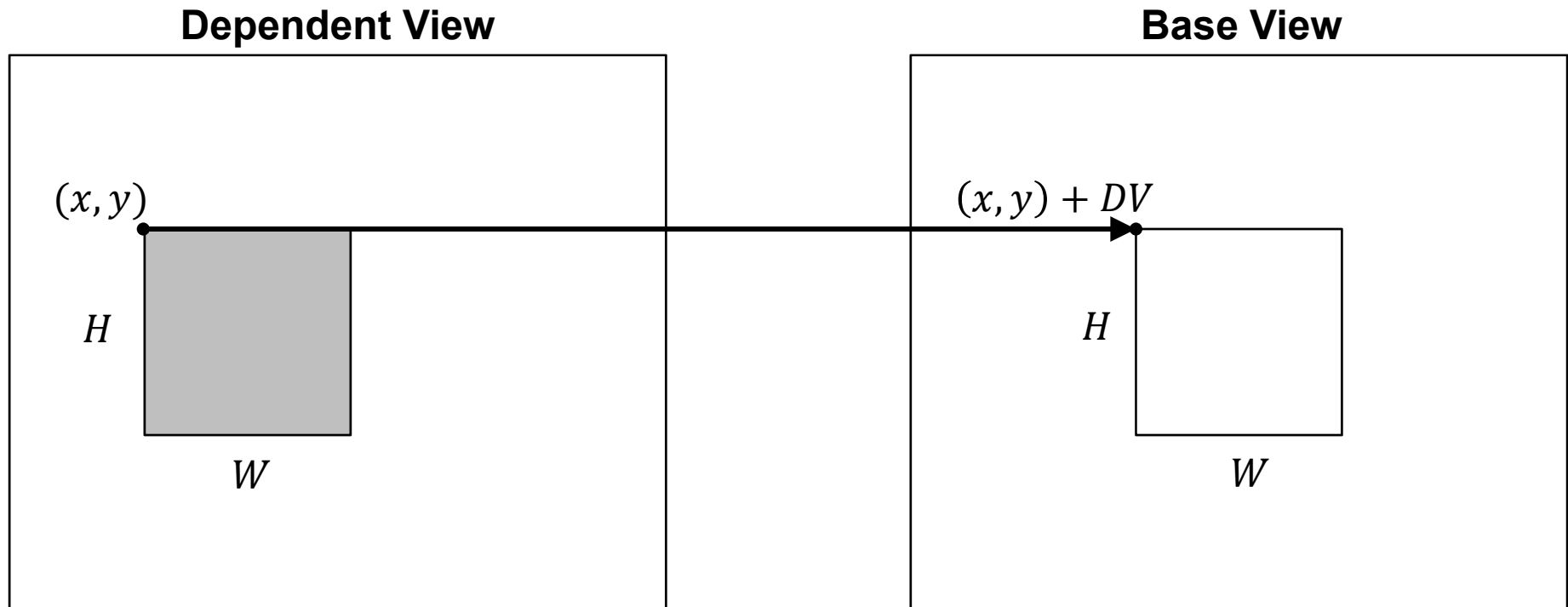 3D-CE5.h related: Inter-view prediction using image deformation characteristics between multi-view images (JCT3V-C0118)

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Introduction

- ## Inter-view Prediction
  - ### Block-based Translational Motion Model

Dependent View

Base View

(x, y)

$(x, y) + DV$

H

W

H

W

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Introduction

- ## Inter-view Image Deformations
  - ### In the rectified multi-view images,
    - #### Walls could be horizontally *scaled*.
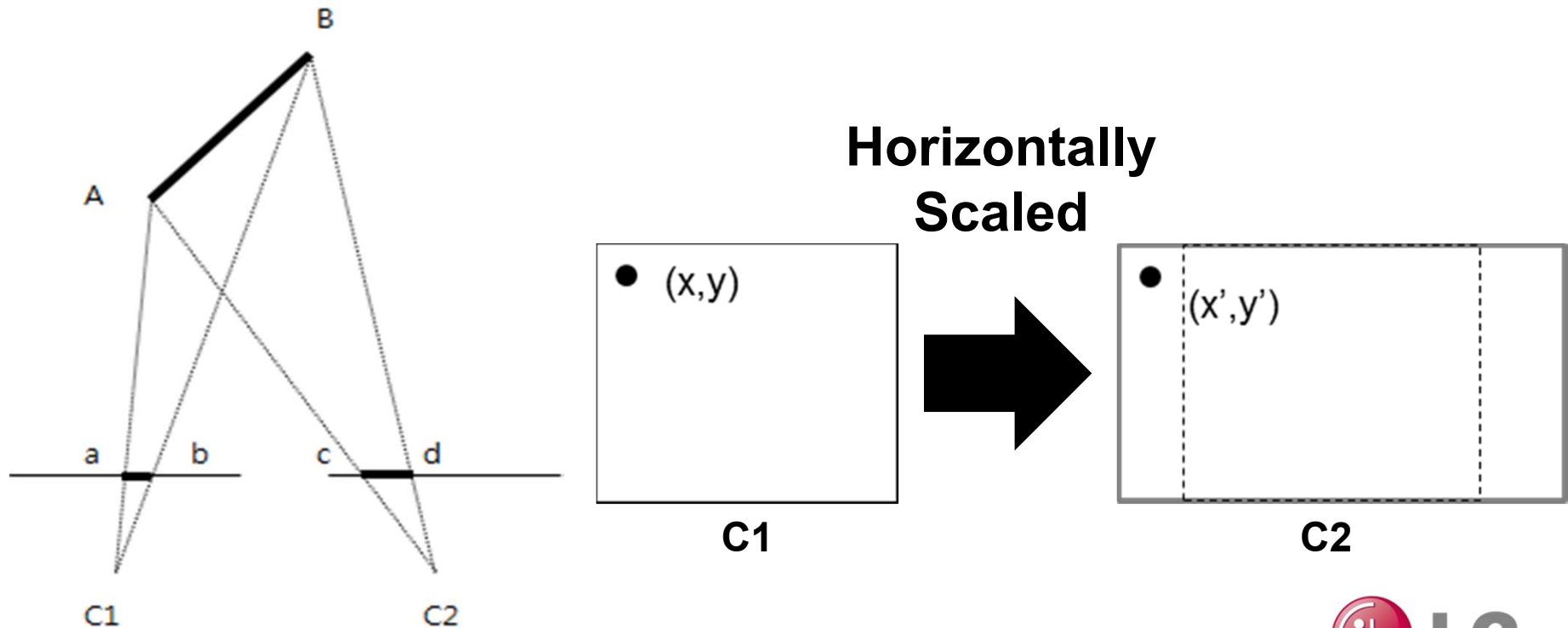
Horizontally Scaled

