Overview of Progress

Overview of the multiple implementen algorithm. We have the standard Lukas Kanade implemented on gray scale image. The Lukas Kanade with multiple channels for color images. Finally, we have the Lukas Kanade with Multiple Channels, Multi Resolution and Iterative Refinement.

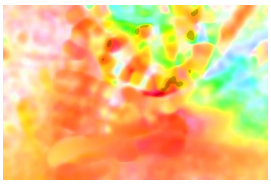
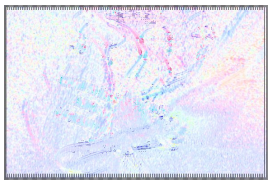
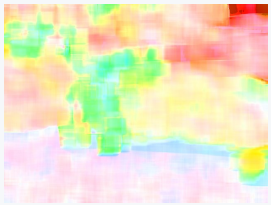
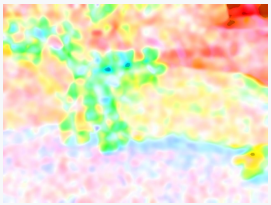
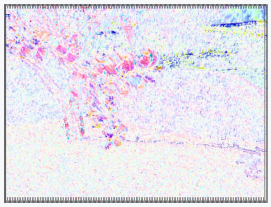
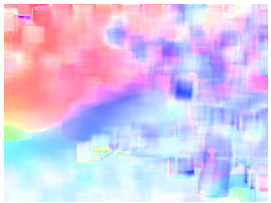
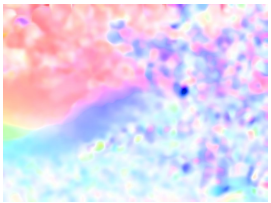
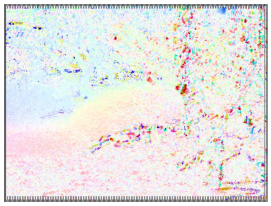
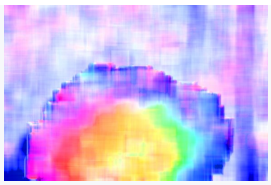
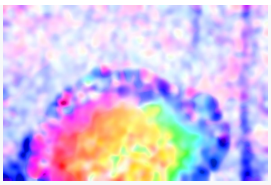
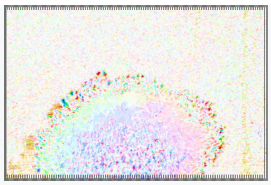
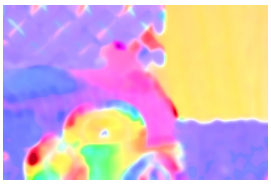
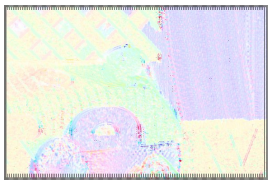
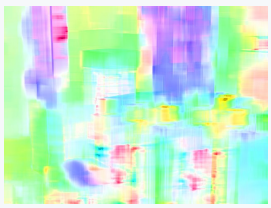
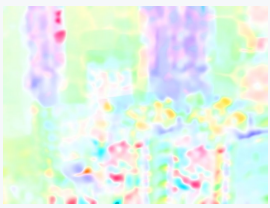
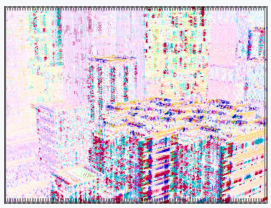
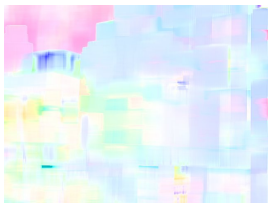
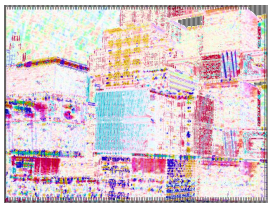
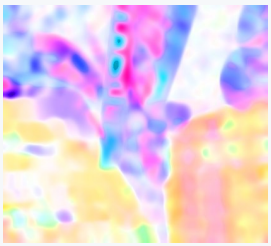
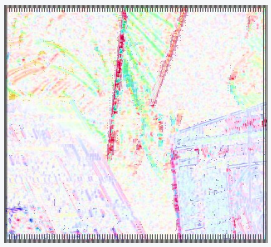
Image	*LK Gray*	*LK Color*	*LK MC+MR+IR*
Dimetrodon			
Grove2			
Grove3			

