

Proposal on a coding scheme for Free
viewpoint Scalability (MVC)
JVT-T134 m13533

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Introduction

- Free viewpoint scalability is an essential functionality for MVC standard to cover a variety of 3D applications.
- We present the overview and key points of free viewpoint scalability.
- We propose a coding scheme to achieve such scalability.
 - Request suggestions at this moment

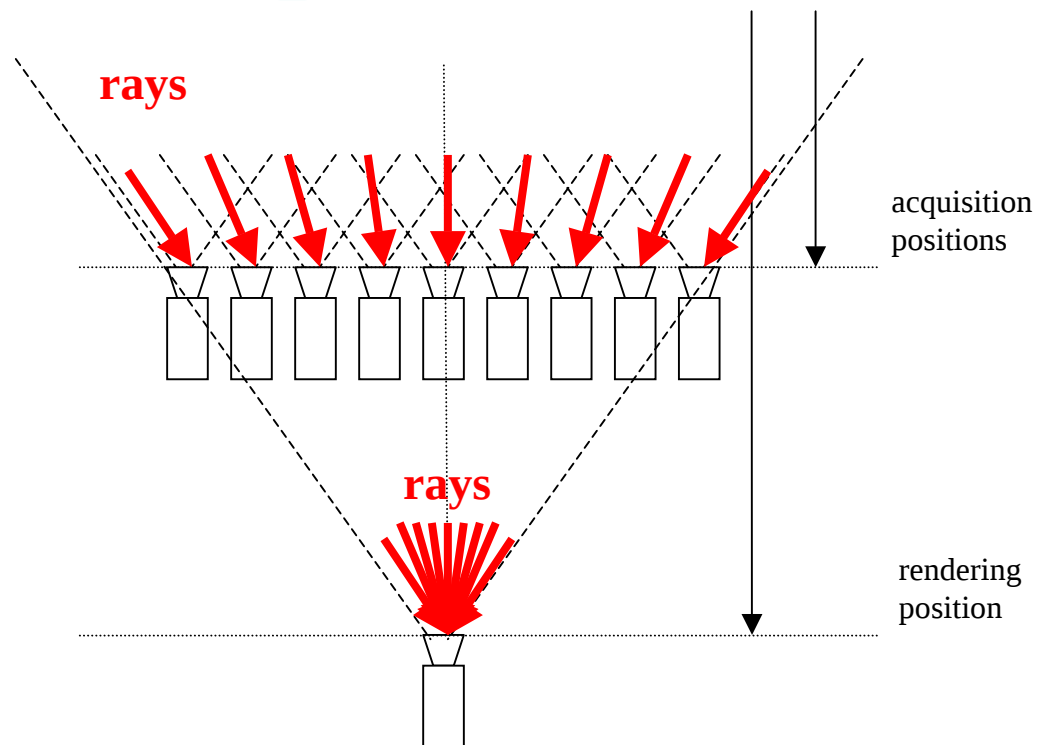
Overview of Free viewpoint Scalability

- Definition of free viewpoint scalability
 - in the MVC Requirements Document
 - “MVC shall support a scalable bitstream structure to allow for access to partial data from which new views can be generated”
- Necessary function to Free viewpoint TV (FTV) as well as 3DTV (3D displays)
 - Necessary for FTV by nature
 - Necessary to support various 3D display capabilities of viewing position and viewing angle

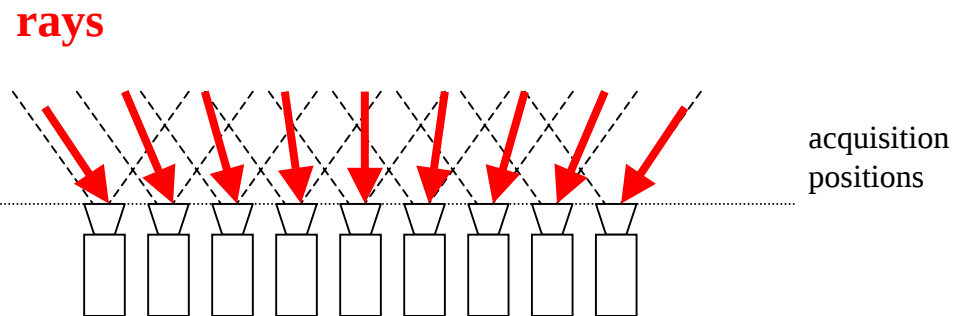
Background of free viewpoint scalability

