

Quiz 2

- ① Assuming this camera matrix please fill in the correct correspondences:

$$\begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix}$$

$$f = cy$$

$$a = fx$$

$$c = cx$$

$$e = fy$$

$$i = 1$$

~~$$fx$$~~

~~$$cy$$~~

~~$$fy$$~~

~~$$cx$$~~

~~$$1$$~~

- ② Order the following stereo vision algorithms, according to their typical computational complexity: (where 1 is LEAST computational demanding, and 3 is MOST comp. demanding).

1 Dense local Stereo Vision Algorithm

3 Dense Graph Cuts-based Stereo Vision Algor.

2 Dense dynamic Programming-based Stereo Vision Algorit.

- ③ Consider the following two tables and calculate their dissimilarity using as metric the sum of squared differences.

$$A = \begin{pmatrix} 10 & 15 & 20 \\ 20 & 20 & 25 \\ 10 & 15 & 20 \end{pmatrix}; \quad B = \begin{pmatrix} 15 & 15 & 15 \\ 20 & 20 & 20 \\ 30 & 30 & 30 \end{pmatrix}$$

$$D = \sum (A_{ij} - B_{ij})^2 \rightarrow D = (10-15)^2 + (15-15)^2 + \dots + (20-30)^2$$

$$D = 800$$

④ Consider a stereo vision system. Choose:

- ☐ The baseline intersects the epipolar plane at the epipole
- ☐ All epipolar lines are parallel to optical axis
- ☒ The epipole lies on the baseline-containing line
- ☒ The epipole can be outside the images
- ☒ All epipolar lines intersect at the epipole
- ☐ All epipolar lines meet at the optical center
- ☐ In certain cases, there can exist just one epipole

⑤ What does a low disparity value mean?

- ☐ The matching pixels are found far from the same position in both images.
- ☒ The matching pixels are found near the same position in both images.
- ☐ Disparity does not tell us the position of the pixels, but about how similar they are.
- ☐ There are no matching pixels between the two images.

⑥ Assuming a camera at location $[X, Y, Z] = [0, 0, 0]$ with a pose defined by the following rotation matrix:

$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ given a camera matrix $\begin{pmatrix} 725 & 0 & 631 \\ 0 & 726 & 360 \\ 0 & 0 & 1 \end{pmatrix}$

At which "x camera coordinate" would the following 3D point be depicted? ~~776~~

$$[X, Y, Z] = [1, 1, 5]$$