G53VIS Coursework Description

Xin Chen & Andy French, 2018-19

1 Introduction

Binocular stereo is a classical problem in computer vision, and one of the best-understood components of biological/human vision. The key idea is that if image features arising from the same real world feature can be extracted and identified (i.e. matched between views), and camera geometry is known, the 3D position of the real world features can be recovered by triangulation. In practice, the computation of horizontal disparity (the difference between the x-coordinates of matched features) is a standard intermediate step, and disparity can be used directly as the depth information for some applications.

General steps involved in computational stereo vision are camera calibration, image rectification, dense correspondence matching, depth image generation. In this particular coursework, you are provided with pairs of rectified images. (Download from http://vision.middlebury.edu/stereo/data/scenes2003/ or Moodle). Your main task is to develop an algorithm to calculate the **dense correspondences** between the pair of images and estimate the **disparity map** (no need to convert to true depth).

2 Key dates

Submission deadline of proposal: 7th March 2019.

Feedback of proposal: 28th March 2019

Submission deadline of Matlab code and report: 13th May 2019.

3 Detailed requirements

Proposal:

You are asked to submit a 500-word proposal to describe the algorithm that you are going to use. Some methods will be suggested in Tutorial 4, but feel free to use any alternative methods you may find. Feedback of the proposal will be provided by 28th March, 2019. From then on, you will start to implement the method based on your proposal and the feedback.

Matlab code:

You need to implement the algorithm using **Matlab**. Save all .m files and the final report into a single folder and compress it into a **single .zip** file for submission. You **must** design your main file as a function that ready to be executed in the format as: [DisparityMap]=disparityEstimation (ImageLeft, ImageRight). The input parameters ImageLeft and ImageRight are the pair of images. Your code should be able to handle **any size** of images as input. **The output disparityMap must be the same size as ImageLeft and the disparity is calculated for imageLeft.** This is important in order for your work to be

properly marked. Note: it is **NOT** allowed to use Matlab built-in function to estimate the disparity (e.g. the link below).

https://uk.mathworks.com/help/vision/examples/depth-estimation-from-stereo-video.html).

Report:

You also need to submit a report that describe your work. A template in word and Latex are provided on Moodle, which is an IEEE conference paper format. You need to follow the template format in terms of font size and layout (double column). In the report, you must include the following sections: Abstract, Introduction, Methodology, Method Evaluation, Conclusion and Reference. The length of the report needs to be **minimum of 3 pages but no more than 4 pages**. Scientific writing will be introduced in one of the tutorials.

4 Marking Criteria

Proposal 10%	Understanding of the problem and method selection
Matlab code 40%	
Result evaluation 20%	The mark is objectively produced that is proportional to the evaluation performance.
Computation speed 10%	The mark is objectively produced that is proportional to the computational speed.
Coding Style 10%	Robustness of code and coding style
Report 50%	
10%	Description of key features of the implementation
15%	Explanation and presentation of the results obtained.
15%	Discussion of the strengths and weaknesses of the chosen approach and methods
10%	Scientific writing and clarity

5 Plagiarism

Copying code or report from other students, from previous students, from any other source, or soliciting code or report from online sources and submitting it as your own is plagiarism and will be penalized as such. FAILING TO ATTRIBUTE a source will result in a mark of zero – and can potentially result in failure of coursework, module or degree. All submissions are checked using both plagiarism detection software and manually for signs of cheating. If you have any doubts, then please ask.