- Necessary part of data for rendering are different when original camera position and rendering position is different
- One solution is
 - to decode all images and to extract necessary images and then to generate the requested image
 - however, too redundant in terms of bandwidth
- Then it is better to transmit and to decode partial data

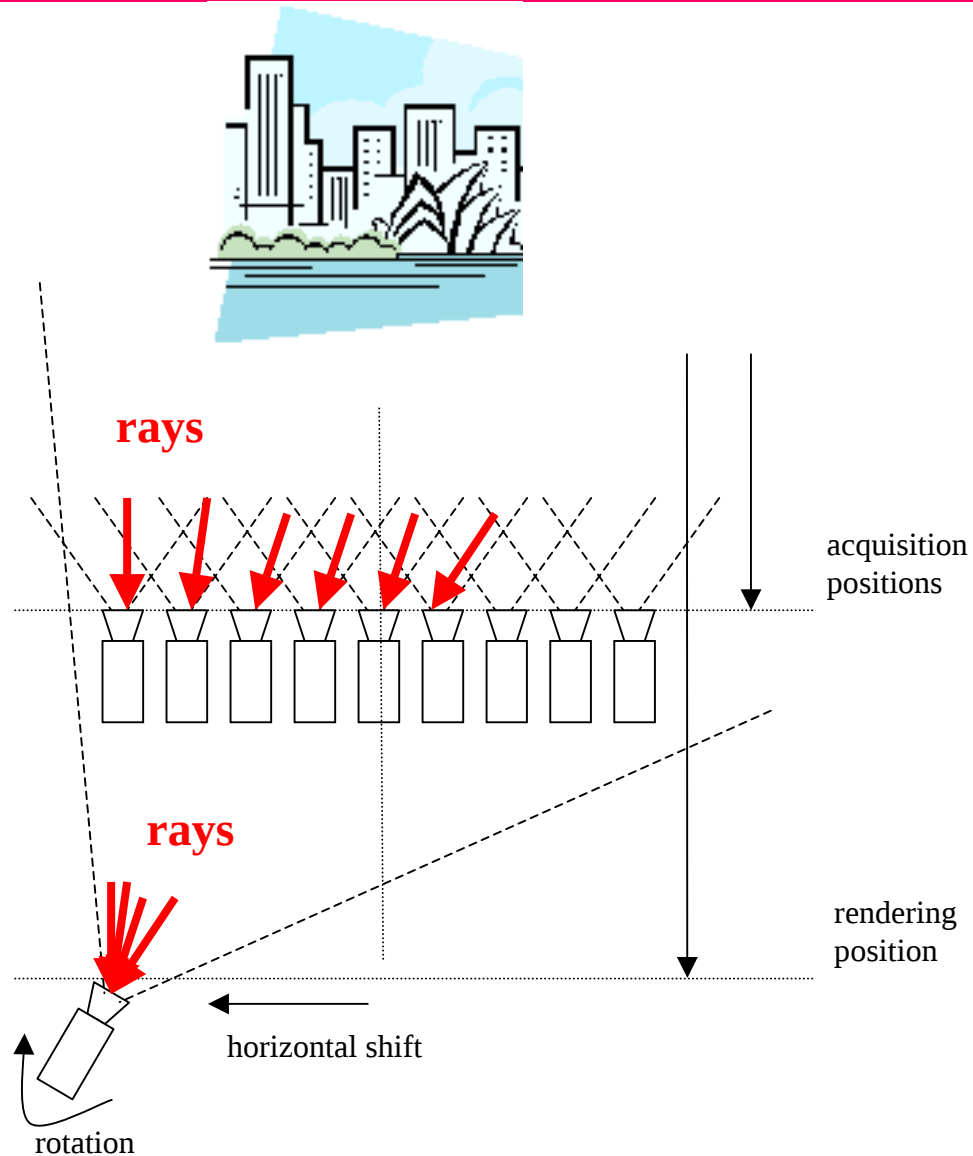
Camera positions (case 1)



