

Project 5 Questions

Instructions

- 4 questions.
- Write code where appropriate.
- Feel free to include images or equations.
- **Please use only the space provided and keep the page breaks.** Please do not make new pages, nor remove pages. The document is a template to help grading.
- If you really need extra space, please use new pages at the end of the document and refer us to it in your answers.

Questions

Q1: Suppose you have a sequence of N images, and you have computed the $N - 1$ homographies between each image pair. Let $I_p \neq I_r$ be two images in the set. Thus, homography H_{rp} transforms image I_p to $I_r = H_{rp}I_p$. How can we relate the transformation from image I_p to image I_r assuming we have image I_q between them. What should we do if we need to transform image I_r to I_p using only the $N - 1$ homographies computed?

A1: Através da formula:

$$\begin{bmatrix} Vx \\ Vy \\ 1 \end{bmatrix} = \begin{bmatrix} h11 & h12 & h13 \\ h21 & h22 & h23 \\ h31 & h32 & h33 \end{bmatrix} * \begin{bmatrix} Ux \\ Uy \\ 1 \end{bmatrix}$$

Q2: Using the RANSAC method to fit data to a model is particularly interesting when the data is considerably noisy. Why using RANSAC in project 5 is interesting? Why the number of outliers tend to grow as you add new images to the mosaic?

A2: A utilização do RANSAC é interessante pois o mesmo é empregado para reconhecimento de objetos, ou seja, o RANSAC possibilita encontrar correspondências geométricas, utilizada para resolver a homografia entre as imagens. O RANSAC funciona em conjunto com o SIFT, no qual o SIFT detecta os pontos chaves de uma imagem.

O numero de outliers tende a aumentar pois as comparações ocorrem com o resultado da homografia e as imagens anteriores.

Q3: Suppose you are implementing a mosaicing application. Once defined the image that will be the mosaic plane, at the mosaic center, how can we transform the remaining images in only one step, i.e, what we must change in each homography matrix to account for the relative translation?

A3: É necessário tomar como base a imagem de centro do conjunto, e a partir dela calcular a rotação das outras imagens, deixando todas no mesmo plano.

Q4: If we know the homography matrix H_{rp} that transforms image I_p to I_r , how can we obtain homography H_{pr} ?

A4: A formula para calcular a matriz de homografia inversa é: