Disparity Compensated View Filters (DCVF): Experiments and Results

KTH Electrical Engineering

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Outline

- Unidirectional DCVF
- Bidirectional DCVF

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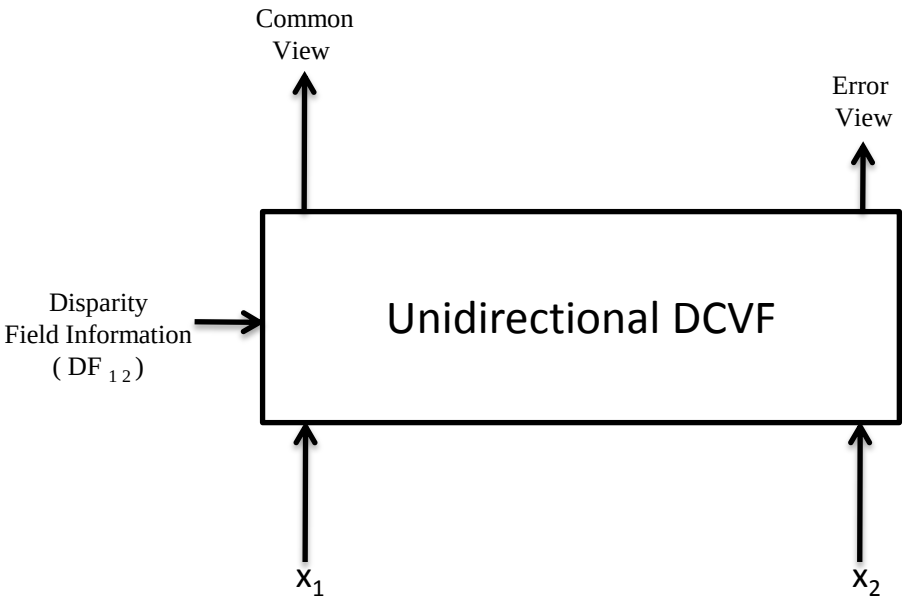
Unidirectional DCVF



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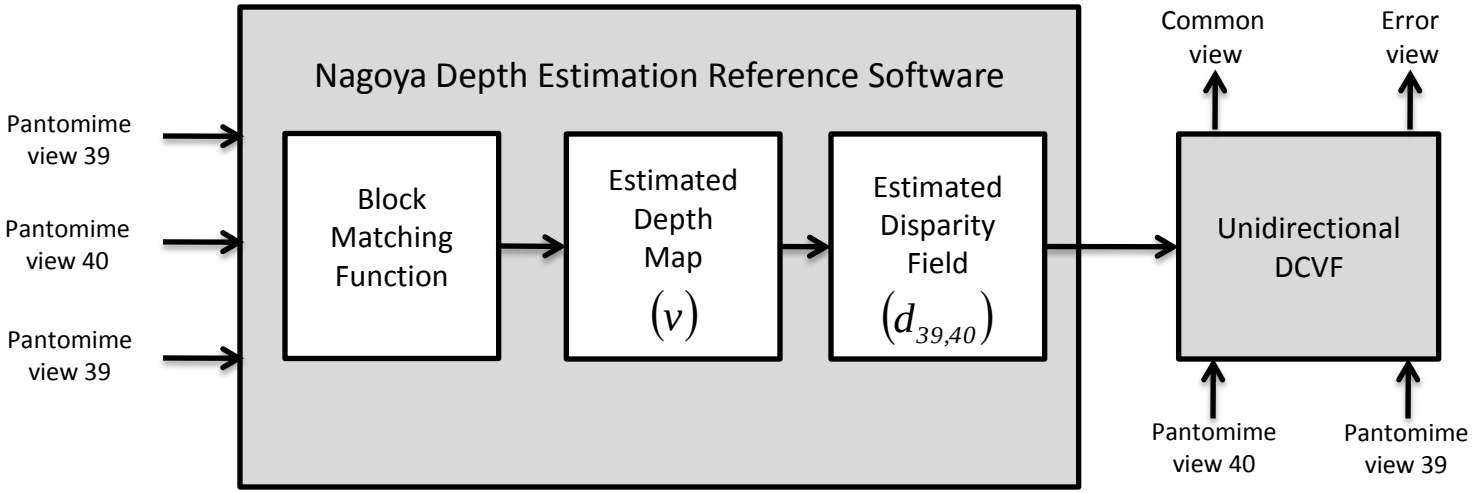
Experiment with Unidirectional DCVF