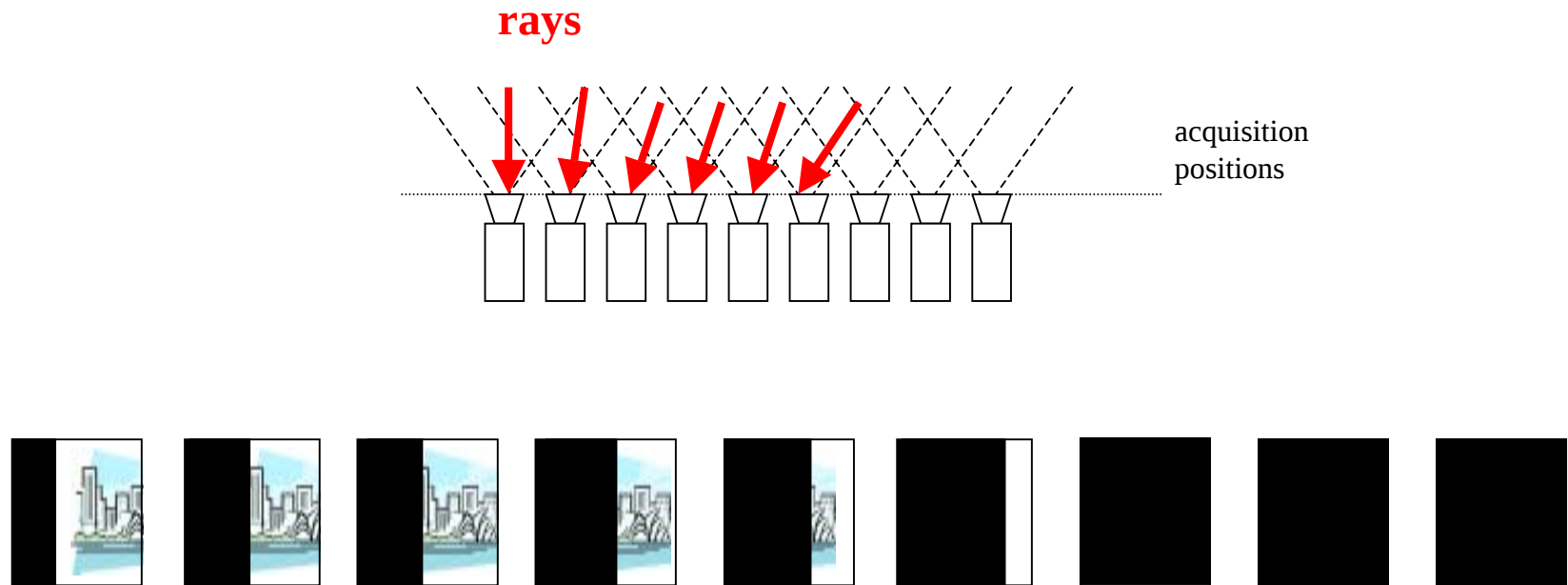
Necessary data (case 1)



Camera positions (case 2)



Necessary data (case 2)



Necessary part of data for rendering

The size, position, and shape of the necessary parts are changed when the viewing position and angle for rendering are changed