C1   C2

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Introduction

- ## Inter-view Image Deformations
  - ### In the rectified multi-view images,
    - Floors (ceilings) could be horizontally *sheared*.
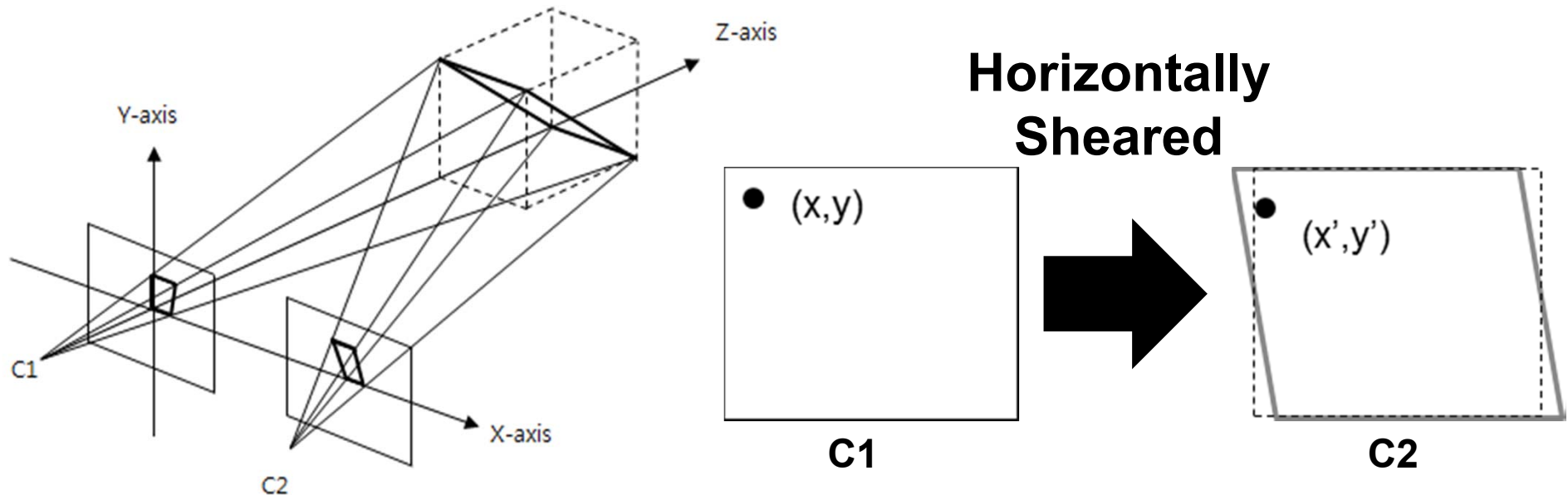
Horizontally Sheared

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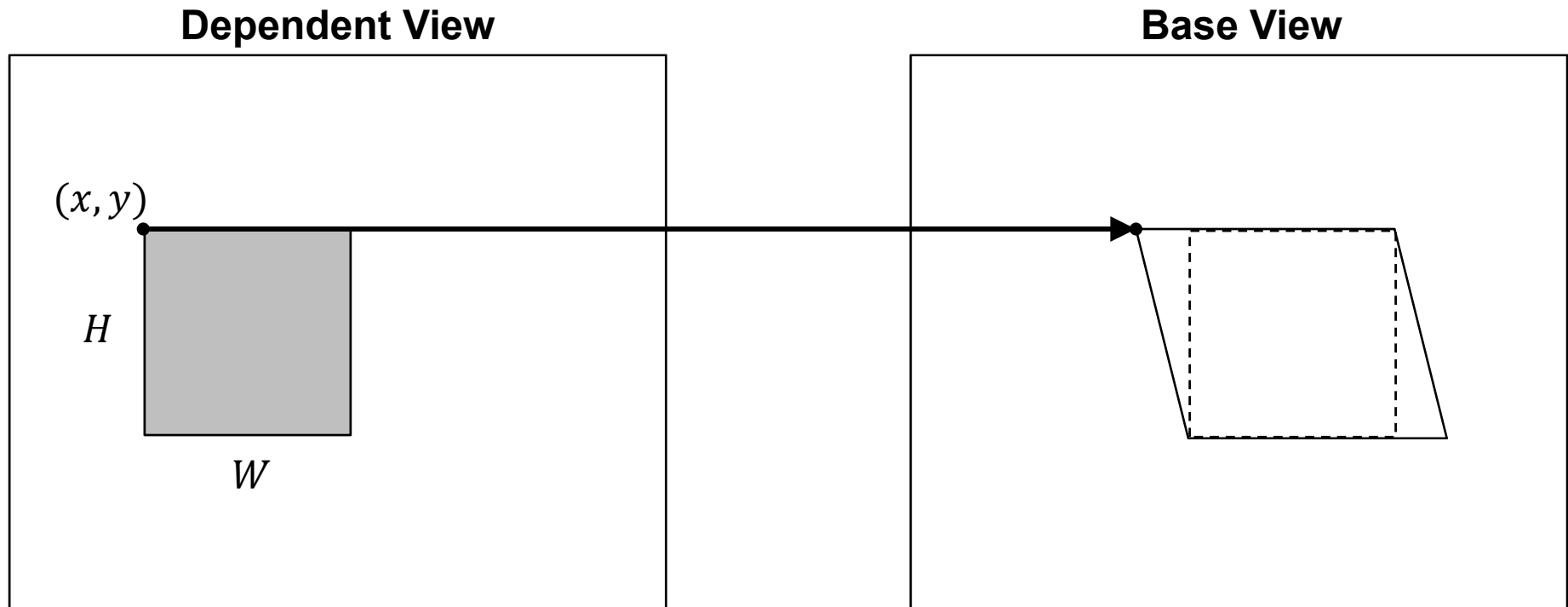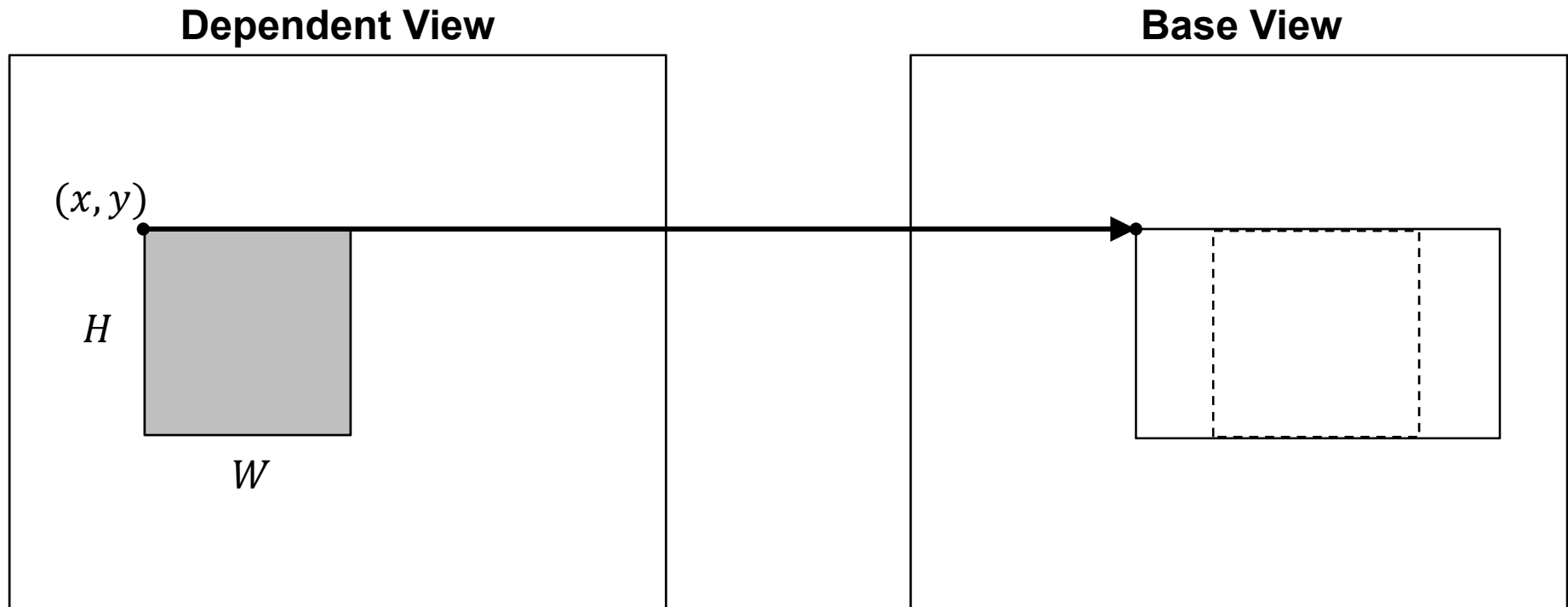
Introduction

