**UFMFRR-15-M Machine Vision**

**Tutorial One**

1. Open the Tutorial\_One notebook in Google Colab. Run individual cells and observe the corresponding output. Use the hyperlinks in the notebook to help you learn more about Python and Numpy. You are encouraged to search for relevant examples online and execute the code in Google Colab.

2. Digital images are commonly represented by matrices (more on this in Week 3). With the help of the Tutorial\_One notebook, practise matrix operations including creating, indexing, slicing, concatenating and expanding matrices.

3. Complete the following exercises:

1. Create the matrix below using two different approaches and compare their respective execution times. Note that this matrix has 25 rows and 25 columns and only has non-zero elements (sequential and incremented by 2) on the diagonal.

*A* =

*Approach 1:*

* Step 1: construct a matrix (namely an array in Numpy) of the required shape and type, filled with zeros.
* Step 2: fill diagonal elements with the specified values in a *for* loop

*Approach 2:*

* Step 1: create a 1D array, filled with the diagonal values
* Step 2: convert it to a diagonal matrix

1. Create matrix B by preserving only the highlighted part of matrix A

*B* =

1. Scale matrix B such that the new matrix C has a minimum value of 0 and a maximum value of 255.
2. Find out what packages/libraries have been pre-installed in Google Colab. List those (up to 8) that are most relevant to image processing and machine learning.
3. Record your results and findings (including your reflections on these exercises). Continue to work on this exercise during non-contact hours.