

Development of a 'Robot Mouse' approach to automate data extraction from OCT imaging and deployment in the VISUAL1 and VISUAL2 uveitis trials datasets

Taylor M¹; Liu X^{1,2}; Capewell N¹; Denniston AK^{1,2}

¹Department of Ophthalmology, University Hospitals Birmingham NHSFT

²Academic Unit of Ophthalmology, University of Birmingham

Background

Assessment of uveitis currently depends on subjective assessment. OCT provides an alternative, more reliable way of objectively quantifying and comparing disease activity for critical features such as vitreous haze¹. These 'inflammatory OCT metrics' currently require manual extraction which limit their usage.

Aims

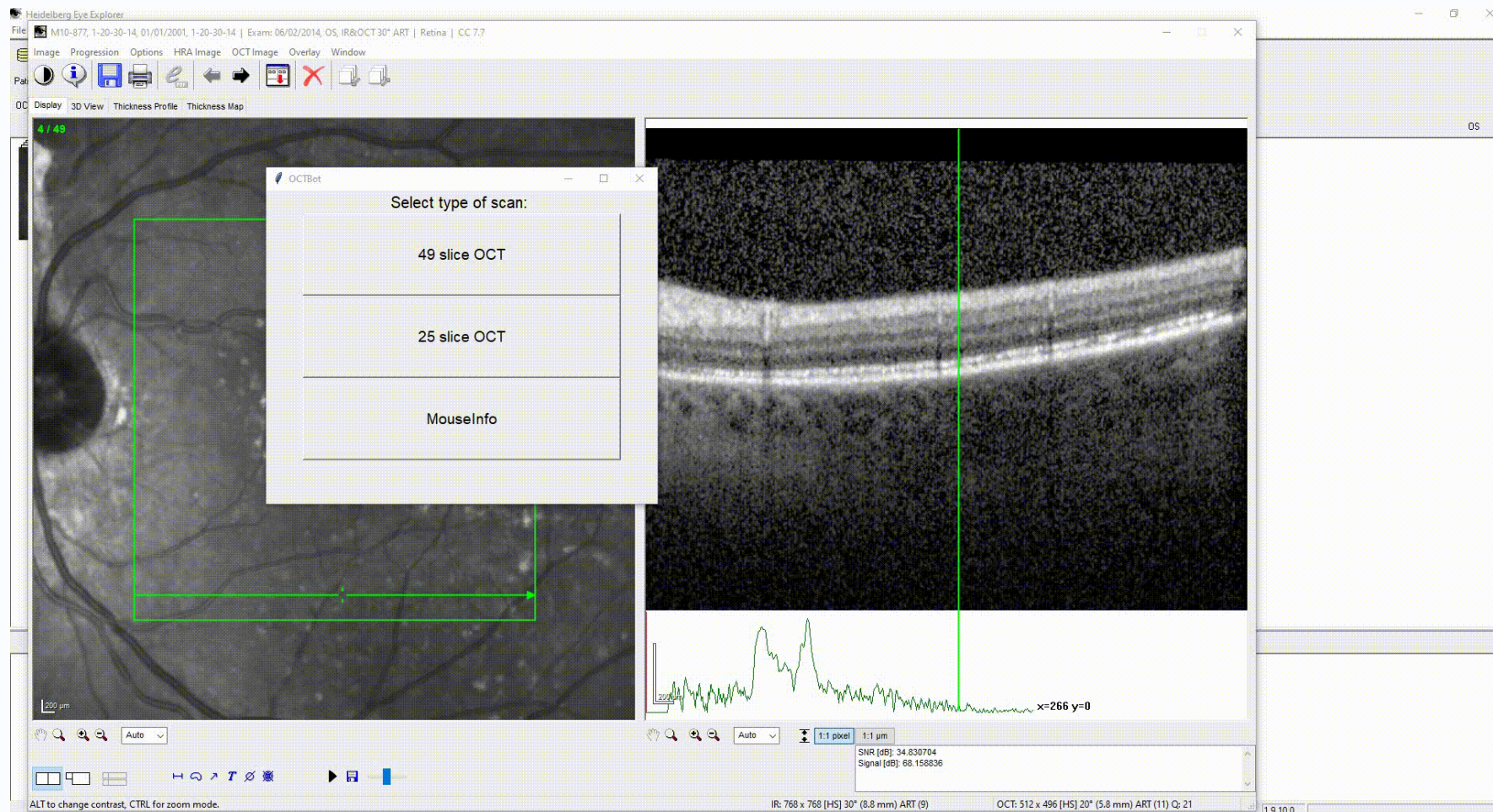
To design a 'robot mouse' (OCTBot) capable of automating data extraction from Heidelberg Eye Explorer (HEYEX), and to deploy it on the Abbvie VISUAL1/VISUAL2 trials² as a novel analysis of the tool on these landmark uveitis trials

Methods

OCTBot was developed using the PyAutoGUI library within Python. This library can replicate the mouse and keyboard function on computers, switch between open applications, and identify relevant features on the screen such as icons. The desired datapoints can be copied from a menu in HEYEX. Importantly, the features of interest (including the button for this menu and the datapoints within it) always occupy the same on-screen location. The coordinates for these locations can be programmed into PyAutoGUI, such that the computer is made to click these in a specified order. By alternating between HEYEX and Microsoft Excel, the computer copies and pastes three desired datapoints per B-scan, before moving to the next B-scan and repeating the process. This is repeated until all 25 or 49 B-scans have been analysed.

References

1. Keane PA et al. Objective measurement of vitreous inflammation using optical coherence tomography. *Ophthalmology*. 2014 Sep; 121(9):1706-14. doi: 10.1016/j.ophtha.2014.03.006.
2. Jaffe GJ et al. Adalimumab in Patients with Active Noninfectious Uveitis. *NEJM*. 2016 Sep; 375:932-943. doi: 10.1056/NEJMoa1509852



Results

OCTBot collects 147 datapoints in 244 seconds – equal to 1.7 seconds per datapoint. Manual data collection is highly variable, and at the fastest is equal to 8.6 seconds per datapoint. OCTBot is approximately 5x faster compared with manual data

collection, and requires no user input whilst it is running.

Conclusions

Robot mouse approaches permit rapid automated extraction of otherwise poorly accessible data fields

enabling large-scale analysis whilst reducing risk of transcription errors. We have developed a Robot Mouse approach to a new analysis with Abbvie of their VISUAL1/VISUAL2 trials in uveitis, and have so far collected 213654 new datapoints for vitreous haze analysis, enabling new approaches to detecting and monitoring inflammation.