- ## Inter-view Image Deformations
  - ### – In the rectified multi-view images,

Dependent View   **Base View**

(x, y)

H

W

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Introduction

- ## Inter-view Image Deformations
  - ## – In the rectified multi-view images,

Dependent View   **Base View**

(x, y)

H

W

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Proposed Method

- **Inter-view Prediction with Image Deformation Information**

    – Add deformation information on the current motion information

    : MV+ RefIdx + <mark>Deformation Information</mark>

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Proposed Method

- ## Inter-view Prediction with Image Deformation Information
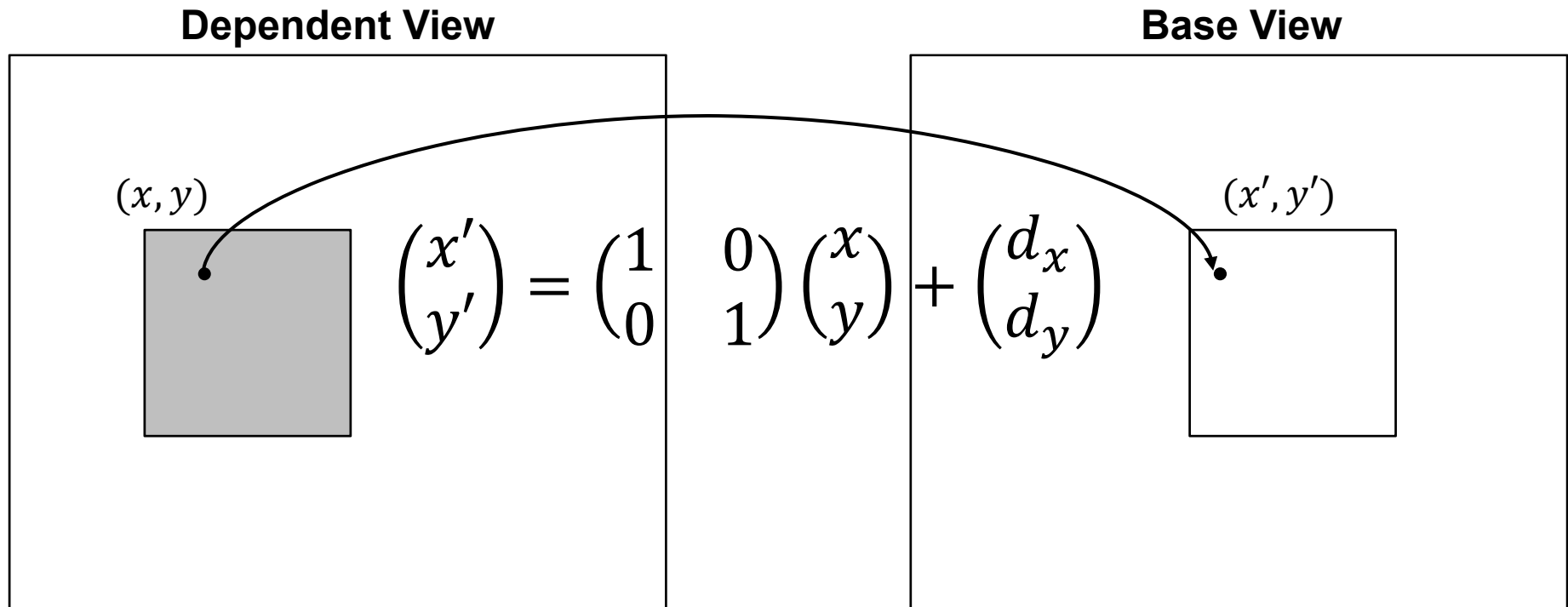
$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} \alpha & \beta \\ 0 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} d_x \\ d_y \end{pmatrix} = \begin{pmatrix} \alpha x + \beta y + d_x \\ y + d_y \end{pmatrix}$$

