Master on Robotics: Perception Systems - Exercise 1.3

Juan Pedro López Cabrera

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1 Exercise 3

Go to the link `http://www.ptgrey.com/blackfly-09-mp-color-gige-vision-poe-sony-icx692-camera`, which is a digital camera from one of the major camera brands used in robotics.

a. Try to understand the specs by drawing them in a sketch similar to that of slide 14.

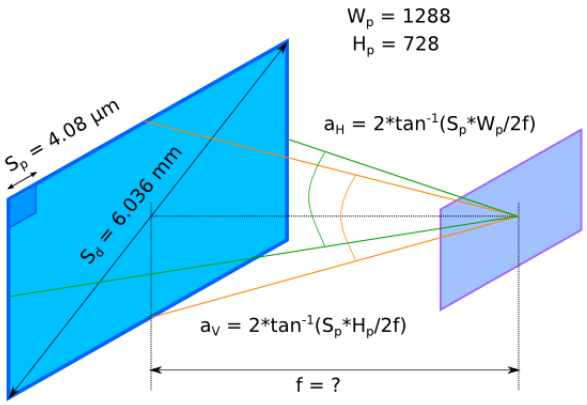

Figure 1: Cam specs diagram.

b. Using a Lense of 8mm (`http://www.ptgrey.com/m12-micro-lens-8mm-3`), How many pixels will represent the Mona Lisa painting if it is situated at 1,2,5,10 m ? Draw a plot distance-pixels. (Mona Lisa dimensions are: 77cm x 53 cm, `https://en.wikipedia.org/wiki/Mona_Lisa`)

The proposed formula to solve this exercise should be divided in two: one for the horizontal pixels and one for the vertical pixels. We'll multiply them later to get the final amount of pixels needed to represent the Mona Lisa.

$$horizontal\ pixels = \frac{pixel\ width \times width\ of\ the\ Mona\ Lisa}{2 \times distance \times \tan\left(0.5 \times horizontal\ angle\right)} \quad (1)$$

$$vertical\ pixels = \frac{pixel\ height \times height\ of\ the\ Mona\ Lisa}{2 \times distance \times \tan\left(0.5 \times vertical\ angle\right)} \quad (2)$$

Given these formulas, we can calculate how many pixels we need to represent the Mona Lisa:

- At 1m, 1509 horizontal pixels x 1039 vertical pixels are needed.
- At 2m, 754 horizontal pixels x 519 vertical pixels are needed.
- At 5m, 301 horizontal pixels x 207 vertical pixels are needed.
- At 10m, 150 horizontal pixels x 103 vertical pixels are needed.

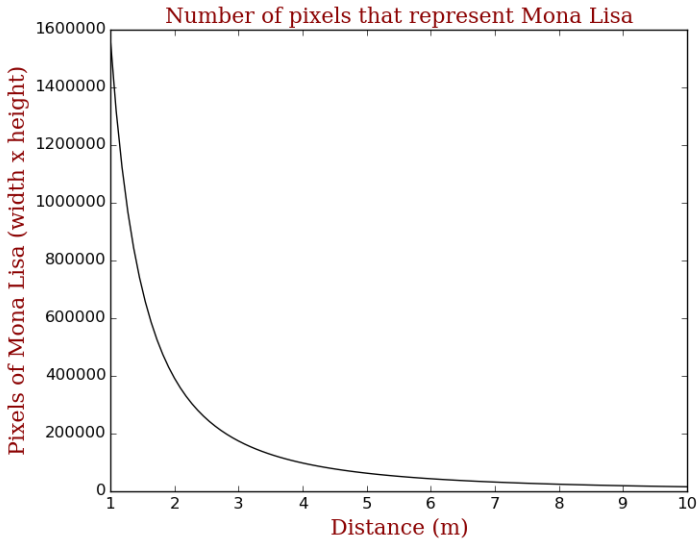

Figure 2: Distance vs pixels plot.

c. Why the proposed (linked) lense in b) could not be used easily with this camera ?

   The proposed lens has an S-mount which has an M12 thread, whereas our camera can only use CS and C-mount lenses which have 1 inch threads.