$$d = \left\lceil f \cdot l. \left(\frac{v}{255} \left(\frac{1.0}{Z_{near}} - \frac{1.0}{Z_{far}} \right) - \frac{1.0}{Z_{far}} \right) - \Delta d \right\rceil$$

d = Disparity vector field

v = Depth map intensity

f = Camera focal length

l = Camera interval

Δd = Camera offset

Z_{near} = Farthest clipping plane

Z_{far} = Nearest clipping plane

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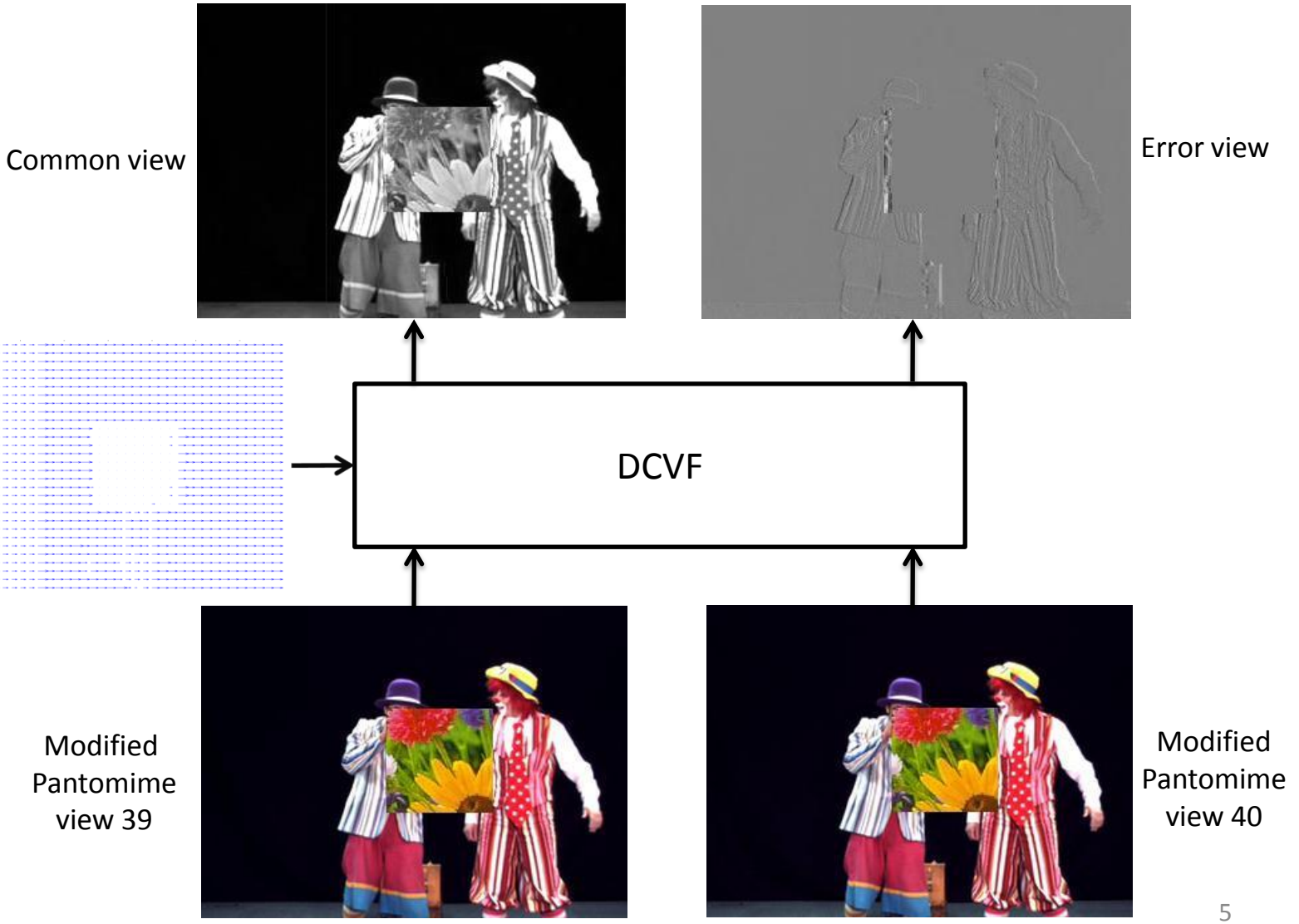
DCVF on the Modified Pantomime