- (x, y) : **current block pixel,** (x', y') : **reference pixel.**

- (d_x, d_y) : **disparity vector.**

- **α, β represents horizontal scaling and horizontal shearing.**

- **Encoder decision based on RD cost.**
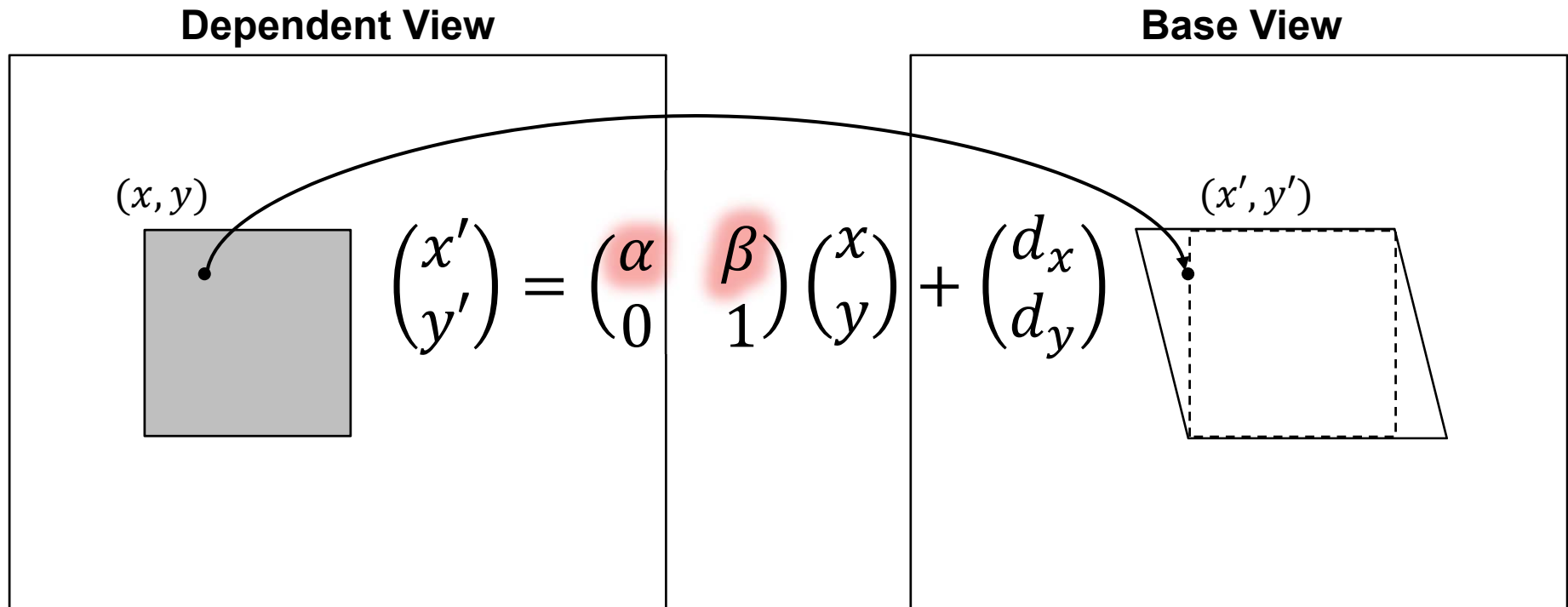
  : Distortion + λ x Rates(motion, α, β)

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Proposed Method

- ## Inter-view Prediction with Image Deformation Information

Dependent View

Base View

(x, y)

(x', y')

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} d_x \\ d_y \end{pmatrix}$$

3D-CE5.h related: Inter-view prediction using image deformation characteristics between multi-view images (JCT3V-C0118)

Proposed Method

- **Inter-view Prediction with Image Deformation Information**

$$\begin{pmatrix} x' \\ y' \end{pmatrix} = \begin{pmatrix} \alpha & \beta \\ 0 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} + \begin{pmatrix} d_x \\ d_y \end{pmatrix}$$

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Simulation Results
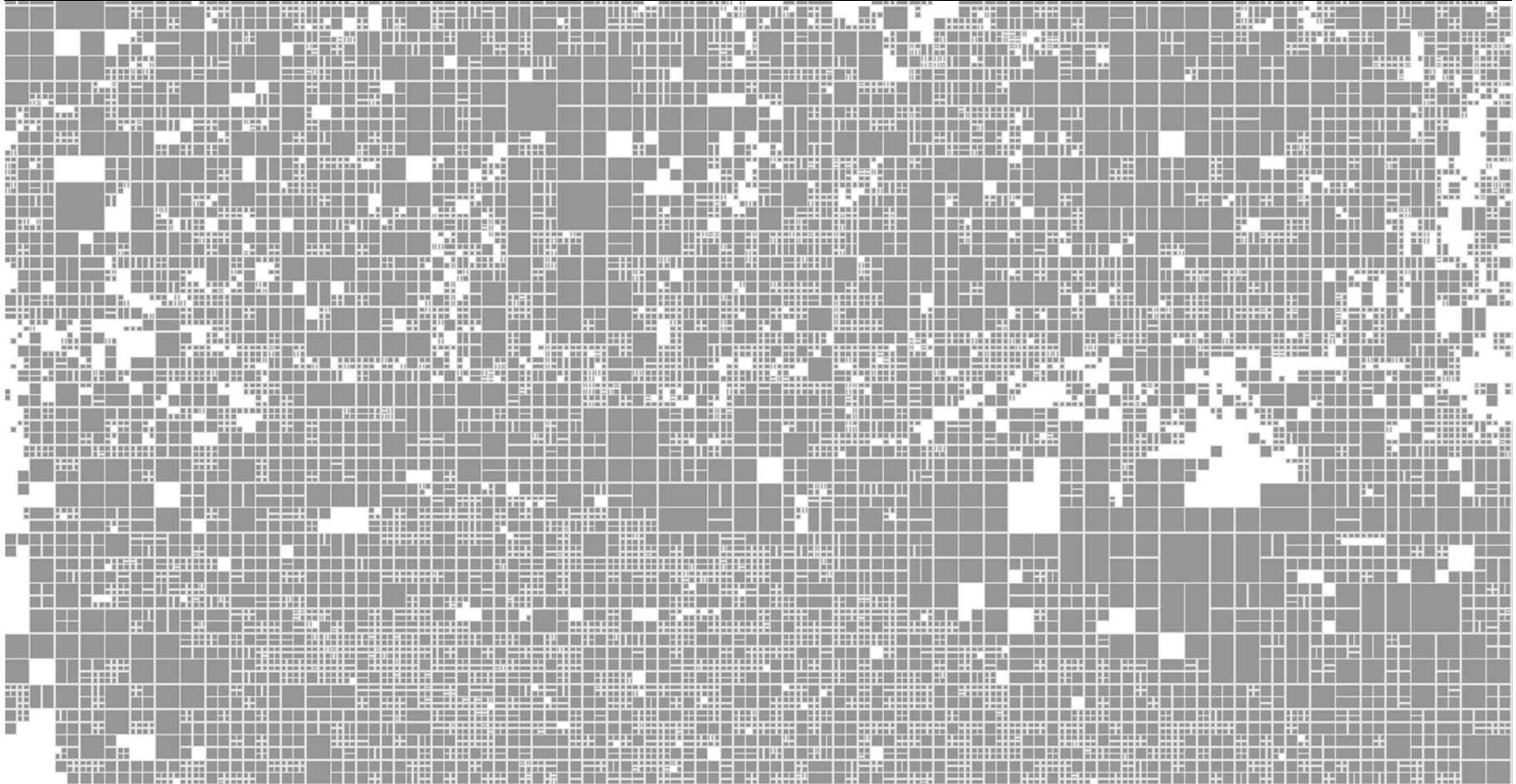
3D-CE5.h related: Inter-view prediction using image deformation characteristics between multi-view images (JCT3V-C0118)

