**Assessment Task**

Figure 1 illustrates the haematoxylin and eosin (H & E) stain. Haematoxylin and eosin (H & E) stain is one of the principal tissue stains used in histology. The cell nuclei is stained blue, and the cytoplasm is stained pink, with other structures taking a combinations of these colours. A representative example of a typical H & E images is given in Figure 1 below. Please note that the actual image set will be different to this image. This is a RGB image which has 3 channels (red, blue and green). You can choose any suitable channel and process the image, by applying appropriate techniques.



 Figure 1. Example representative segmentation biomedical image.

Please note the actual segmentation set may be different than these representative images.

Your solution should provide at least the following functionality:

* The ability to process all the images within the set.
* Choose suitable channel image to apply appropriate techniques.
* Clear segmentation of structures such as nucleus/ stroma in the image set.
* Simple numerical measurements of the nucleus in the images within the set, for example, size (area, perimeter), shape, and position in the image, orientation, and other parameters.
* Extract and display information such as number of nuclei in the image, percentage of pixels corresponding to nucleus, percentage of the image corresponding to stroma.
* Visualisation of the results to the segmentation, visual plotting of measures or plots of data from the image set
* Clean usable code functionality. Specifically, code written to operate as MATLAB .m functions in clear, readable and commented .m /.mlx files.
* A working solution. Please note that your solution may not be fully functioning for all image examples in the set and it is expected that you will have failures to the segmentation, however your code should operate without excessive manual intervention and without “bugs”.

You are then required to produce a technical report (of no more than 2000 words) which discusses your implementation and the theory behind its working.

Your report should discuss the theories to the image processing methods you have applied and any issues encountered. It should discuss the theory behind the algorithms you have applied alongside the merits of using different operations such as histogram equalization, thresholding, morphology, region growing etc.

You are required to demonstrate the development of your solution throughout the module in allocated demonstration times. This will form a project management element of the assessment and will be awarded as 10% of the assessment final mark (see marking criteria below).

**Submission Details**

The following need to be uploaded to the assessment link on Moodle:

* Professionally formatted completed as a .gdoc .odt .ott .oth .rtf .docx .doc , .pdf document
* .m files developed as part of the solution and any supplementary code functions.
* Any supplementary required images
* A clear “readme” file (.txt) detailing how to operate and run your solution.
* Attach the Assessment Coversheet and Feedback Form at the beginning of your coursework.
* The demonstrations will be within the tutorial sessions and the report will be 2000 words +/-10%.

Total word count 2000 +/- 10% (not including tables, figures, references, appendices, and other supporting document