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## Image Stacks

15-463: Rendering and Image Processing  
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### Announcements

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We are now done with the first part of the course,  
broadly defined as:

#### SINGLE IMAGE STUFF

Now, we are ready to move on, but first...

#### MID-TERM

- Week from today: Thursday, Oct 21, in class
- Will take about an hour
- Closed books, closed notes, one double-sided "cheat-sheet" allowed
- Covers everything up to this point
- Review on Tuesday (bring questions!)

## The story so far...

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Figure by Leonard McMillan

So far, we dealt with but a little part of our Plenoptic Function:

- A pencil of rays through **one** point
- At **one** instance in time
- A 2D snapshot, an instantaneous **image** of the world

We have been frozen in space-time, with no way to get out...

...now we are reading to break out of 3D

## Breaking out of 2D

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...now we are ready to break out of 2D



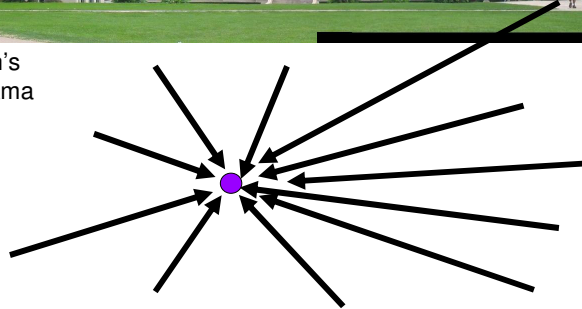
And enter the real world!



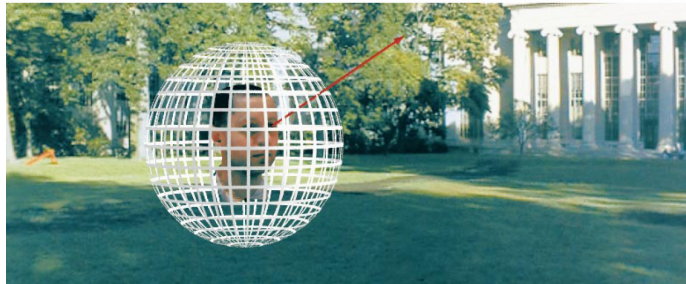
## All rays are not equal



Suporn's  
panorama



## Recovering structure



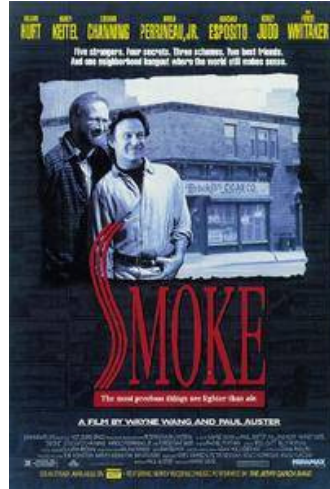
Q: What must we do to uncover the structure of the world?

A: Move!

- in space
- and/or in time
- Not 2D anymore!

## “Smoke” (1996), the “photo album scene”

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## Moving in Time

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Moving only in time, while not moving in space, has many advantages

- No need to find correspondences
- Can look at how each ray changes over time
- In science, always good to change just one variable at a time

This approach has always interested artists (e.g. Monet)

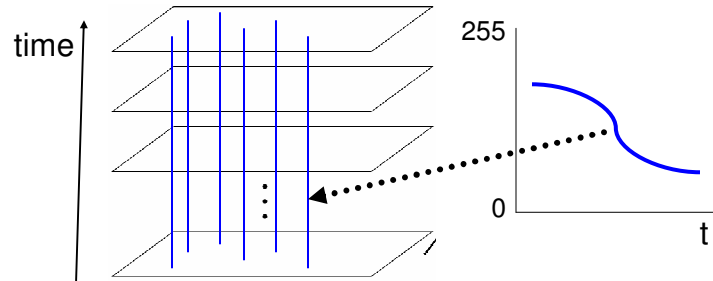


Modern surveillance video camera is a great source of information

- There are now many such WebCams now, some running for several years!

## Image Stack

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As can look at video data as a spatio-temporal volume

- If camera is stationary, each line through time corresponds to a single ray in space
- We can look at how each ray behaves
- What are interesting things to ask?

## Average Image

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Compute the average value of each pixel

What will it do?