Simulation Results

Poznan Street V1 POC 0 QP25: anchor (12,930 partitions)

3D-CE5.h related: Inter-view prediction using image deformation characteristics between multi-view images (JCT3V-C0118)
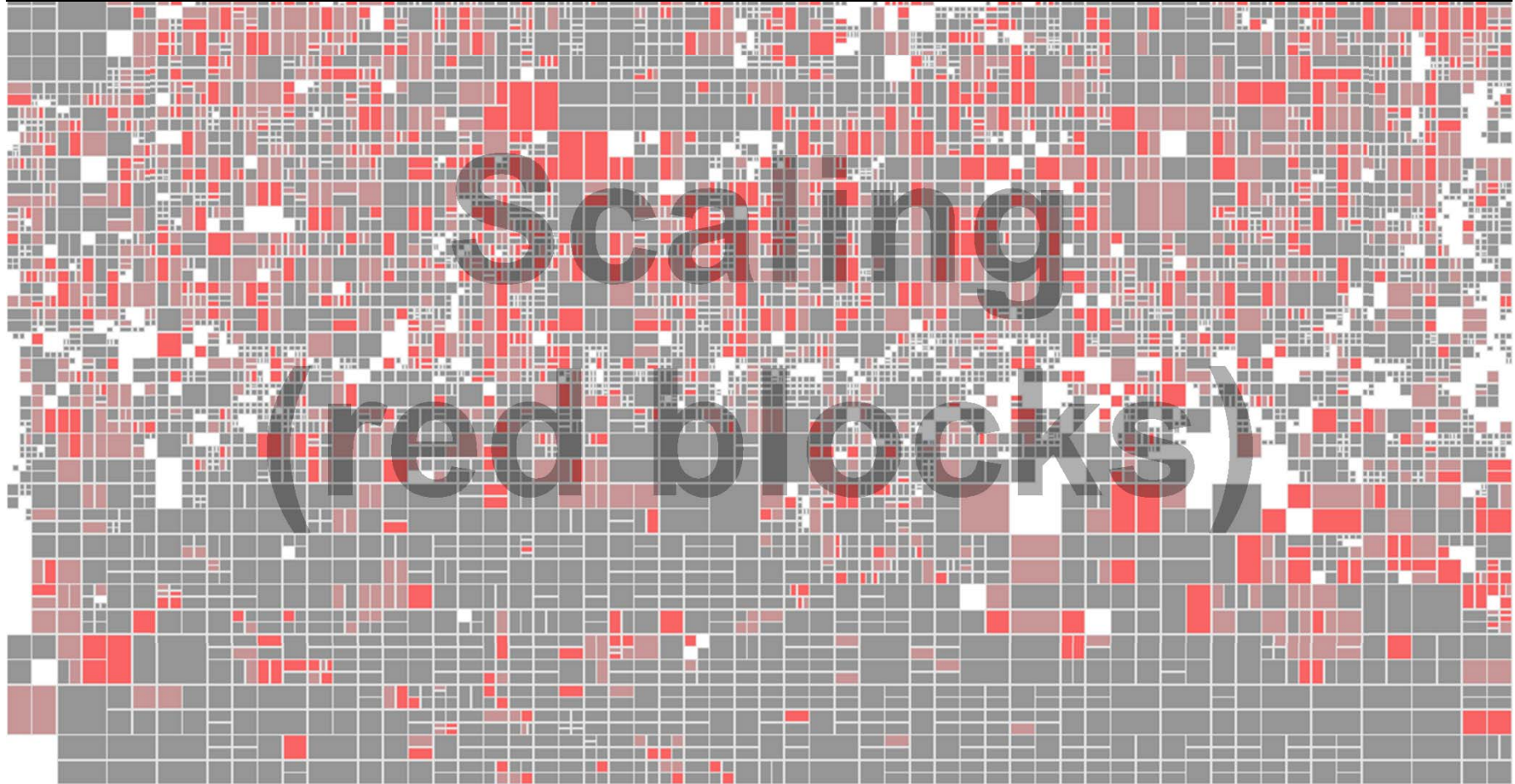
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Simulation Results

Poznan Street V1 POC 0 QP25: proposed method (7,586 partitions)

