Multiple Hypothesis Algorithm

Pravin Kumar Rana
Sound and Image Processing Lab.(SIP)
KTH - Royal Institute of Technology
SE-10044 Stockholm, Sweden
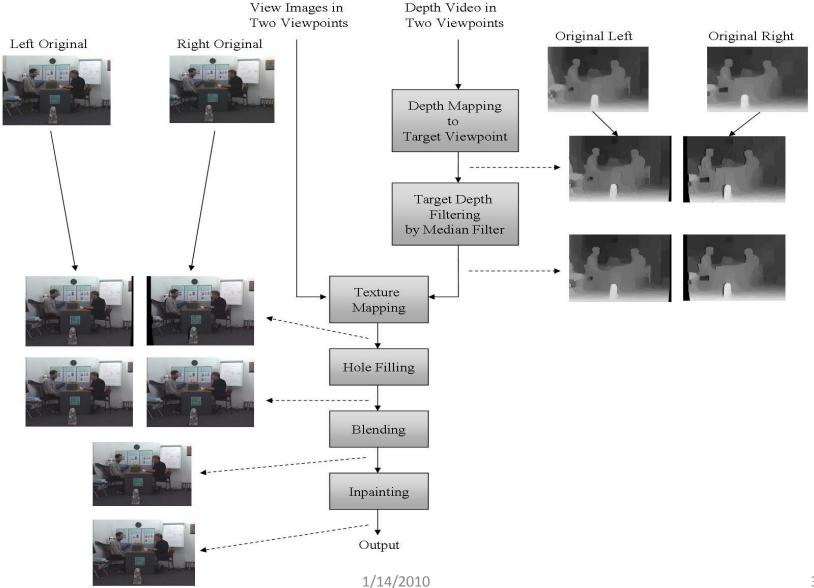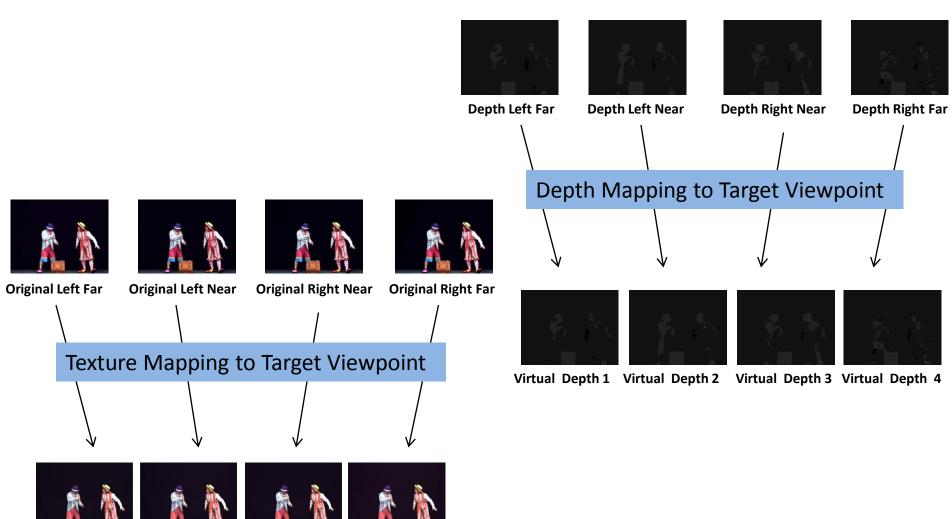
Outline

- Multiple Hypothesis Algorithm
- Results

View Synthesis Reference Software

Multiple Hypothesis Algorithm

Depth Left Far   **Depth Left Near**   **Depth Right Near**   **Depth Right Far**

Depth Mapping to Target Viewpoint

Original Left Far   **Original Left Near**   **Original Right Near**   **Original Right Far**

