Computer Vision (600100)
ACW (60% of Module)
Counting Starfish
CAUTION: PRELIMINARY ACW

This ACW is preliminary, and some details may change. However, the task itself will not, nor the subcomponents.

This ACW contains a demonstration (face-to-face) component, which will be conducted at the end of Week 35 (timetabling permitting) afternoon of Friday 1st May 2pm onwards in Fenner 052 A&B. Code and Report deadlines are to be in Week 35; Wed 29th April by 2pm.

Deliverables:

MATLAB Script (.m/.mlx/.zip):	Wednesday 29th April by 2pm	45%
Report PDF	Wednesday 29th April by 2pm	35%
Software Demonstration	Friday 1st May 2pm onwards	20%

Assignment

Canvas contains a zip file of images, labelled Starfish-Images.zip. Each image within this contains a number of starfish. The primary image for the assignment is Starfish.jpg (shown below).

This image contains 5 starfish, with other objects, and noise has been added. The assignment task is to design and develop an image processing pipeline (series of MATLAB processes / steps) that can process an image provided to produce a graphical display; showing important steps in the processing pipeline and providing a final count on the number of starfish detected in the image. Your main script will need to be able to accept a file path and load the image it relates to, and input this through your implemented pipeline. Your pipeline should return a count, and the bounding box positions of the detected starfish.

The processing pipeline needs to be able to work on, and will be tested on, three more images from the zip file:

The first of the three additional images you will be tested on are variations on Starfish.jpg, but with different noise characteristics (i.e one of starfish_noise1.jpg to starfish_noise10.jpg). Nine noise variations are given within the zip file.

The second of the extra images will be variations upon Starfish.jpg but with different colour characteristics (ie one of Starfish_map1.jpg or Starfish_map3.jpg).

The third of these extra images will be one of the images that is not based on Starfish.jpg. E.g Starfish_5.jpg, or Starfish_17.jpg.

Note: You may not use the filename of a given image to switch program/pipeline logic. However, you may use image properties to determine the best course of action.

Software

MATLAB will be used for the ACW task, and is used throughout workshops. The workshops are based around this. MATLAB is available across University imaged machines. Students can install this, guidelines on this are available at:
https://support.hull.ac.uk/tas/public/ssp/content/search?q=MATLAB

You will need to ensure optional packages are installed (you may wish to check what is run in the labs). Primarily, this should include the Computer Vision packages. Further packages can be installed without requiring reinstallation of MATLAB itself.

Image Processing Pipeline

You will need to produce a MATLAB Script that processes the images. This will be used for the code submission, and the software demonstration. This can be a .m, or a .mlx file. If you wish to separate out functions into separate files for your pipeline you may submit these as part of a .zip submission. All of your code should be runnable on the Fenner 052 Imaged machines.
The sequence of image processing actions and function calls (whether MATLAB or your own) is the image processing pipeline.

You should ensure that your code is clearly commented for your proposed pipeline, with any functions you use; especially any parameters which you have found. It is expected that you write task specific functions for each major step in the image processing pipeline (i.e functions for handling major processing steps). Not only do these need to be documented in the code, but you should be able to explain them in the demo, and justify any functions used / developed within the submitted report.

Report

A report template is provided on Canvas for the Report section of this ACW.

Report (minus front pages & references) must be <u>within</u> 6 page maximum. Strict page limits will be enforced, with any extra pages being ignored (and no marks given for any work on those pages).

This should detail the pipeline you have developed, with justification for steps taken, as well as any results your pipeline generates for input images. The report will include a discussion section around the pipeline, its performance, techniques, and any improvements which could be made.

More information can be found in the template.