Image	*LK Gray*	*LK Color*	*LK MC+MR+IR*
Hydrangea			
RubberWhale			
Urban2			
Urban3			
Venus			

Comparing best results to the true flow

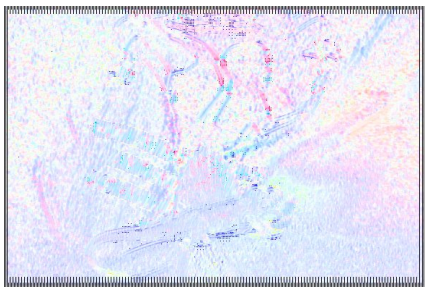
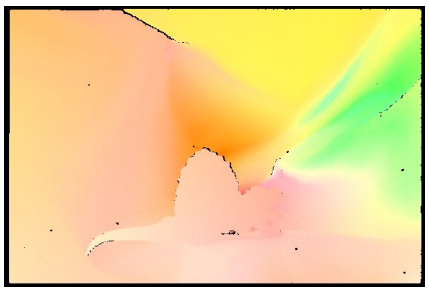
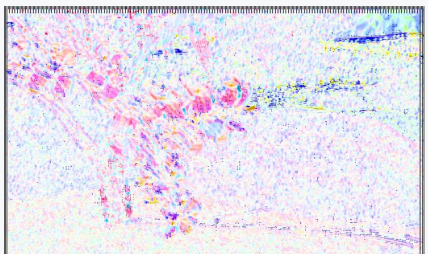
Image	*LK MC+MR+IR*	*True flow*
Dimetrodon		
Grove2		