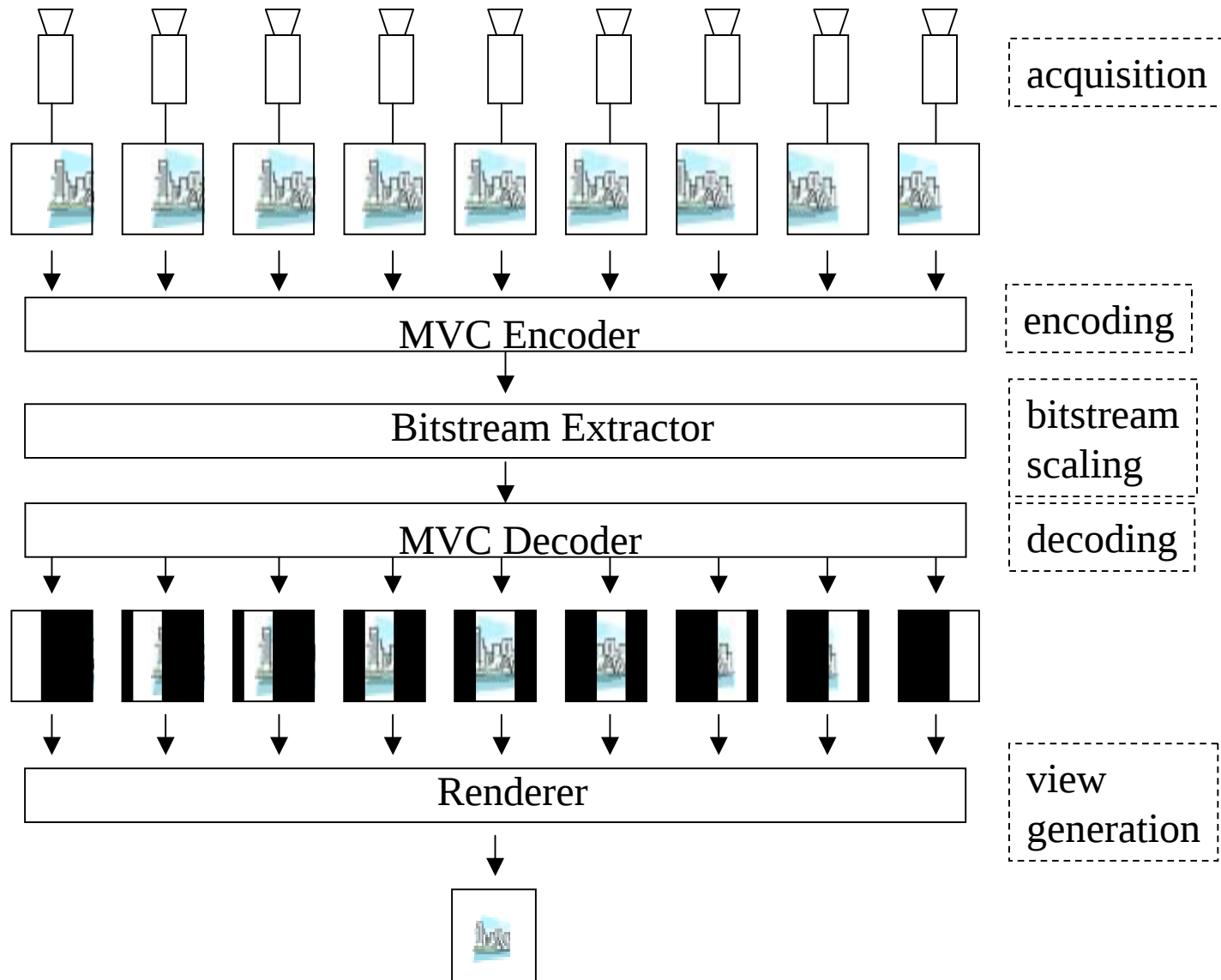


for case 1 camera position



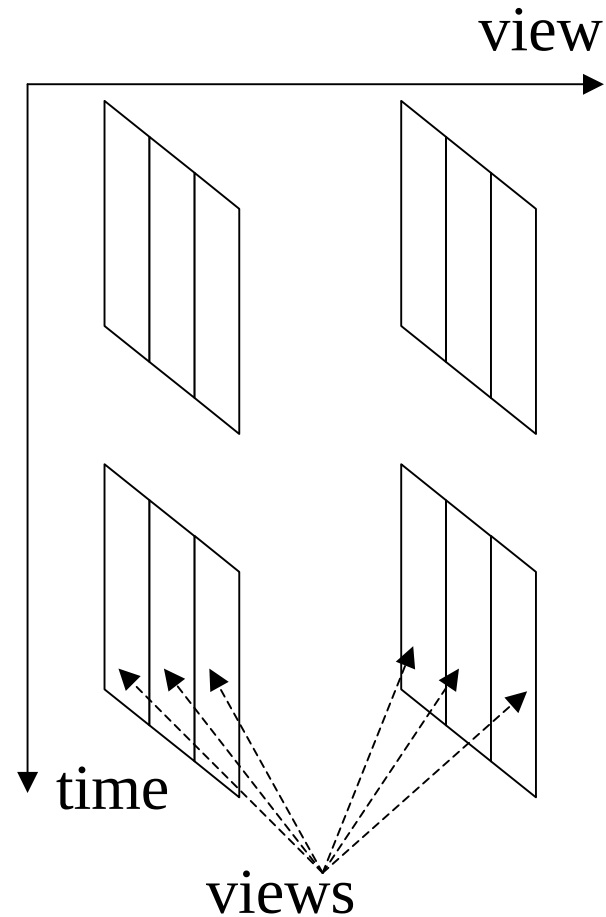
for case 2 camera position

Bitstream scaling and generation



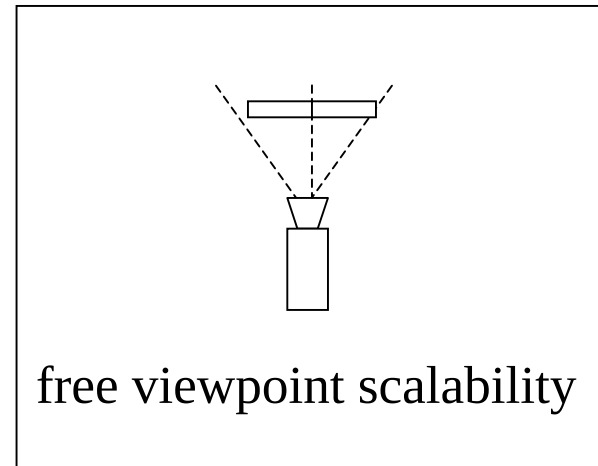
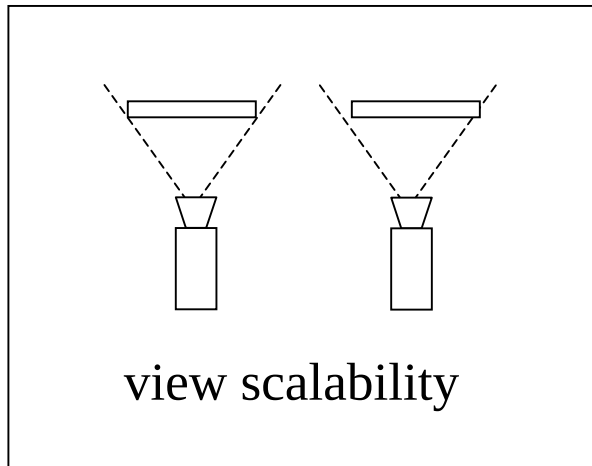
Proposed coding scheme

- A segmented area is treated as a view
 - Minor extension of definitions of views
- This can be also a kind of Multi-view Video
 - Still the access unit is a view
 - We can apply MVC to these kind of structures of views
 - Encoder is responsible for determining the shape of views, dependency of views, and the decoding order
 - These belong to encoder optimization