Energy ratio = 0.46 %



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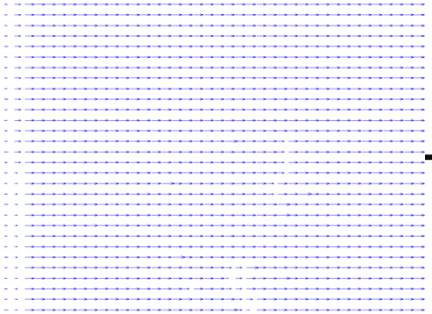
DCVF on the Pantomime

Energy ratio = 0.42 %

Common view

Error view

Disparity Vector Field



DCVF

Modified Pantomime view 39

Modified Pantomime view 40

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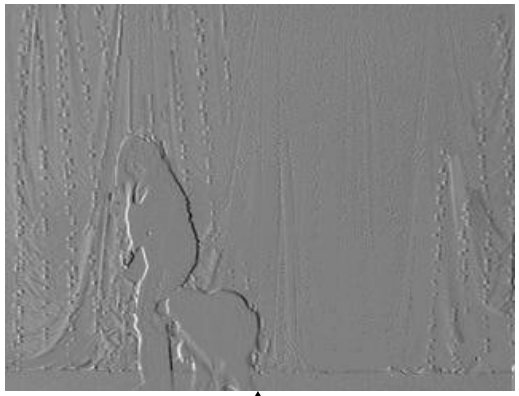
DCVF on the dog

