Lenses

Introduction to Digital Photography

Lecture outline

- Lenses
  - Wide angle, “Normal,” Telephoto
  - Zoom, Prime
  - Specialty
    - Macro
    - Tilt-shift
    - Pinhole
    - Lensbaby
  - Angle of view
  - Focal length & distortion

Lenses

- Lenses can be broken down into three main categories based upon focal length
  - Wide angle: lenses between 10.5mm – 35mm
  - Normal: lenses between 35mm – 85mm
  - Telephoto: lenses over 85mm

- Lenses can also be broken down into two other categories based upon focal length
  - Prime: fixed focal length
  - Zoom: variable focal length

Lenses

- Prime lens
  - Fixed focal length
  - Good aperture = “fast” lens, good for low light

Lenses

- Zoom lens
  - Variable focal length
  - @ 17mm, maximum aperture is *f* 4
  - @ 85mm, maximum aperture is *f* 5.6
  - Close focusing of .35m / 1.2’

Lenses

- Zoom lens
  - Variable focal length
  - @ 24mm through 70mm the maximum aperture is *f* 2.8

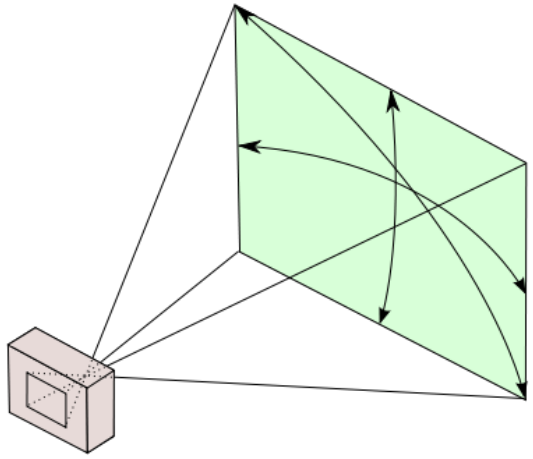
Lenses

- Tilt shift
  - Tilts focal plane

Lenses

- Lensbaby
  - Selective focus
  - Fixed aperture rings
  - Inter-changeable optics
  - Great for soft focus portraits

Angle of View



Wide angle | Normal | Telephoto

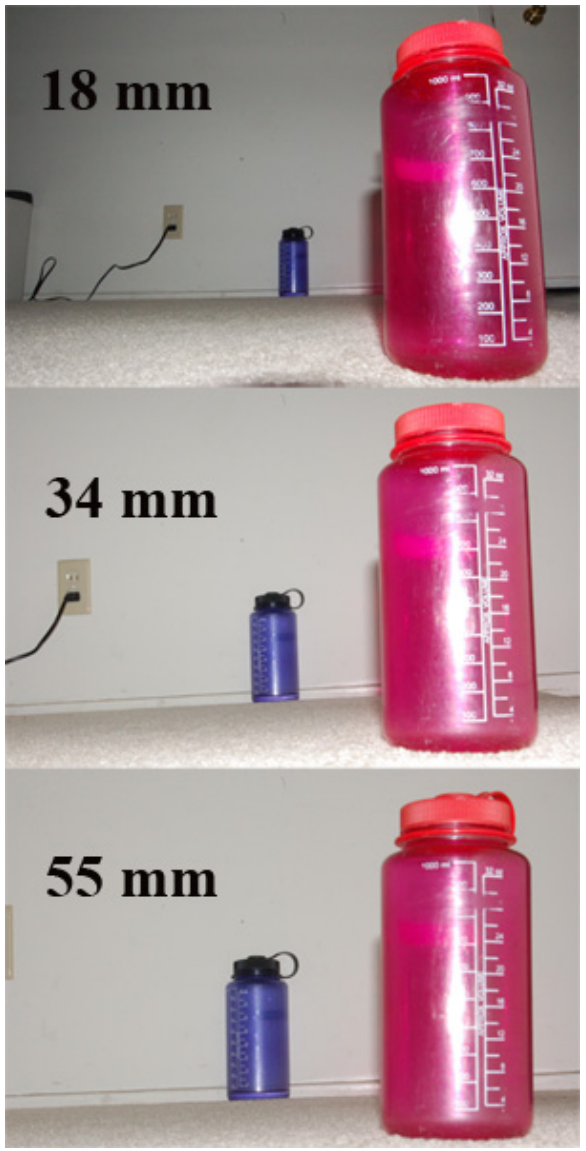
Focal Length (mm)	13	15	18	21	24	28	35	43.3	50	70	85	105	135	180	200	300	400	500	600	800	1200
Diagonal (°)	118	111	100	91.7	84.1	75.4	63.4	53.1	46.8	34.4	28.6	23.3	18.2	13.7	12.4	8.25	6.19	4.96	4.13	3.10	2.07
Vertical (°)	85.4	77.3	67.4	59.5	53.1	46.4	37.8	31.0	27.0	19.5	16.1	13.0	10.2	7.63	6.87	4.58	3.44	2.75	2.29	1.72	1.15
Horizontal (°)	108	100.4	90.0	81.2	73.7	65.5	54.4	45.1	39.6	28.8	23.9	19.5	15.2	11.4	10.3	6.87	5.15	4.12	3.44	2.58	1.72

Ultra wide angle | Wide angle | Med. Telephoto | Super Telephoto

Table from: http://en.wikipedia.org/wiki/Angle_of_view

Focal Length & Distortion

- Distortion
  - Shorter focal length & larger angle of view increases distortion
  - Primary reason why portraits are taken with at least an 85mm focal length to minimize distortion of face



Fisheye Lens (10.5 mm – Ultra wide angle)

Pro:

- very sharp at center of image
- very deep depth of field (image sharp from front to back)
- lens has nearly 180 degree angle of view

Con:

- exaggerated distortion along edges due to design of lens elements