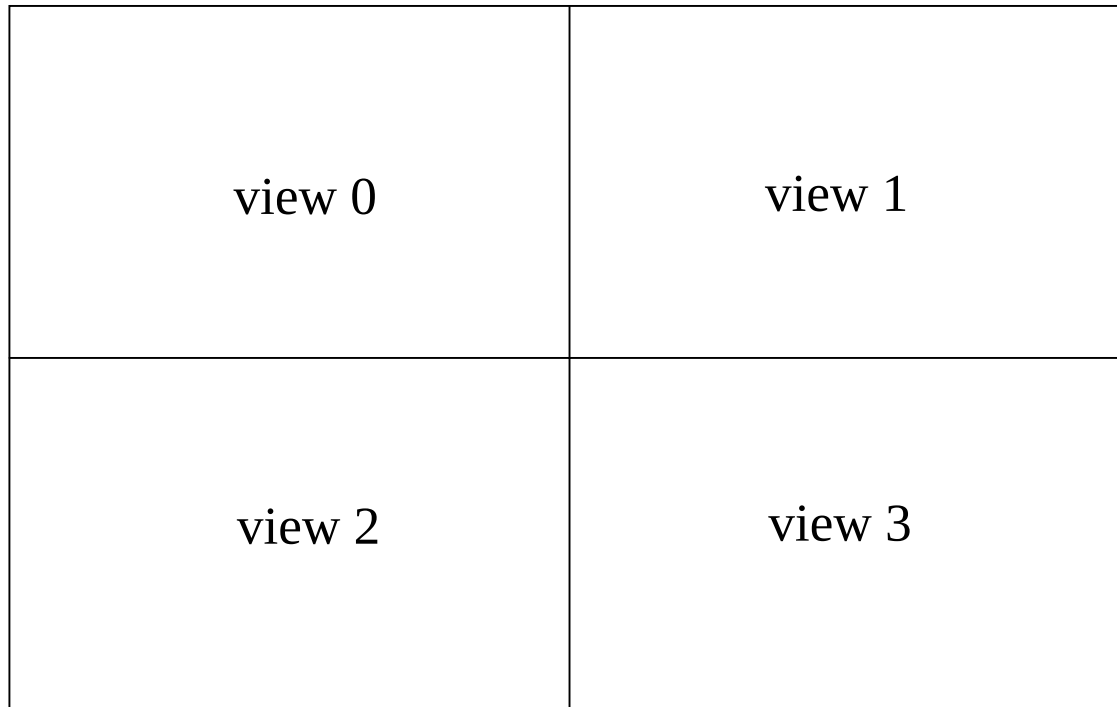
Comparison with view scalability

- Free viewpoint scalability might be a kind of extension of conventional view scalability



Applicable to coding large pictures

- This scheme can be applicable to coding large pictures
 - Parallel decoding can be applied

