Submission before: 03.01.2016
Discussion on: 04.01.2016
Submission on stud.ip, submission folder for sheet.
Please submit a zip file containing the .m files for Matlab programming tasks.

Exercise 1 *(Captcha – 10p)*

Three images of real captchas are provided with this sheet (`captchaN.jpg`). Use template matching to solve these captchas automatically. Templates for 26 characters are provided (`template.zip`). These templates are not perfect matches for the captchas but are generic versions of the alphabet (this may cause minor errors).

(a) Implement a function that reads in all templates located in a folder (*hint:* the templates have different sizes, so a Matlab cell array may be useful here).

Mean absolute difference?

(b) Implement a function that calculates the correlation coefficient and the mean average distance (MAD) between an image patch and a template.

(c) The captcha images exhibit a regular structure. Exploit this structure and adapt the templates to better match the target letters of the captchas.

(d) Try to identify the letters displayed on the three captcha images automatically. The structure of the captcha images can be further exploited for this task. Decide for yourself which measure (correlation or MAD) to use.

Exercise 2 *(Where's Waldo? – 10p)*

In the two images `wheresWaldo1.jpg` and `wheresWaldo2.jpg`, Waldo is hiding in the midst of a busy crowd. He always wears the same red and white striped sweater and hat. However, he may be carrying a something that varies from scene to scene.
Use template matching with the given Waldo templates (`Waldo.zip`) to locate Waldo. Highlight Waldo in the scene and indicate which template was matched.
Hint: as the images are quite large the matching procedure may take some time. Hence you may consider the following strategies:

1. First test your code on a suitable image patch to make sure it works, before applying it to the whole image.
2. You may try to identify promising regions in the image and apply template matching only to these regions.

Happy new year!