



Phillip Napieralski

# REU

# WEEK 12 PRESENTATION

# From last time

	Z	S	FS	BS	P	V	St	Tw	R	Ci	Lsb	Rsb	Inf	Ca	Tri	
Zorro	0.5	0	0	0	0	0	0	0	0	0.2	0	0	0.3	0	0	
S	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	
Forward_Slash	0	0.7	0.1	0	0	0	0	0	0	0	0	0	0	0	0	
Back_Slash	0.1	0	0.1	0.1	0	0	0	0	0	0	0	0	0	0.7	0	
Pigtail	0.1	0	0	0	0.1	0	0	0	0	0.2	0	0	0.3	0.3	0	
V	0	0	0.1	0	0	0.4	0	0	0	0.4	0	0	0	0	0.1	
Stab	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
Twist	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	
Rectangle	0	0.1	0	0	0	0	0	0	0.9	0	0	0	0	0	0	
Circle	0	0	0	0	0	0	0	0	0	0.9	0	0	0.1	0	0	
Left SB	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	
Right SB	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	
Infinity	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
Caret	0	0	0	0	0.4	0	0	0	0	0	0.1	0	0	0.5	0	
Triangle	0	0.1	0	0	0	0	0	0	0.4	0	0	0	0	0	0.5	
																0.666666667


- Average accuracy: 66.67%

# New Dataset (PaF)

- Official PaF dataset
  - Contains 10 gesture instances from Kevin, 10 from Ben and 10 from Lance
  - Total of 450 gesture instances to test on



# New Results 1

- Add Jon's features
    - Divide egomotion (R & T) matrix into 4 sections
  - Also, divide into 2, 3 and 4 sections
    - Had best results
  - For each section, find the signed average
  - Feature vector is 56 items long
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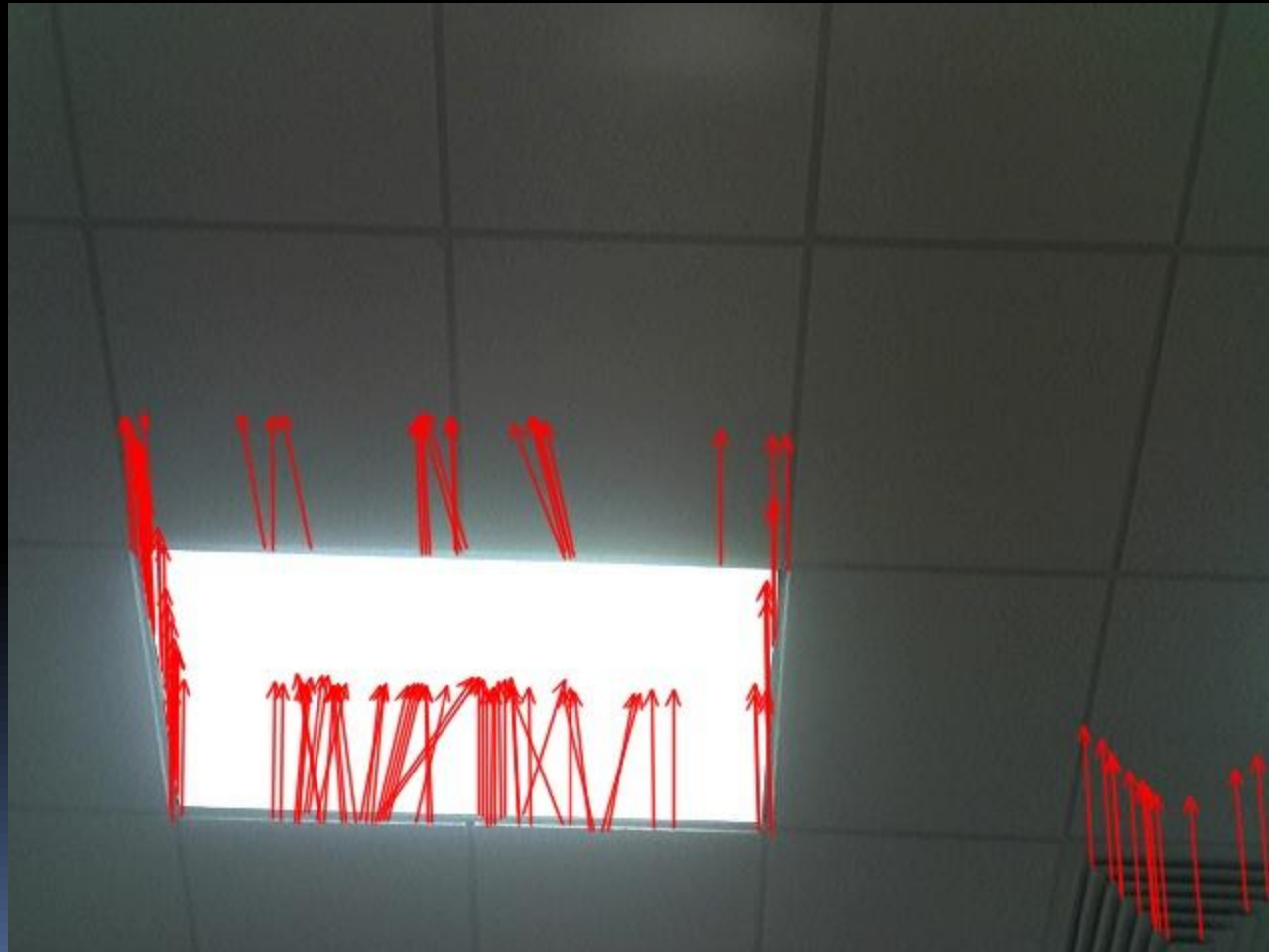
# Improving it



