School of Computer Science – Coursework Issue Sheet

Session	2018/19	**Semester**	Spring
Module Name	Computer Vision	**Code**	G53VIS/COMP3007
Module Convenor(s) **(CW Convenor in Bold)**	Andy French and Xin Chen		

Coursework Name	G53VIS Coursework	**Weight**	40%
Deliverable (a brief description of what is to be handed-in; e.g. 'software', 'report', 'presentation', etc.)	1. Proposal 2. Matlab code 3. Written report		
Format (summary of the technical format of deliverable, e.g. "C source code as zip file", "pdf file, 2000 word max", "ppt file, 10 slides max", etc.)	Proposal: PDF, 500 words max Matlab code: .m file Report: PDF, 4 page double column scientific paper format (template is provided)		

Issue Date	22nd February 2019
Submission Date	Proposal: 7th March 2019 Matlab code and Report: 13th May 2019
Submission Mechanism	Moodle
Late Policy **(University of Nottingham default will apply, if blank)**	Default
Feedback Date	Proposal: 28th March 2019 Matlab code and Report: 3rd June 2019
Feedback Mechanism	Moodle

Instructions	**Matlab Binocular Stereo System** 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 for some applications.

	1. **Design a binocular stereo algorithm** based upon the components discussed in the lectures (feature extraction, constraints, patch-based correlation, etc.). Your algorithm does not have to be novel; you are welcome to choose one of the methods described in the lectures. I would encourage you to at least think a little about variations on the theme, though, many stereo algorithms can be built from the elements we have discussed. Those of you considering a patch-based method might find it helpful to read the Scharstein and Szeliski paper available on Moodle, as it contains useful information on a wide range of matching cost measures. **Provide an outline of your design, and your reasons for choosing it, in a written proposal (500 words max).** **2. Write a Matlab program implementing your design.** 3. **Test your program on the Middlebury 2003 dataset** at http://vision.middlebury.edu/stereo/data/scenes2003/, comparing the disparity values you obtain with the ground truth provided by Middlebury. Some evaluation methods will be introduced in one of the tutorials. **Note** that these images have been rectified so that epipolar lines correspond to image rasters, so you do **not** need to consider camera calibration issues. There is also no need to consider converting disparity to depth; Middlebury provides ground truth disparity values. 4. **Write a report** (**4-page double column paper**) which: • presents your coursework in a structured scientific paper format (4-page double column, template will be provided, including section headings) • describes and justifies the steps included in your method, and the specific image processing techniques employed • clearly presents *and explains* the results obtained on the test images • critically evaluates your method on the basis of those results; what are its strengths and weaknesses? This section of the report should make explicit reference to features of the results you obtained and how they compare to the expectations you had of your design.
Assessment Criteria	Proposal: 10% Matlab code: 40% Report (50%): • Description of key features of the implementation: 10% • Explanation and presentation of the results obtained: 15% • Discussion of the strengths and weaknesses of the chosen approach and methods: 15% • Scientific writing and clarity: 10%