3D-CE5.h related: Inter-view prediction using image deformation characteristics between multi-view images (JCT3V-C0118)
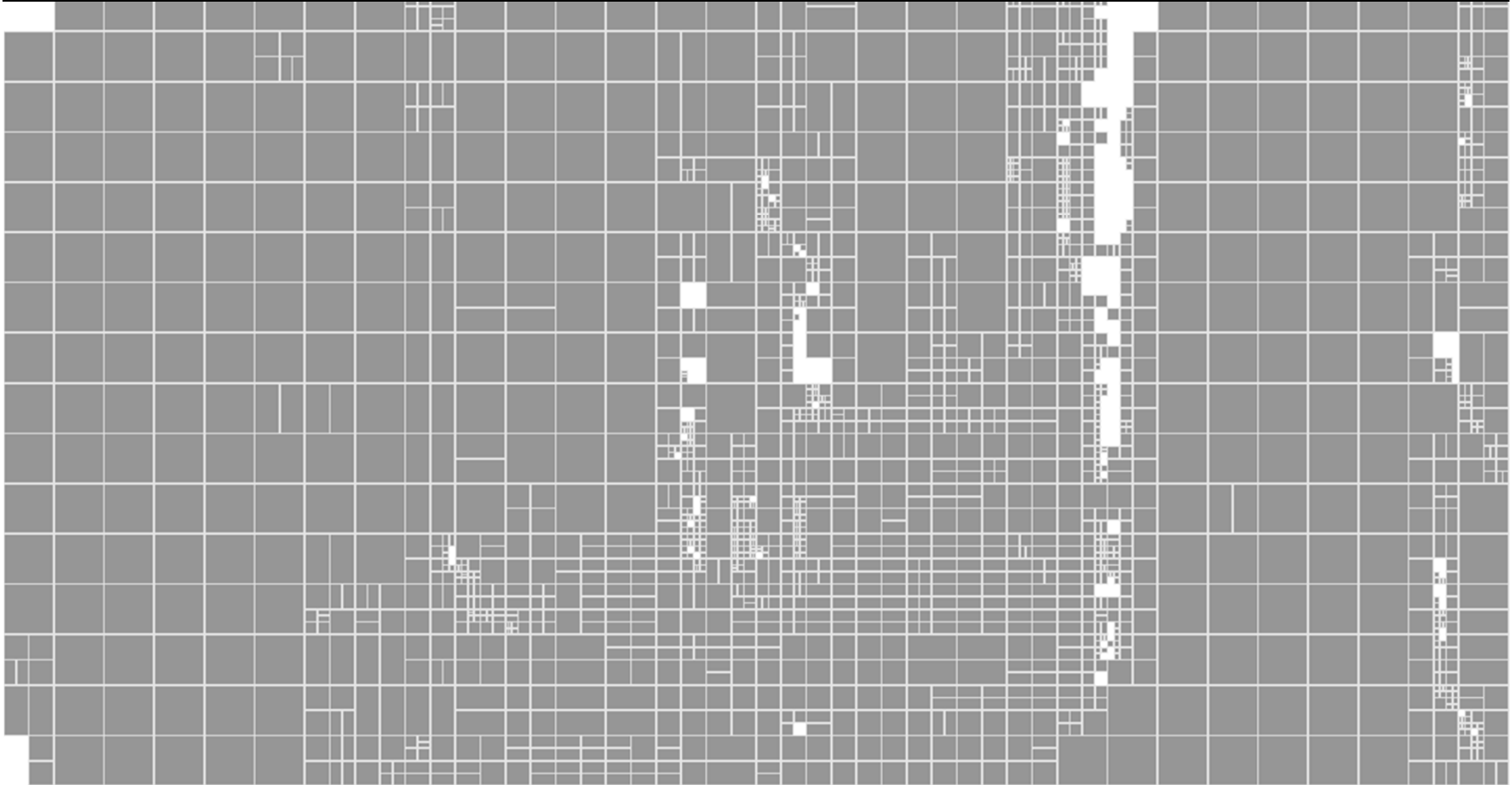
Simulation Results

Poznan Street V1 POC 0 QP25: proposed method (7,586 partitions)

3D-CE5.h related: Inter-view prediction using image deformation characteristics between multi-view images (JCT3V-C0118)

Simulation Results

Undo_Dancer V1 POC 0 QP40 : anchor

3D-CE5.h related: Inter-view prediction using image deformation characteristics between multi-view images (JCT3V-C0118)
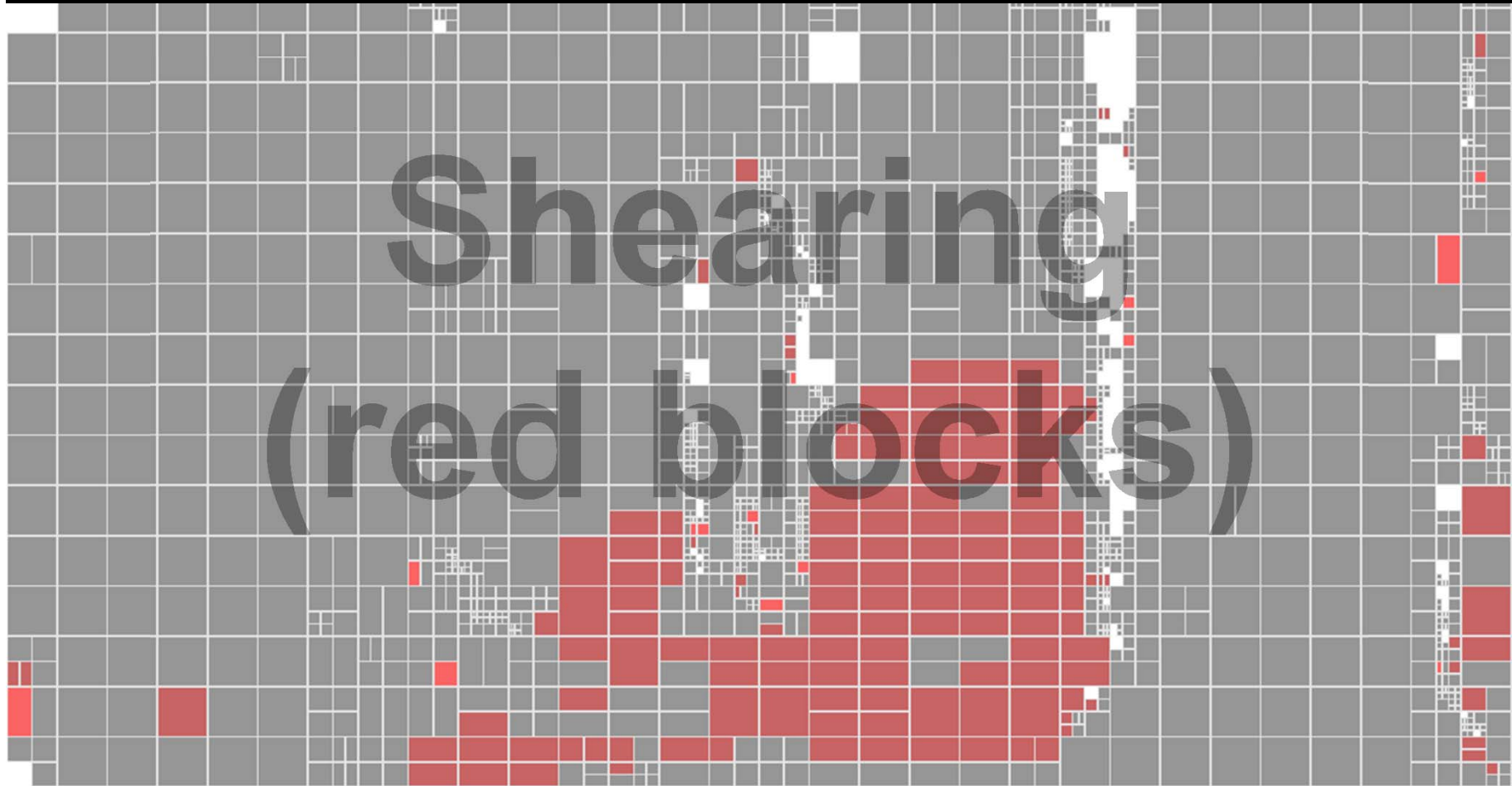
Simulation Results

