Compressive Optic Neuropathy Study (CONS)

1 message

Joos Meyer <joos.meyer@gmail.com>
To: jmcanoy@gmail.com

Wed, Dec 4, 2019 at 8:23 PM

Hi Louie,

Thanks for coming in to the hospital to catch up today. Here's a synopsis of the study as well as the R code so far.

Goal - single row of GCL layer thickness values for each patient eye at each visit.

Specifications:

1. First cell in the row must represent the centre of the retina (fovea) and subsequent cells must be taken from an outwardly spiralling pattern
2. We will need to exclude the top and bottom few rows depending on where the central coordinate lies across all the scans. I think this will be a bit of a challenge as we'll need to find the central point of all the scans and check to see how off centre they get. The reason for this is so that when we extract the cells in a spiral we are confident that each cell represents the same position on the retina in each patient.
3. Find the coordinate of the retinal centre. Create a matrix of retinal thickness' at each point to do this and find the thinnest value. Use a heat map to confirm this is true. I will need to visually inspect each heatmap
4. Once you have the coordinate, use this to identify the first cell to extract from the GCL layer
5. Calculate GCL thickness matrix by subtracting RNFL from GCL.
6. Take cell by cell into a row from the central point spiralling outwards of the GCL layer

Background:

- A type of brain tumour called a pituitary adenoma can cause damage to the eye by compressive the nerve that supplies the eye. This nerve is called the optic nerve.
- The optic nerve exits the back of the eye and runs backwards into the head and connects to the brain. It sends visual information collected by the cells in the retina.
- The retina has 10 different layers. The Ganglion cell layer (GCL) is the layer where all of the cell bodies of the ganglion cells live. The ganglion cells send arms out which make up the retinal nerve fibre layer (RNFL) and run towards the point of exit of the eye. When all of the arms collect together, they form the optic nerve. Each ganglion cell has one arm which runs all the way to the brain.
- We measure the layers of the back of the eye with OCT scans. The OCT scanner we are using takes 512 x 25 point of interrogation. At each point it measures the depth of each layer.
- The export file has these points with numbers representing the distance from the scanner at each point. The deeper the layer, the larger the number.
- To calculate the thickness of a given layer, you must subtract the value of the deepest boundary from the most superficial boundary. For example, to calculate the GCL you must subtract RNFL from GCL.
- The reason we are interested in the GCL is that we think this will be more sensitive to detecting compression by a tumour than existing measurements.

Files attached:

- CONS.zip contains R project, scripts so far and the python scrip for the spiral coordinates.
- Test files.zip contains the test data .csv's. The naming convention is patient id_visit_eye for example 3_1_od is patient 3, visit 1, right eye. od is right, os is left. There are 2 patients with a number of visits each in the file.
- 23_3_od has n.a. values in the first row so you can see how they are handled
- Patient 22 is 49 line scans
- I think there is one 98 line scan in there somewhere but I don't know which one. Is it possible to identify this one?

As mentioned my main constraint is budget right now. Theres quite a bit else I'd like to work with you on but will depend on what I can afford. I have a number of research projects in the pipeline so depending on your level of interest, this could be a nice foundation for collaboration. There is another scanner that takes a different measurement which we will need to extract the data from also once I get the manufacturers approval for export next week sometime.

Let me know if any questions!

Cheers,

Joos

2 attachments

CONS.zip
34K

test files.zip
13677K