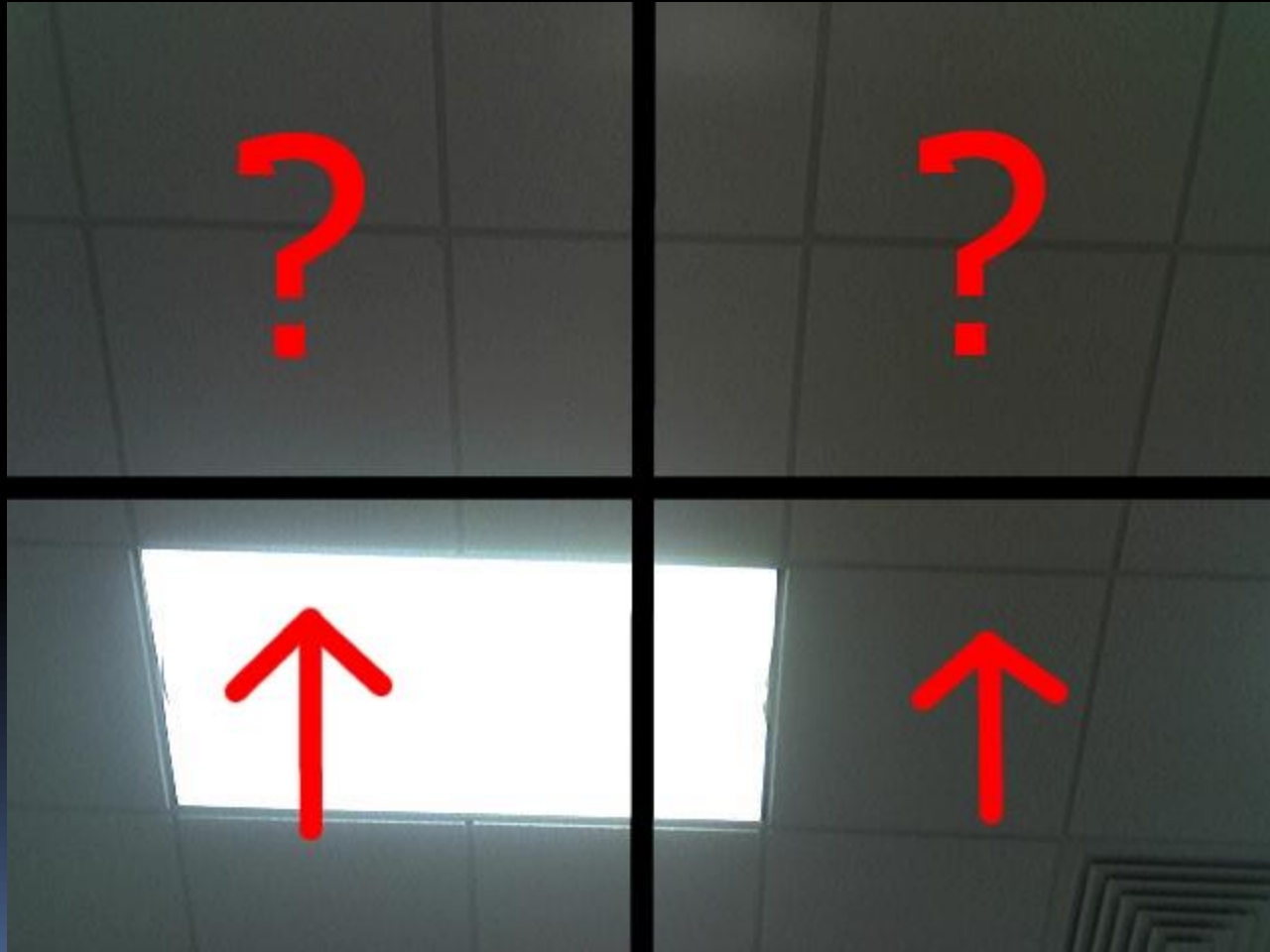
# Improving It



# Improving It




# Improving It







# Improving It

- Moral: Consider the average optical flow over the whole image plane
  - This allows many more great circles and thus greater accuracy
  - In practice, using just the whole image plane gives the best results
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# New Results 2 (Kevin)

- Using the new classifier (Euclidean distance):
  - Without whole image plane averaging:
    - 76.7% average accuracy on Kevin's data
  - Whole image plane exclusively:
    - 87.3 % average accuracy
  - 3x3, 2x2 and whole image plane:
    - 89.3% average accuracy
  - Now test it on the official PaF data set

# New Results 3 (PaF)


- Using the new classifier (Euclidean distance):
  - 2x2, 3x3 and whole image plane averaging:
    - 86.2% average accuracy on PaF
  - Whole image plane exclusively:
    - 88.9% average accuracy
- Conclusion: The 2x2 and 3x3 cases are still too noisy in the long run

# New Results 4 (PaF)

- Using the new classifier (Manhattan distance)
  - 2x2, 3x3 and whole image plane averaging:
    - 83.6% average accuracy
  - Whole image plane exclusively:
    - 89.6% average accuracy
- Conclusion: Average the whole image plane only and use manhattan distance



# Other things

- Sliding window is implemented
    - Real-time gesture recognition works well
  - Paper is up to 6 pages (goal of 8)
  - Web page is completed
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# Questions?

UCF Computer Vision REU  
Summer 2009

Phillip Napieralski



## About Me

I'm a rising senior at BSU. This website was built as part of the UCF Computer Vision REU requirements.

## Acknowledgements

I'd like to acknowledge my project advisor Niels da Vitoria Lobo, Marshall Tappen, and Mubarak Shah for making this summer interesting and enjoyable.

I would also like to acknowledge Prince Gupta for being an excellent mentor.

## Associates

Jon Harter and Prince Gupta

Personal Website: [pnapieralski.com](http://pnapieralski.com)

## Research Abstract

We created a device that can be used for human-computer interaction (HCI). This is done by first calculating the optical flow from four cameras that are set up in a "cross" formation and then analyzing the egomotion from them. We then train a simple classifier on the egomotion that we found and then obtain real-time gesture recognition results.

## Powerpoints

Week 1  
Week 2  
Week 3  
Week 4  
Week 5 (Out of town)  
Week 6 (CVPR 2009)  
Week 7  
Week 8  
Week 9

