Dalyell Group Week 4

Exercise

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1. Perform some manipulation similar to what is done in the recording. You may need to Google the relevant functions. The numpy documentation for n-dimension arrays can be helpful.

   In a Python interactive shell:

   a. Read the koala image `koala.tiff`;
   b. Find the 75 percentile (`p75`) of all signal intensities (SI);
   c. Find the pixels whose SI is above `p75` and halve their SI;
   d. Save the image using the file name `koala_processed.tiff`;
   e. Get the difference image (the SI difference of the `koala_processed.tiff` compared with the `koala.tiff`) and save it as `koala_diff.tiff`;
   f. Rotate `koala_diff.tiff` 90 degree clockwise and scale it to 50% of the original size. Save the result as `koala_diff_rot.tiff`.

2. Medical images are typically stored in a format call DICOM. A DICOM file has a header which contains the meta-information (i.e. scan type, scan date, etc.). To read a DICOM image, you need to use specialised modules, such as `pydicom`.

   Install the module `pydicom`. Refer to this guide about how to install third-party Python modules. Typically you should get it installed in the terminal (cmd in Windows) using

   ```
   pip install pydicom
   ```

   Get back to the Python interactive shell:
   (Data source: https://zenodo.org/record/16956#.XWc1b-P7Rpg)

   a. Read the DICOM image `MR000008`, assign it to a variable `dcm`;
   b. Use the print function to print `dcm`. What do you get?
   c. Get the `pixel_array` from `dcm` and assign to `data`. Now `data` holds the imaging data.
   d. Refer to the recording. Plot `data` using `matplotlib`;
   e. Save `data` as `MR000008.tiff`;
   f. Perform the same tasks in Question 1 on data and generate the corresponding files:
      i. `MR000008_processed.tiff`;
      ii. `MR000008_diff.tiff`;
      iii. `MR000008_diff_rot.tiff`;

3. In the previous question, the `MR000008` is taken a 3D scan. The whole scan is in `SE000001.zip`. Unzip this file and inspect three more slices.