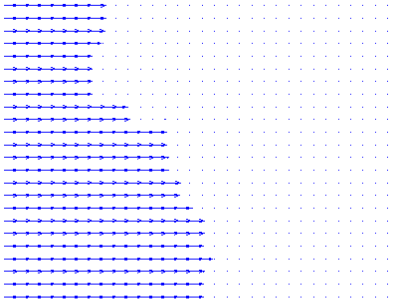
Energy ratio = 2.41 %

Common view



Error view

Disparity Vector Field



DCVF

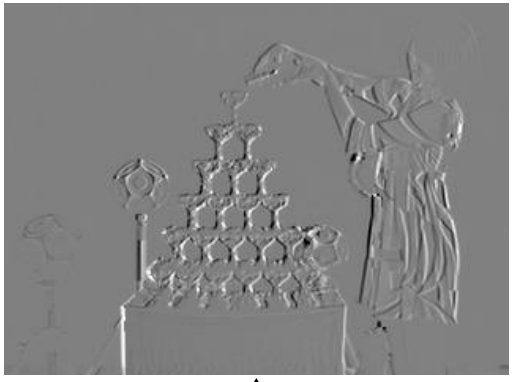
Dog view 40

Dog view 41

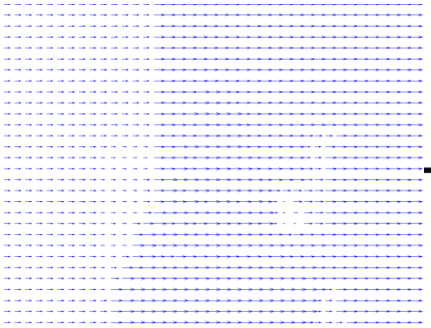
DCVF On the Champagne tower

Energy ratio = 2.01 %

Common view



Error view



Disparity Vector Field

DCVF

Champagne view 40

Champagne view 41

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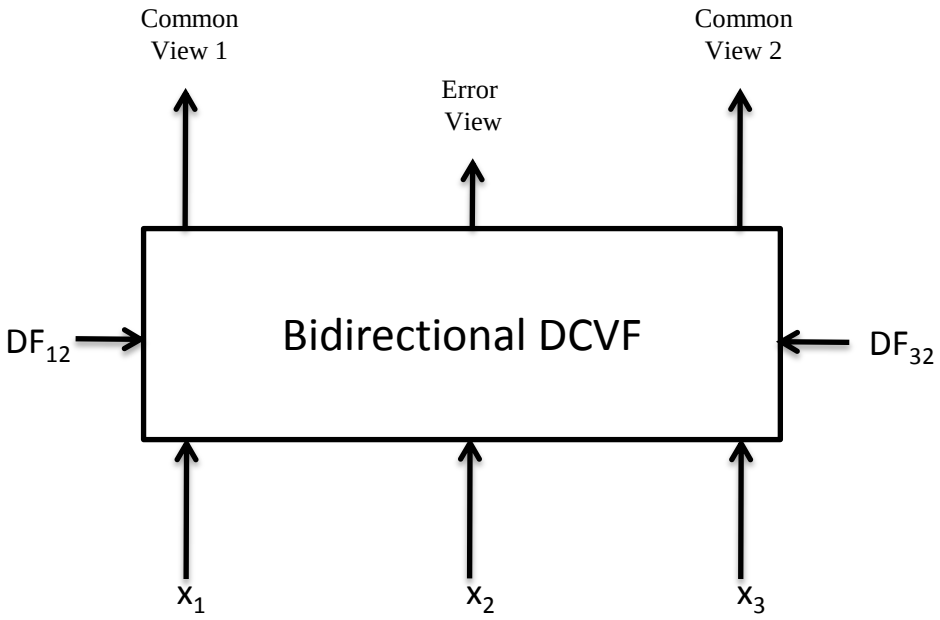
Bidirectional Disparity Compensated View Filter



- Takes sequence of 3 views
- Consider up to two disparity vector fields per view
- Energy concentrated into two common views and one error view