Undo_Dancer V1 POC 0 QP40 : proposed method

3D-CE5.h related: Inter-view prediction using image deformation characteristics between multi-view images (JCT3V-C0118)

Simulation Results

Poznan_Hall2 V1 POC 0 QP40 : anchor

3D-CE5.h related: Inter-view prediction using image deformation characteristics between multi-view images (JCT3V-C0118)

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Simulation Results
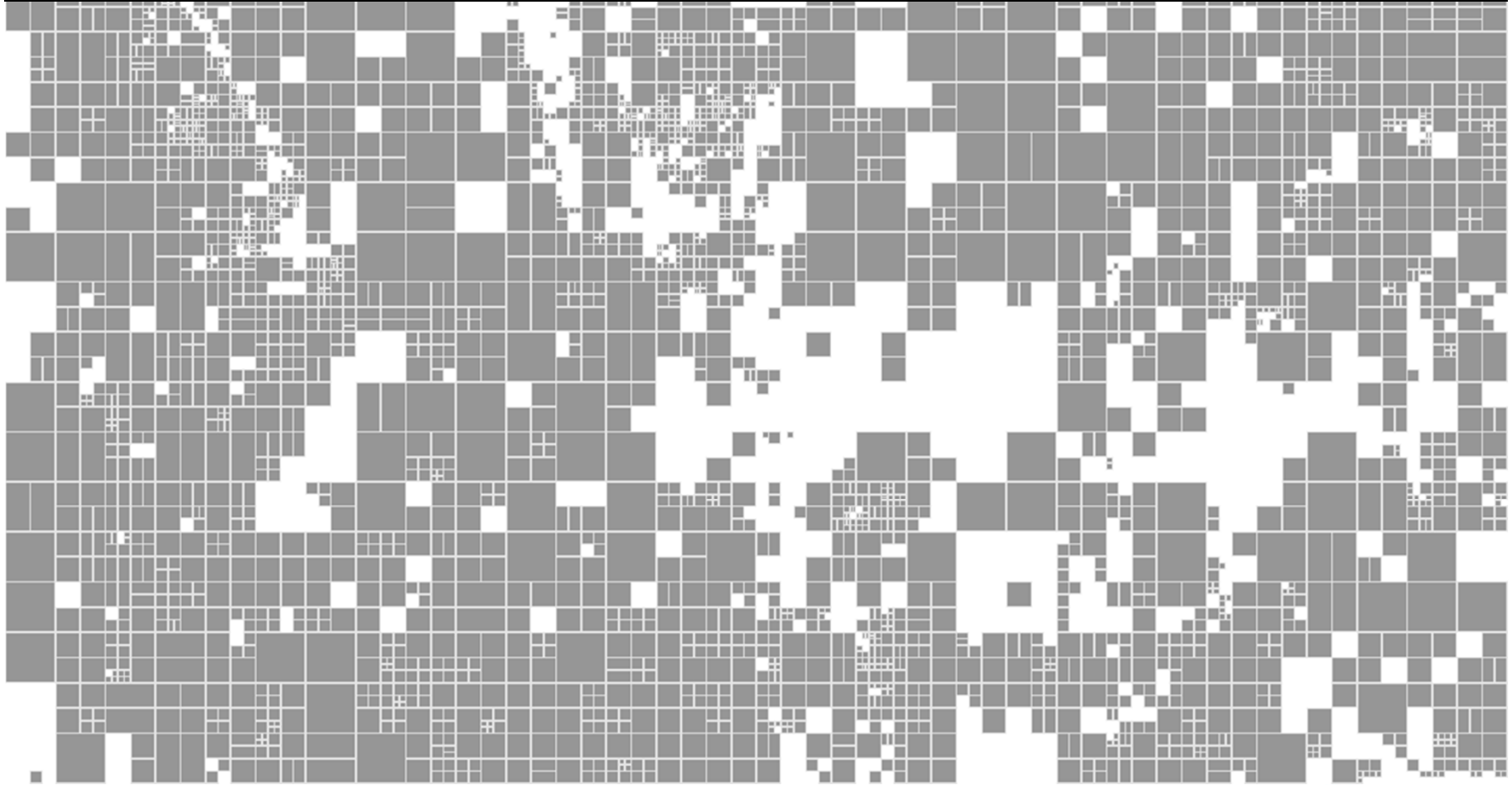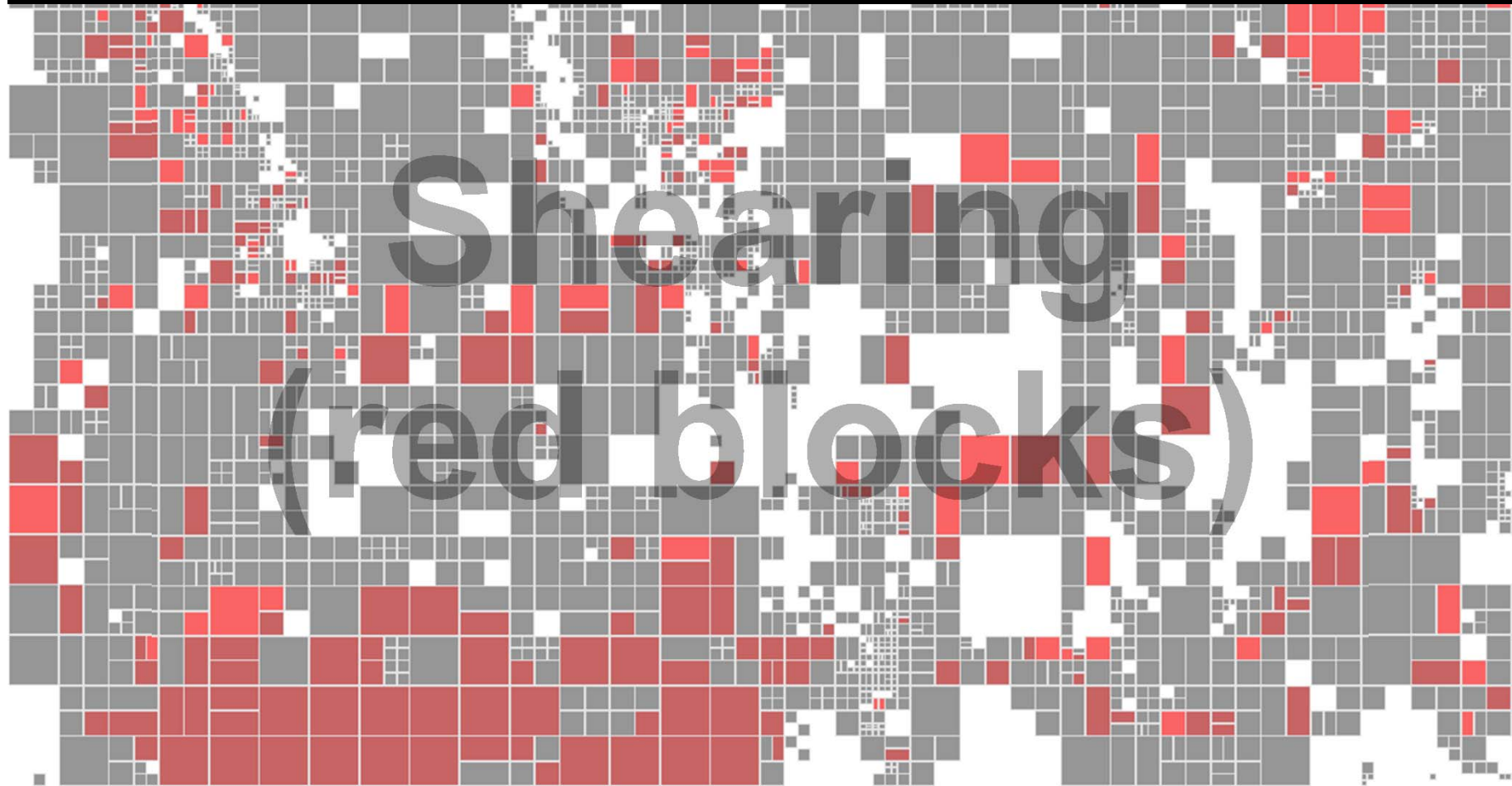
Poznan_Hall2 V1 POC 0 QP40 : proposed method