Texture Mapping to Target Viewpoint

Virtual Depth 1   Virtual Depth 2   Virtual Depth 3   Virtual Depth 4

Virtual View 1   **Virtual View 2**   **Virtual View 3**   **Virtual View 4**
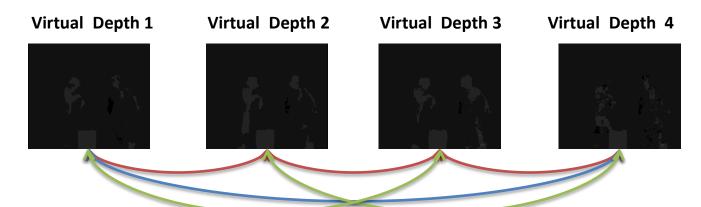
Absolute Depth Pixel Difference

$$\begin{pmatrix} - & (1,2) & (1,3) & (1,4) \\ - & - & (2,3) & (2,4) \\ - & - & - & (3,4) \\ - & - & - & - \end{pmatrix}$$
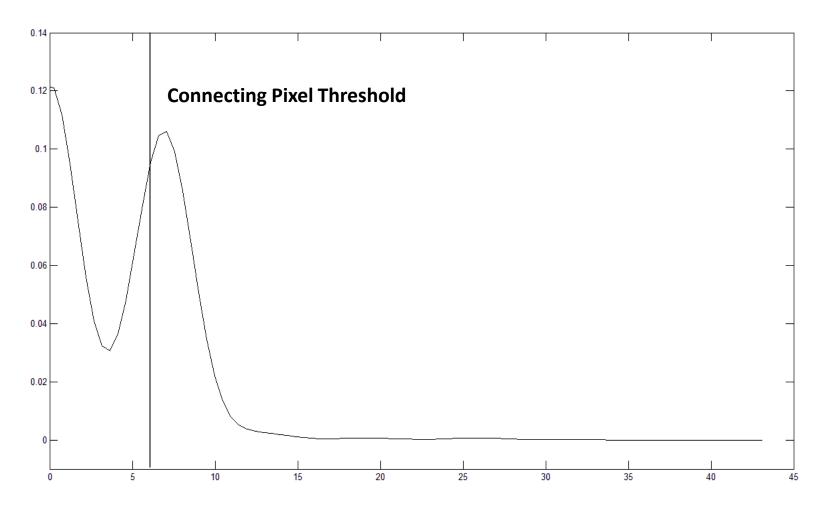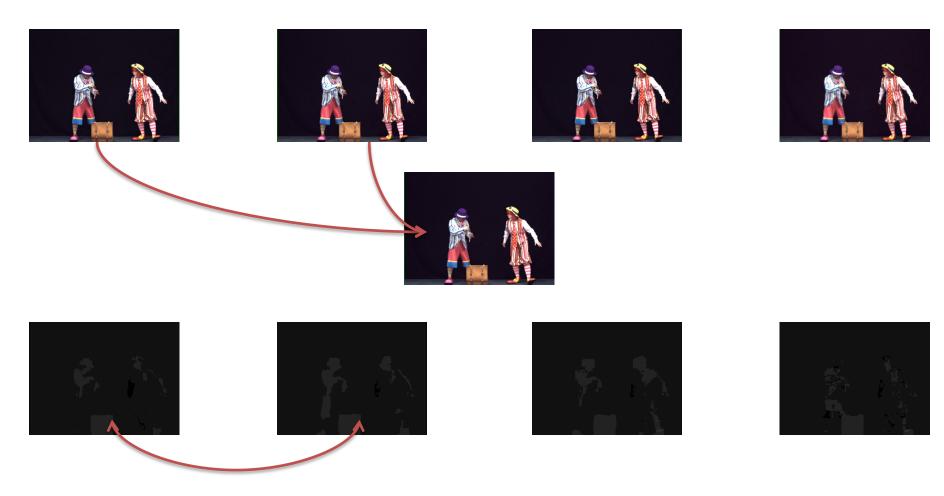
Virtual Depth 1   **Virtual Depth 2**   **Virtual Depth 3**   **Virtual Depth 4**

Distribution of Pixel Differences

Connecting Pixel Threshold

Absolute Pixel Difference

Case "1" : Two Hypothesis Case

Case "1" : Two Hypothesis Case

Virtual View 1

Virtual View 2

Virtual View 3

Virtual View 4

Virtual Depth 1

Virtual Depth 2

Virtual Depth 3

Virtual Depth 4

Case "2"