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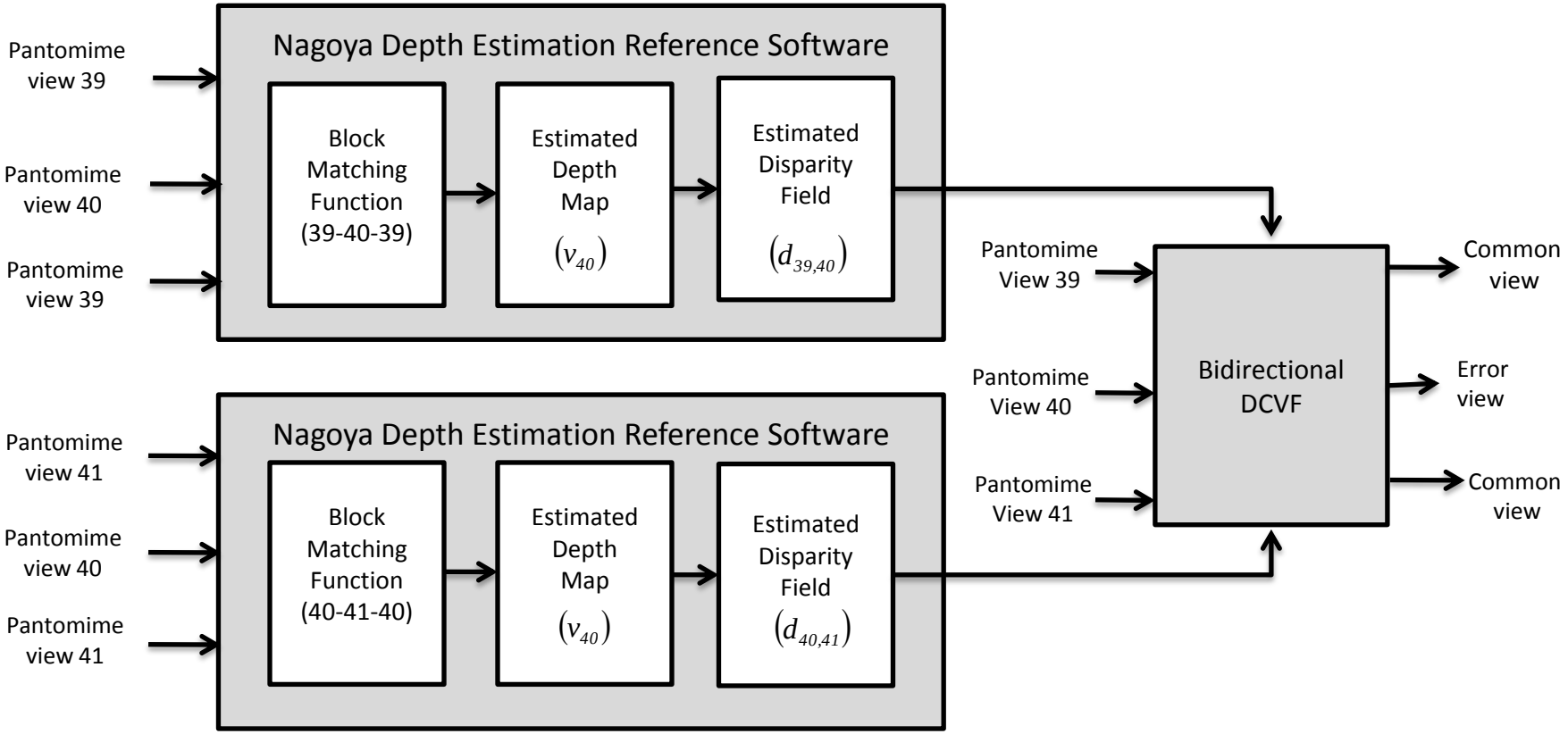
Experiment-(1) with Bidirectional DCVF



(Legacy of the disparity field estimation tool)

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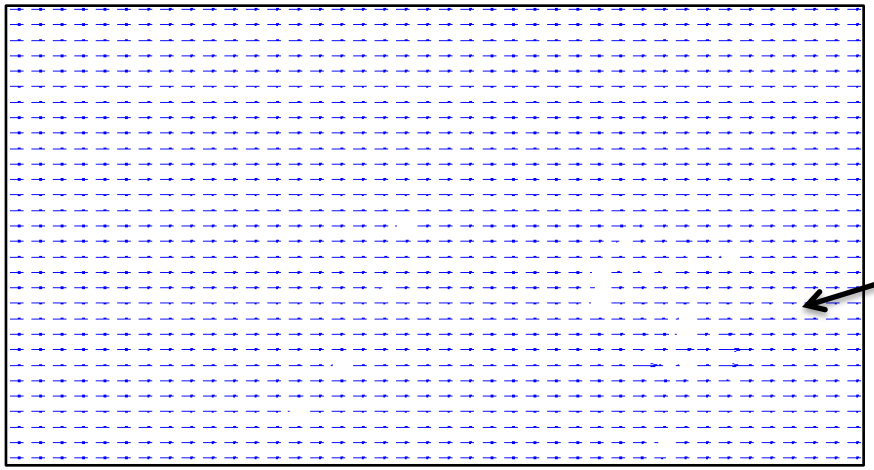
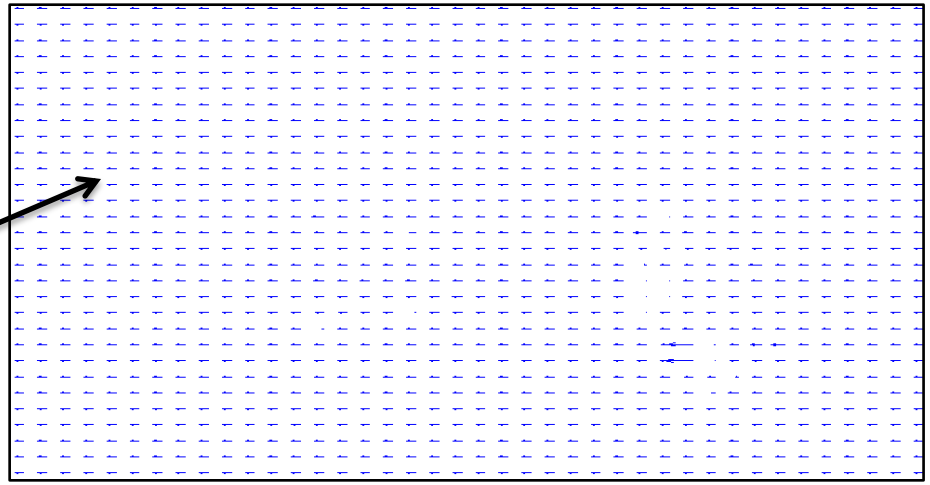
Bidirectional Disparity Vector Field



