Assignment 2, Face Recognition, Computer Vision, 2018
Due: 11:59pm, 26/4/18

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Abstract

The second assignment is about face recognition. The submission will take the form of a conference paper.

1. Tasks

We have the following tasks in this assignment

1.1. Task 1: L2 method (40 points)

Following the definitions in [1], derive the solution of the following objective function

$$\operatorname*{argmin}_{\boldsymbol{\alpha} \in \mathbb{R}^n} \| \mathbf{x} - \mathbf{A}\,\boldsymbol{\alpha} \|_{\ell_2}^2 + \lambda \|\boldsymbol{\alpha}\|_{\ell_2}^2, \qquad (1)$$

where $\lambda > 0$. Try a different λ and explain how it may effect the result. Use equation (10) in [1] to find the face ID. You need to implement it and show results.

1.2. Task 2: L1 method (40 points)

Following the definitions in [1], derive the solution of the following objective function

$$\operatorname*{argmin}_{\boldsymbol{\alpha} \in \mathbb{R}^n} \| \mathbf{x} - \mathbf{A}\,\boldsymbol{\alpha} \|_{\ell_2}^2 + \lambda \|\boldsymbol{\alpha}\|_{\ell_1}, \qquad (2)$$

where $\lambda > 0$. Try a different λ and explain how it may effect the result. Use equation (10) in [1] to find the face ID. You need to implement it and show results.

Hint: you can download the face recognition code in [1] from myuni, and modify it to suit your needs.

1.3. Task 3: Face detector (20 points)

Use any face detector to detect the face first, and then to recognise them using the methods from Tasks 1 and 2.

1.4. Bonus Task 1: Face detection and recognition in a supermarket from a single image (10 points)

Develop an algorithm that can detect and recognise all faces in an image in a supermarket.

1.5. Bonus Task 2: Face detection and recognition in a supermarket from a video (10 points)

Develop an algorithm that can detect and recognise all faces in a video in a supermarket. Explain why we may need to use a video rather than an image alone.

2. Submission

Please submit a single zip file (compression) via myuni assignment submission interface.

In the zip file, please use two folders 'Report', and 'Code'. Place your report pdf file only in the 'Report' folder, and place your code in the folder 'Code'. Provide a README.txt file in the 'Code' folder to explain how to use your code (such as downloading&installing some packages, execution of your code). Do not put large packages/libraries in 'Code'. Use README.txt to explain how to get packages/libraries. Keep the submission light.

The report takes the form of a CVPR conference paper as we did before. CVPR papers are up to 8 pages, and most of them are 8 pages. As for the assignment, it is limited to maximally 8 pages too, and there is no minimum page requirement (as we adopt CVPR requirement). If you can impress us positively with only 1 page, that is great. Though I think putting everything beautifully in one page is much harder than putting them in more pages. We will not be marking the quality of your code, only checking that it shows enough evidence that you wrote it yourself.

References

[1] Q. Shi, A. Eriksson, A. van den Hengel, and C. Shen. Is face recognition really a compressive sensing problem? In *Proc. IEEE Conf. Computer Vision and Pattern Recognition*, Colorado Springs, USA, 2011.