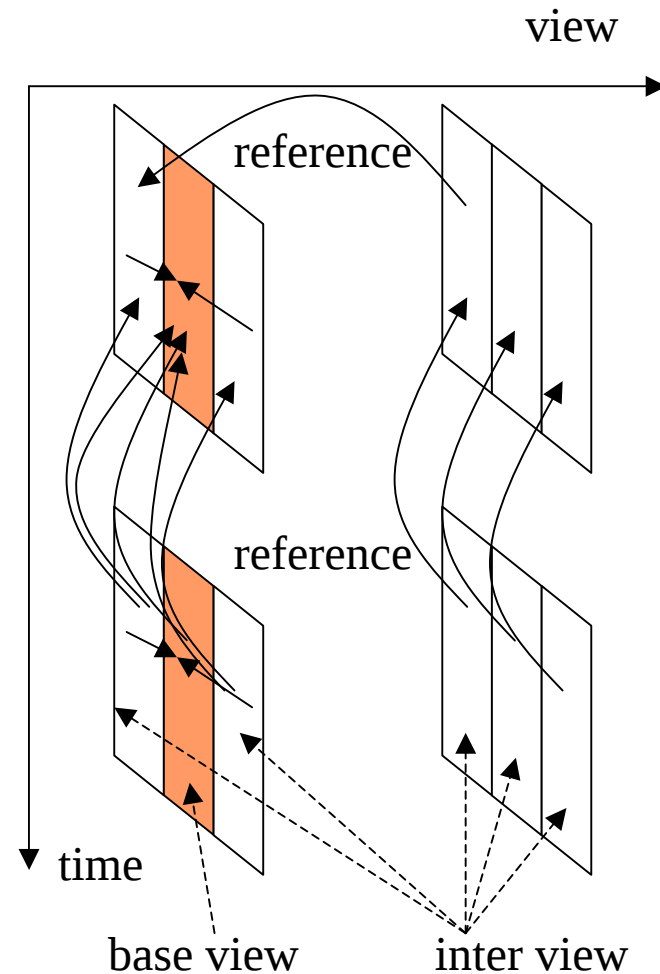


Coding scheme of segmented views

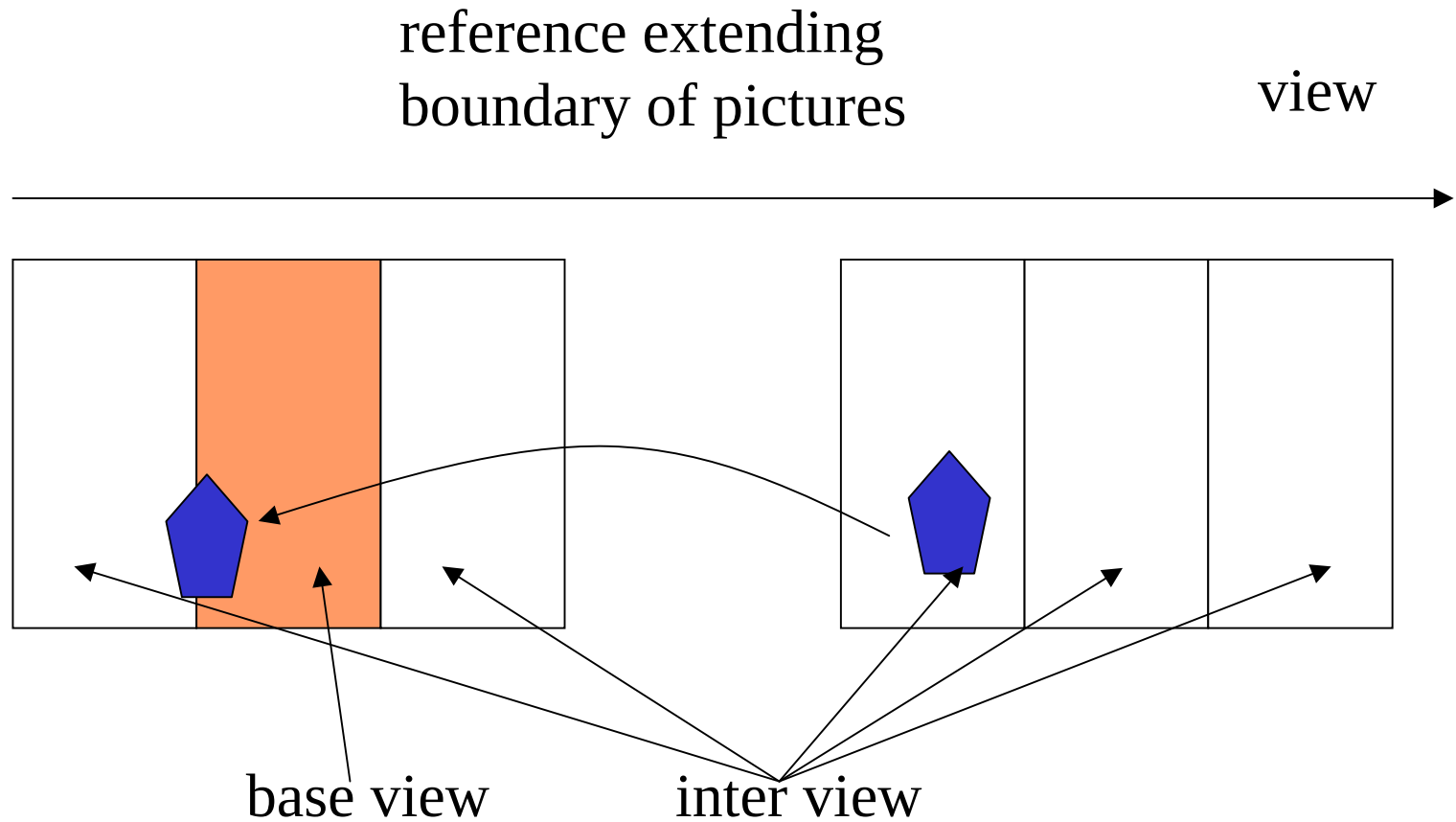
- Simple solution
 - All segmented views are coded independently.
 - NOT allow prediction coding across the boundaries of segmented views
 - However,
 - It consumes many bits when prediction from boundary areas
 - → NOT necessarily desired
- Advanced solution
 - Allow prediction coding across boundaries for segmented views
 - This is beneficial to improve coding efficiency.