DVF between Pantomime view 39 and 40

DVF between Pantomime view 40 and 41



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Experiment -(1) Results

Energy ratio = 0.37 %

Error view

Common view between view 39 and 40

Common view between view 40 and 41

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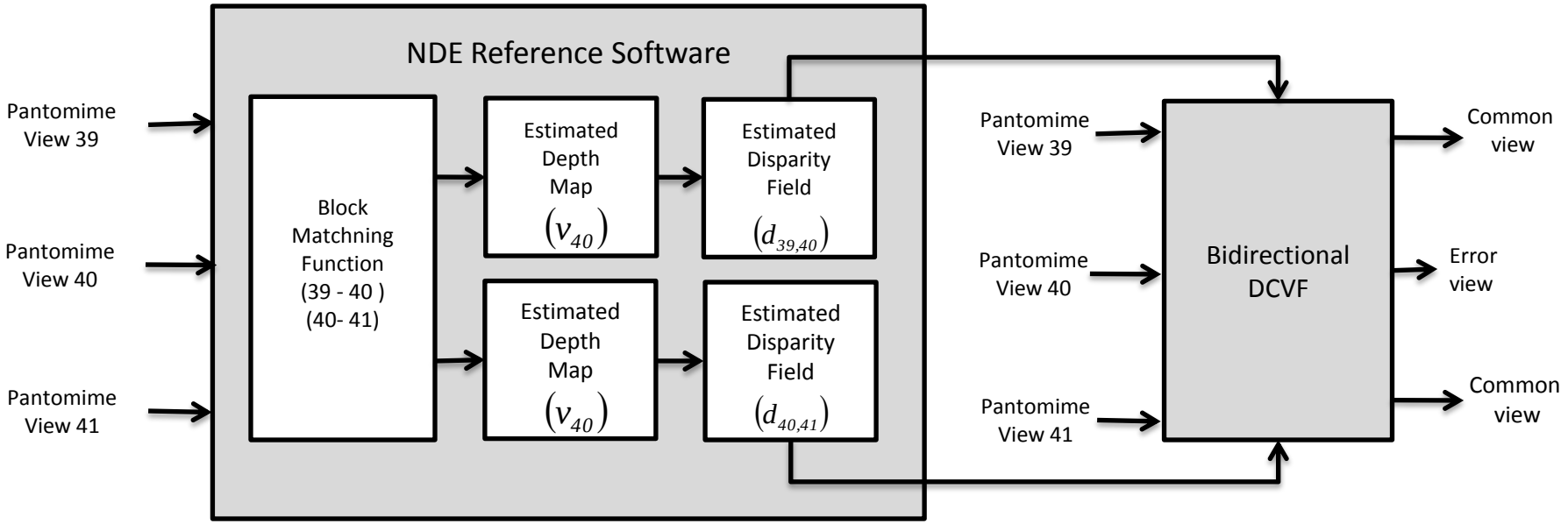
Experiment-(2) with Bidirectional DCVF



$$d = \left\lceil f \cdot l. \left(\frac{v}{255} \left(\frac{1.0}{Z_{near}} - \frac{1.0}{Z_{far}} \right) - \frac{1.0}{Z_{far}} \right) - \Delta d \right\rceil$$