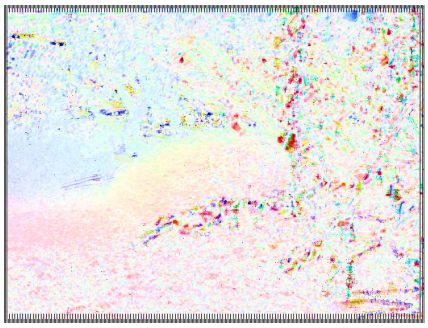
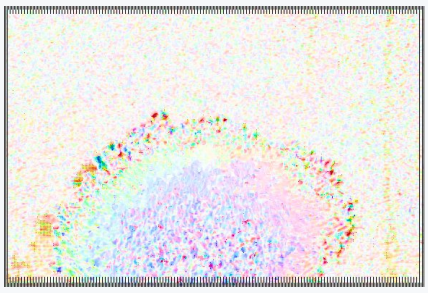
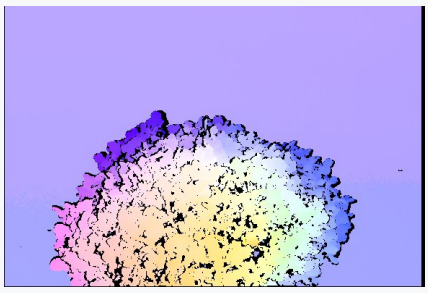
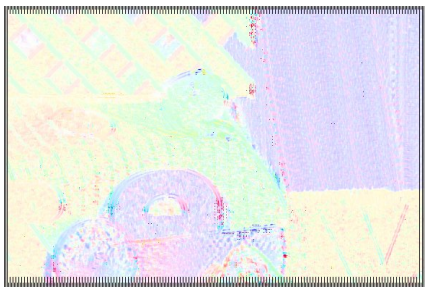
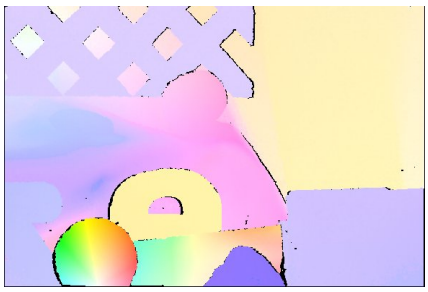
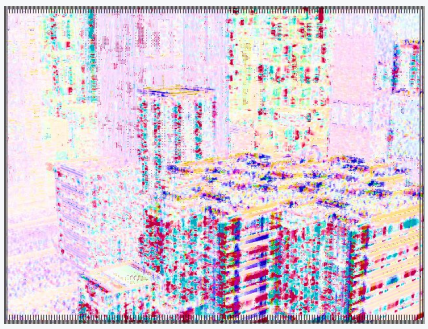
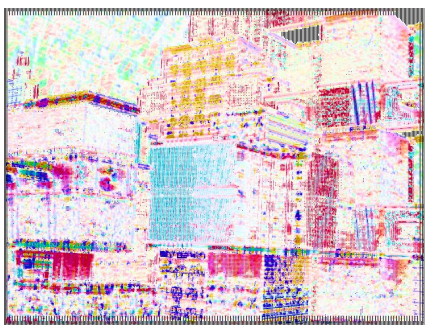
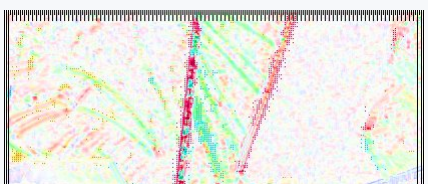
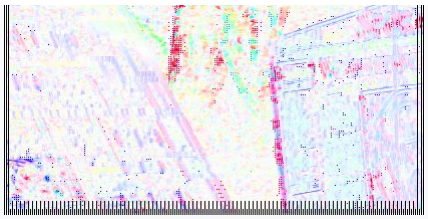
Image	*LK MC+MR+IR*	*True flow*
Grove3		
Hydrangea		
RubberWhale		
Urban2		
Urban3		
		

Image	*LK MC+MR+IR*	*True flow*
Venus		

Comparing our Average End-Point-Error statistics to the statistics of the professor

Image	*LK MC+MR+IR*	*Professor*
Dimetrodon	1.95 (0.71)	0.392
Grove2	3.03 (0.5)	0.308
Grove3	3.84 (2.37)	0.988
RubberWhale	1.13 (0.49)	0.345
Hydrangea	3.65 (1.17)	0.468
Urban2	8.32 (8.1)	0.572
Urban3	7.22 (4.39)	0.862

Comparing our Average Angular Error statistics to the statistics of the professor

Image	*LK MC+MR+IR*	*Professor*
Dimetrodon	55 (13)	8.48 (14.95)
Grove2	37 (6)	4.08 (8.26)
Grove3	38.4 (23.1)	8.18 (16.39
Hydrangea	36 (14)	9.68 (18.74)
RubberWhale	73 (11)	6.87 (18.46)
Urban2	39 (29)	7.78 (17.39)
Urban3	27 (15)	5.53 (16.64)

Conclusions

We conclude that using the informating within the color channels is informative to calculate the optical flow. The biggest difference we found is using multi resolution and iterative refinement. We believe that Lucas Kanade made a big jump in performance using MR and IR due to Lukas-Kanade being a local approach.

In regular optical flow method, we assume the following: a) brightness constancy b) small motion c) Spatial coherence

We conclude that using the information from within the color channels is informative to calculate the optical flow.

Now, if the object were to move a larger distance then the traditional optical flow method would work bad. This is why, we use gaussian pyramids (coarse-to-fine) method to apply optical flow.