Example of prediction

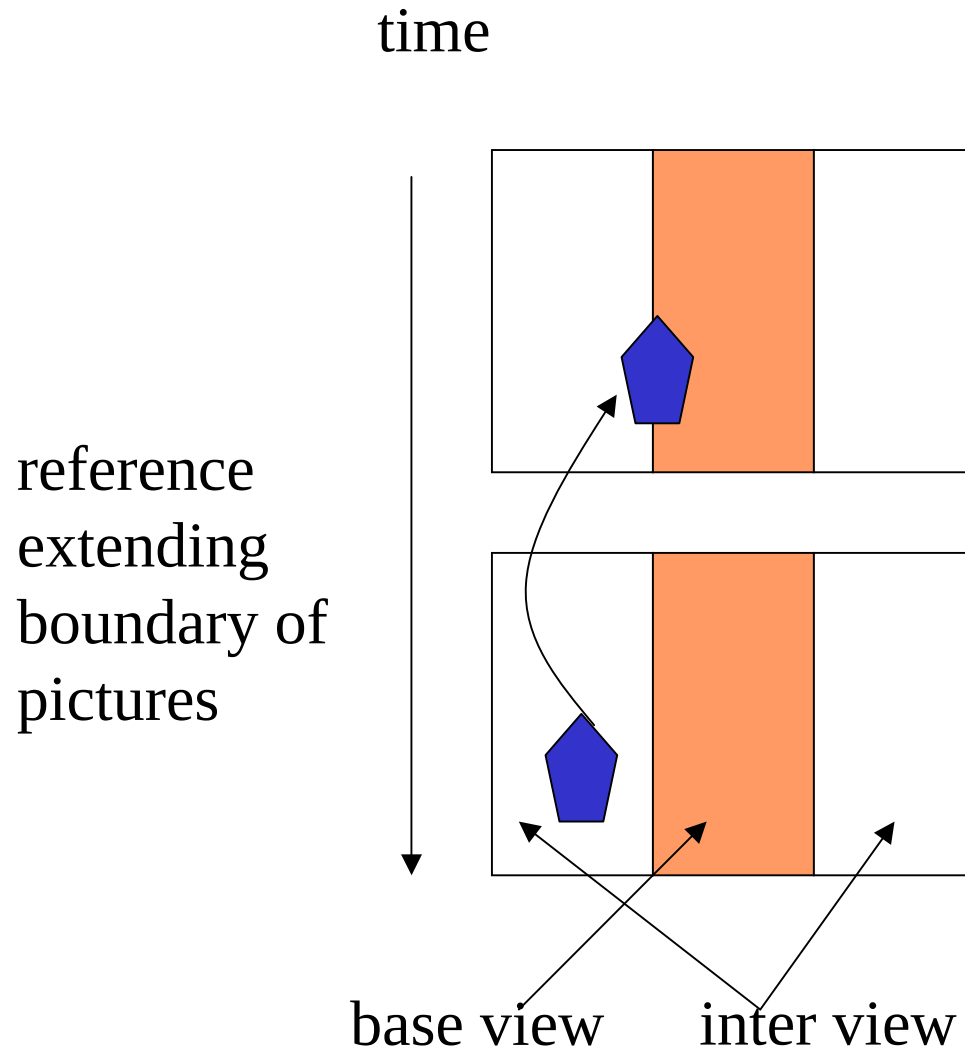
- Supposed prediction coding across the boundaries
 - disparity compensation
 - motion compensation
 - intra prediction



Disparity compensation

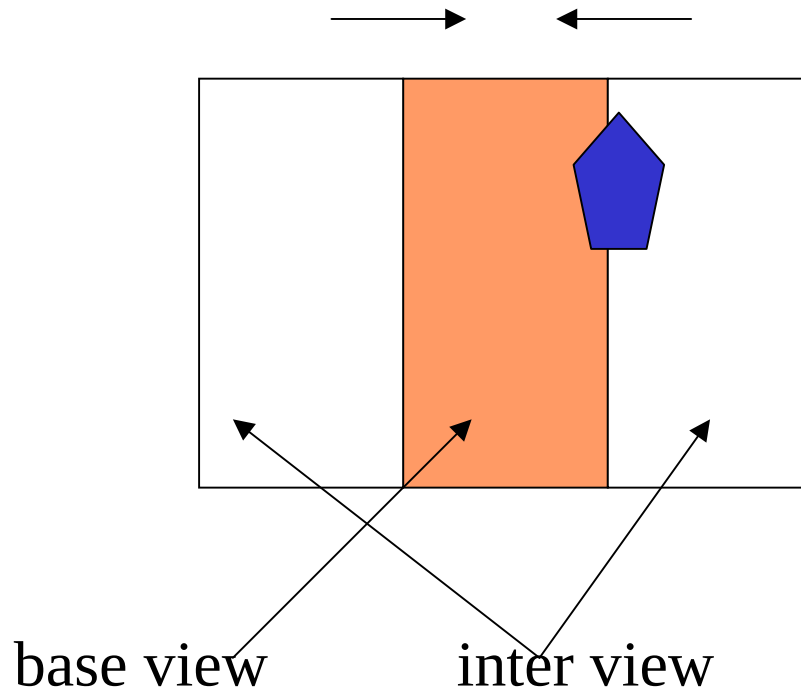


Motion compensation



Intra prediction

intra prediction from
adjacent pictures



Conclusion

- We presented overview of free viewpoint scalability and propose a basic coding scheme to achieve such functionality.
- We will propose coding methods at the next meeting.
 - Inc. prediction coding across boundaries
- Welcome suggestions
 - Definition of views
 - Coding scheme
 - Prediction coding across boundaries