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Experiment –(2) Results

Energy ratio = 0.18 %

Error view

Common view between view 39 and 40

Common view between view 40 and 41

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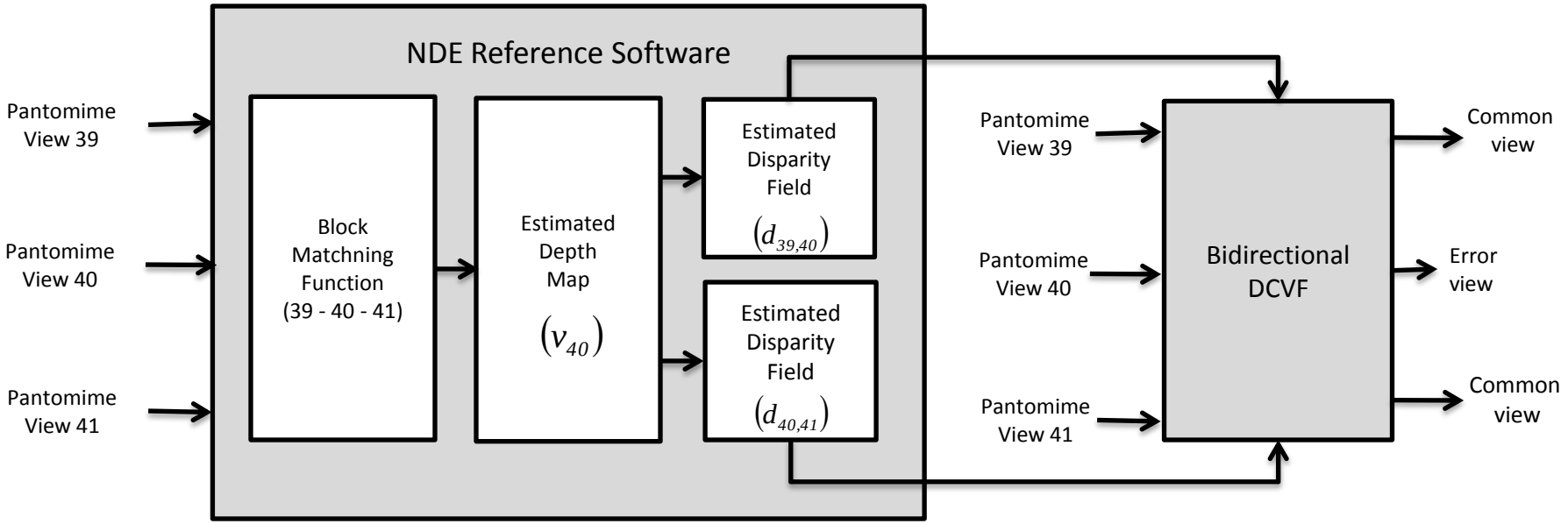
Experiment-(3) with Bidirectional DCVF



$$d = \left\lceil f \cdot l. \left(\frac{v}{255} \left(\frac{1.0}{Z_{near}} - \frac{1.0}{Z_{far}} \right) - \frac{1.0}{Z_{far}} \right) - \Delta d \right\rceil$$

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Experiment –(3) Results

Energy ratio = 0.92%

Error view

Common view between view 39 and 40

Common view between view 40 and 41

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Results

DVF Estimation Method	Test Data	Energy Ratio (%)
Unidirectional DCVF		
Experiment with UDCVF	Pantomime	0.42
Experiment with UDCVF	Modified Pantomime	0.46
Experiment with UDCVF	Dog	2.41
Experiment with UDCVF	Champagne Tower	2.01
Bidirectional DCVF		
Experiment -1	Pantomime	0.37
Experiment -2	Pantomime	0.18
Experiment -3	Pantomime	0.92

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Conclusion

DVF extraction from the NDE reference software has its limitations due to depth map representation.

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Future Directions

Explore more efficient DVF representation for the multiresolution analysis and synthesis.