3D-CE5.h related: Inter-view prediction using image deformation characteristics between multi-view images (JCT3V-C0118)

Simulation Results

Poznan_Hall2 V1 POC 0 QP40 : proposed method

3D-CE5.h related: Inter-view prediction using image deformation characteristics between multi-view images (JCT3V-C0118)

Simulation Results

Rate-distortion results of 'Inter-view Prediction with Image Deformation Information'

	video 0	video 1	video 2	video only	synthesized only	coded & synthesized
Balloons	0.0%	1.0%	0.7%	0.3%	0.3%	0.3%
Kendo	0.0%	0.3%	0.4%	0.1%	0.2%	0.1%
Newspapercc	0.0%	0.0%	-0.2%	-0.1%	0.0%	-0.1%
GhostTownFly	0.0%	0.5%	0.3%	0.1%	0.1%	0.1%
PoznanHall2	0.0%	-0.1%	-0.3%	-0.1%	0.0%	-0.1%
PoznanStreet	0.0%	-0.8%	-0.8%	-0.5%	-0.3%	-0.3%
UndoDancer	0.0%	-1.6%	-1.2%	-0.4%	-0.5%	-0.5%
1024x768	0.0%	0.4%	0.3%	0.1%	0.1%	0.1%
1920x1088	0.0%	-0.5%	-0.5%	-0.2%	-0.2%	-0.2%
average	0.0%	-0.1%	-0.2%	-0.1%	0.0%	-0.1%

3D-CE5.h related: Inter-view prediction using image deformation characteristics between multi-view images (JCT3V-C0118)

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Simulation Results

Running time ratio of 'Inter-view Prediction with Image Deformation Information'

	enc time	dec time	ren time
Balloons	103.1%	100.7%	106.3%
Kendo	102.8%	95.6%	110.1%
Newspapercc	103.0%	98.6%	100.9%
GhostTownFly	102.2%	101.1%	102.9%
PoznanHall2	103.5%	96.9%	106.1%
PoznanStreet	102.9%	98.2%	105.2%
UndoDancer	102.3%	99.8%	106.0%
1024x768	103.0%	98.2%	105.7%
1920x1088	102.7%	99.0%	105.0%
average	102.8%	98.7%	105.3%

3D-CE5.h related: Inter-view prediction using image deformation characteristics between multi-view images (JCT3V-C0118)

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Summary

- **An inter-view prediction algorithm is proposed to efficiently code the inter-view image deformations.**

- **The proposed algorithm showed BD bitrate gains of -0.1%, -0.2%, -0.1%, 0.0%, -0.1% for V1, V2, video only, synthesized only, coded & synthesized, respectively.**

- **We recommend further investigation of the possible improvements of the proposed algorithm in the CE.**

3D-CE5.h related: Inter-view prediction using image deformation characteristics between multi-view images (JCT3V-C0118)

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