German University in Cairo
Computer Science and Engineering Department
Dr. Rimon Elias
DMET 901: Computer Vision

DMET 901: Assignment #4

Due: Thursday, January 15th, 2009

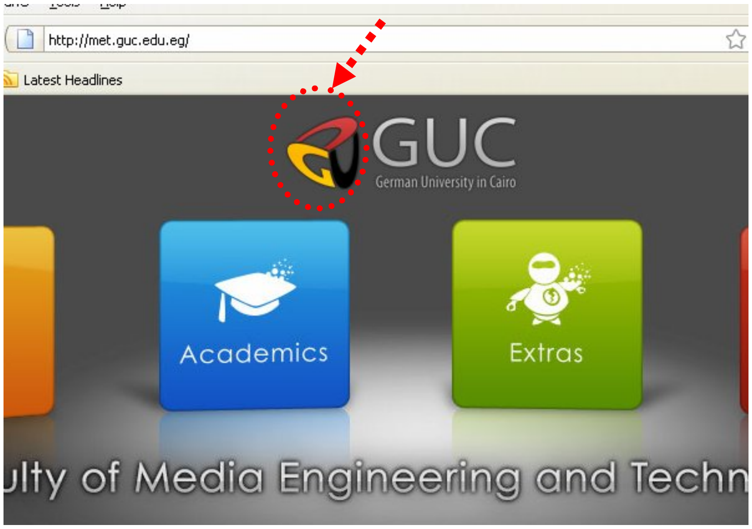
Important:

☞ The assignment is to be solved individually. You may discuss your work with your colleagues but you have to submit your own copy. Cheating cases will be dealt with firmly.

☞ You may use any built-in functions from OpenCV to achieve the results.

Question 1:

Some day you woke up to browse your beloved MET Web site and you noticed that the logo of the university has moved from its original location at the top of the page. You estimated the movement to be within ±5 pixels in the horizontal and/or vertical directions.


http://met.guc.edu.eg/
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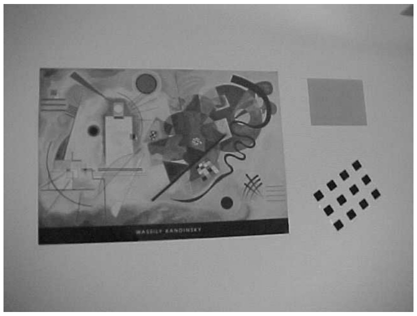
ulty of Media Engineering and Techn

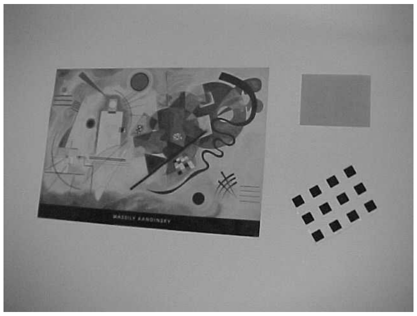
In order to prove this to your friends who did not believe you, you applied the correlation techniques SSD and SAD to the original image **`guc1.bmp`** and the image currently displayed **`guc2.bmp`** (images are posted) and you got the results. Were you right?! If yes, in what direction(s) was the logo moved?! And how far was it moved?!

Question 2:

Consider the image pair **painting1.jpg** and **painting2.jpg**.



painting1.jpg



painting2.jpg

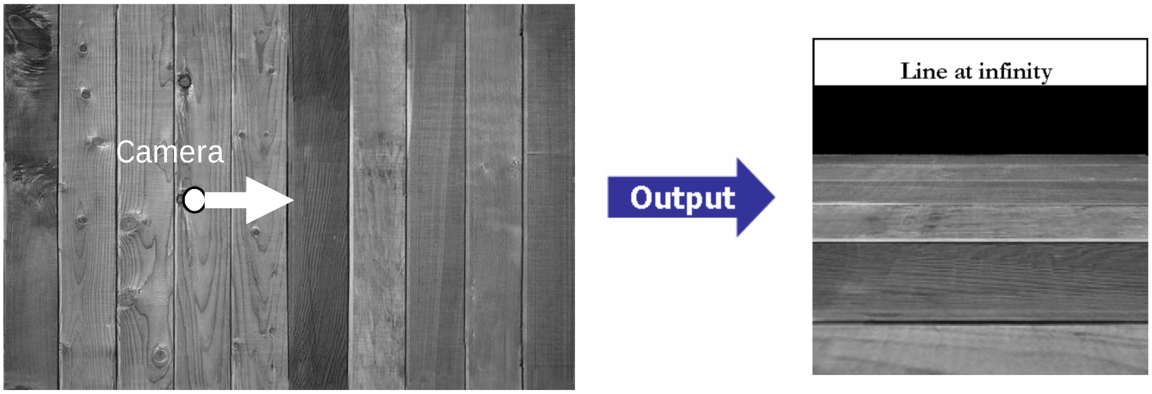
Manually determine a set of corresponding points (you may save them in a text file). Use RANSAC scheme to compute the fundamental matrices from the list of correspondences (two directions should be considered: from **painting1.jpg** to **painting2.jpg** and from **painting2.jpg** to **painting1.jpg**). Allow the user to click on any point in “any” of the two images to generate and display its corresponding epipolar line in the other image.

Question 3:

Rectify the previous two images (**painting1.jpg** and **painting2.jpg**) using homography transformation. This can be done by using the four corners of the painting to define a rectangular area parallel to the horizontal and vertical image axes. Apply all the steps of Question 2 again to the rectified pair. What differences were made?

Question 4:

If an image is placed on a horizontal flat plane and a virtual camera is observing such a plane, another image seen by this camera can be generated. See the example below.



Write a dialog-based application using OpenCV library to allow the user to open an input image and set a list of parameters for the virtual camera (e.g., focal length, location and orientation). Your code should generate the new view seen by the virtual camera. Note that the user should set dimensions of the output image. In your code, the line at infinity must be detected and only the points below that line should be considered in the final image. Apply the algorithm to an image of your choice.

Submission:

1. Submit a typed report, written as an MS Word file (or in LaTeX), including all results along with applicable theory and discussion including sample images and snapshots for the results.
2. Your code completed with useful comments.

Note that only Question 4 must be implemented as a dialog-based application. You may choose any type for the other questions.