Virtual View 1

Virtual View 2

Virtual View 3

Virtual View 4

Virtual Depth 1

Virtual Depth 2

Virtual Depth 3

Virtual Depth 4

The Case "2"

Virtual View 1

Virtual View 2

Virtual View 3

Virtual View 4

Virtual Depth 1

Virtual Depth 2

Virtual Depth 3

Virtual Depth 4

Case "2"

Virtual View 1

Virtual View 2

Virtual View 3

Virtual View 4

Virtual Depth 1
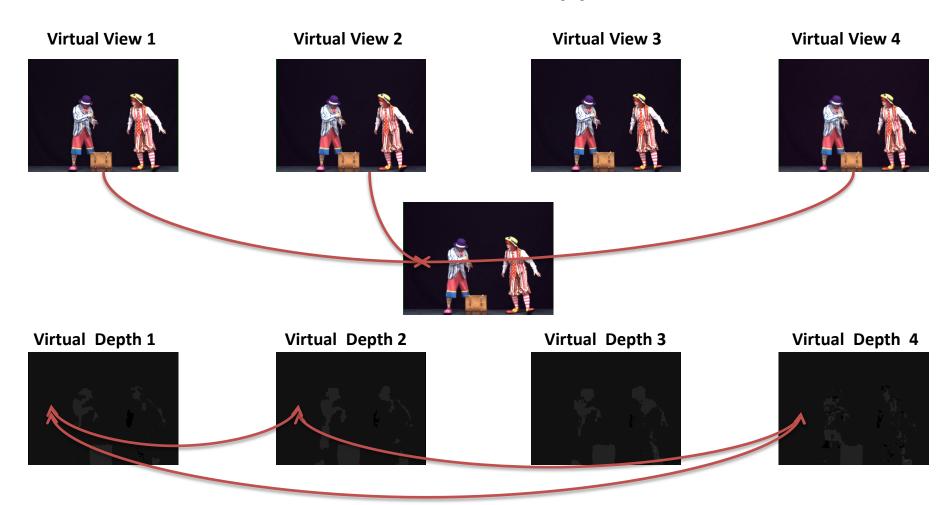
Virtual Depth 2

Virtual Depth 3

Virtual Depth 4

Case "3" : Three Hypothesis

Virtual View 1   **Virtual View 2**   **Virtual View 3**   **Virtual View 4**

Virtual Depth 1   **Virtual Depth 2**   **Virtual Depth 3**   **Virtual Depth 4**

Case "3" : Three Hypothesis

Virtual View 1   **Virtual View 2**   **Virtual View 3**   **Virtual View 4**

Virtual Depth 1   **Virtual Depth 2**   **Virtual Depth 3**   **Virtual Depth 4**
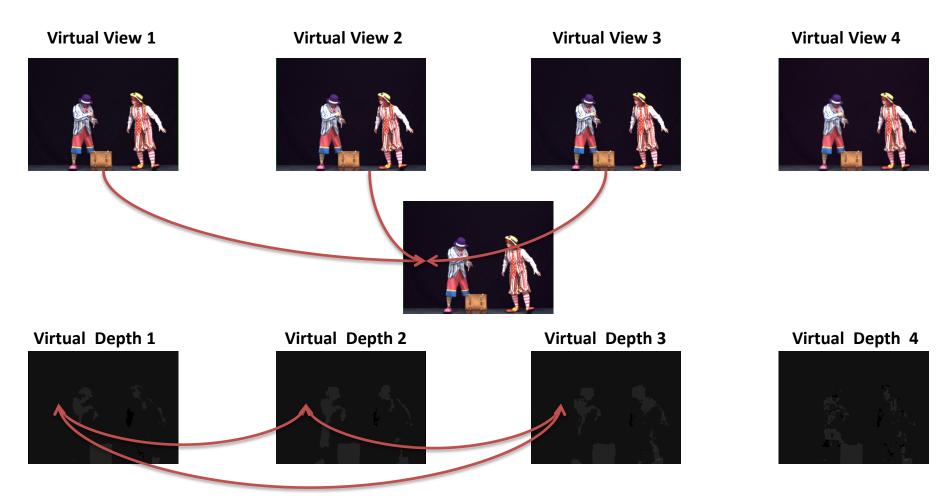
Case "4" : Three or Four Hypothesis

Virtual View 1

Virtual View 2

Virtual View 3

Virtual View 4

Virtual Depth 1

Virtual Depth 2

Virtual Depth 3

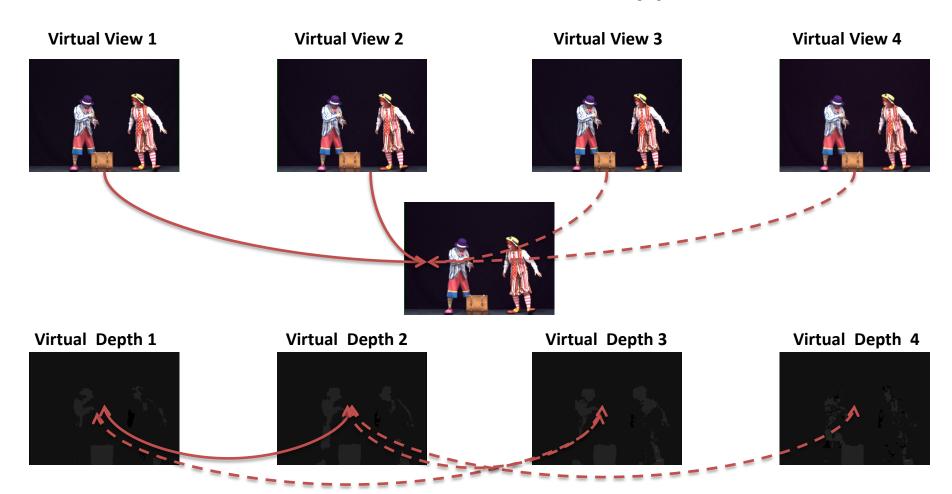**Virtual Depth 4**

Case "5" : Three or Four Hypothesis

Virtual View 1 **Virtual View 2** **Virtual View 3** **Virtual View 4**

Virtual Depth 1 **Virtual Depth 2** **Virtual Depth 3** **Virtual Depth 4**

Case "6" : Four Hypothesis

Virtual View 1

Virtual View 2

Virtual View 3

Virtual View 4

Virtual Depth 1

Virtual Depth 2

Virtual Depth 3

Virtual Depth 4

(All pixels are connected.)

