INFORMATICS INSTITUTE OF TECHNOLOGY

IN COLLABORATION WITH

UNIVERSITY OF WESTMINSTER (UOW)

FINAL YEAR PROJECT 2018/2019

BENG(HONS) IN SOFTWARE ENGINEERING

Image Analysis and Data Extraction of Suprachiasmatic Nuclei

Author

R.M.M.M BANDARA

IIT ID: 2015045

UoW ID: w1583056

Supervisor

Mr Namal MALALASENA

April 23, 2019

Abstract

The circadian rhythm is a fundamental process in any organisms' daily life-cycle. It governs over the organisms bodily processes and has effects both in the short and long term. Despite this process being such a fundamental part of every organisms' life, research done in this area gets slowed down since researchers have a hard time manually sorting through the image data they obtain and coming to conclusions about various aspects of the data, such as data validity. In order to do this project, it was first necessary to understand that attempting to use simple image processing techniques to classify data as "correct" and "incorrect" is not possible since the data does not have a specific standard for correctness. Therefore, since image processing alone is incapable of proving a datasets' validity, this research presents an algorithm which uses a mix of image processing, digital filtering, and differential calculus to achieve this result. The final result of this project is a system capable of accepting a directory of images, then analysing the directory to determine whether the data contained in the directory is valid or invalid, as well as provide information on how neuron clusters form over time. A system like this proves that it is possible to automate certain areas of research, thereby increasing the speed of research being done.

Keywords— Data validation, First derivative test, Noisy signal pattern recognition, Savitzky–Golay filter