Case "0" : Holes

Virtual View 1

Virtual View 2

Virtual View 3

Virtual View 4

Holes

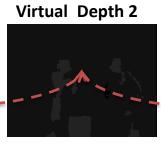**Virtual Depth 1**

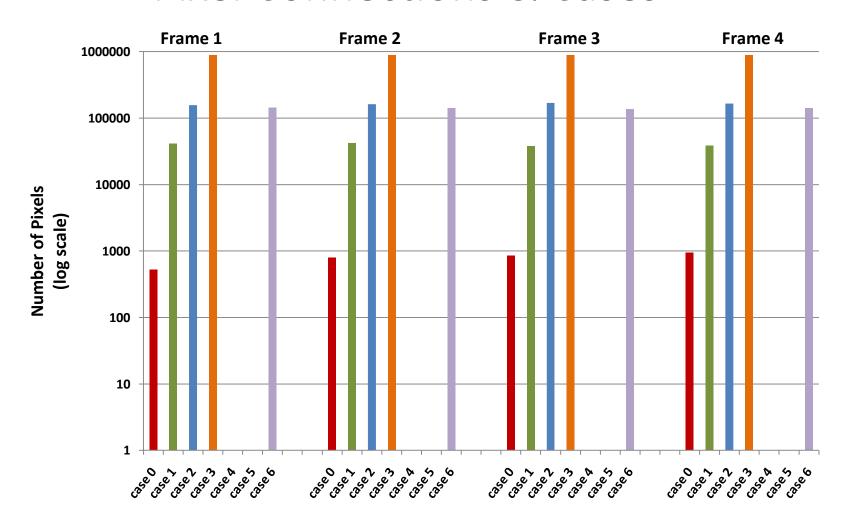**Virtual Depth 2**

Virtual Depth 3

Virtual Depth 4

Results
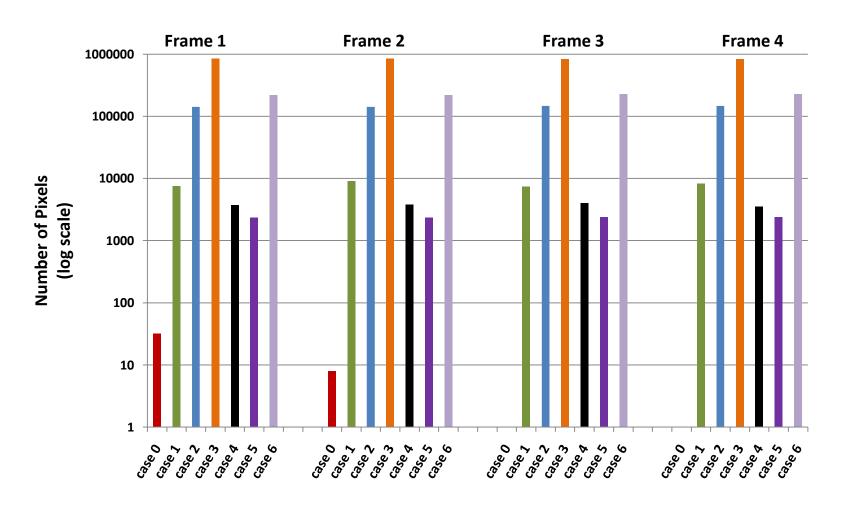
Pantomime Test Data				
	PSNR (dB)			
Frame Number	**View Synthesis Reference Software**	**Connecting Pixel Threshold = 0.0**	**Connecting Pixel Threshold ≤6.0**	**Connecting Pixel Threshold ≤7.0**
1	39.8287	40.0432	40.2105	39.9007
2	39.6836	39.7855	40.2482	39.9031
3	39.9196	39.5292	40.2871	40.0056
4	40.0300	39.9476	40.3326	40.0549
Average	39.8655	39. 8264	**40.2696**	39.9660

Pixel Connections & Cases

Connecting Pixel Threshold =0

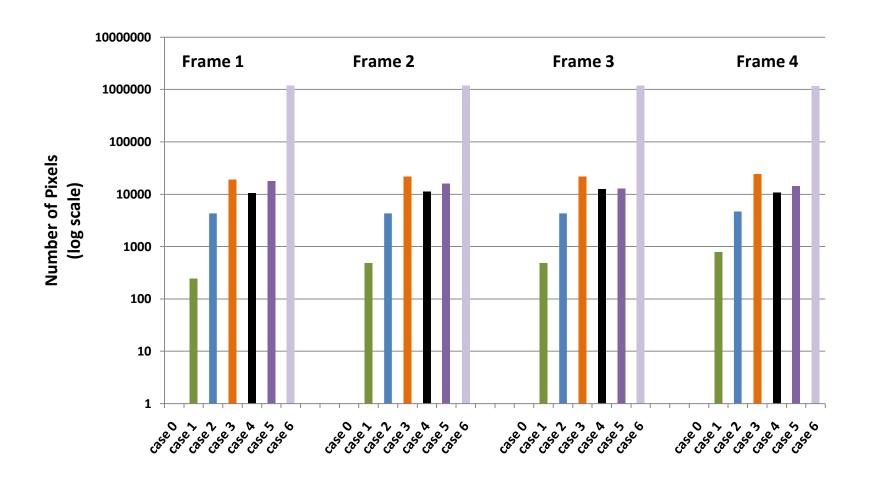# Pixel Connections & Cases

Connecting Pixel Threshold ≤6

Pixel Connections & Cases

Connecting Pixel Threshold ≤ 7

Synthesized Virtual Views

(a) Frame #01

(d)Frame #02

(C) Frame #03

(d)Frame #04

(Synthesized "Pantomime" view 40)

Depth Maps @ Virtual Position

(a) Left Far

(e) Virtual Depth using MHA

(d) Left Near

(a) Right Near

(d) Right Far

Views @ Virtual Position

(a) Left Far

(d) Left Near

(C) Right Near

(d) Right Far

Pixel Connections & Cases