

UNIVERSITI TEKNOLOGI MARA

**OPTIC CUP AND OPTIC DISC
SEGMENTATION USING IMPROVED
SELFISH GENE ALGORITHM**

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Thesis submitted in fulfillment
of the requirements for the degree of
Master of Science

Faculty of Computer and Mathematical Sciences

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CONFIRMATION BY PANEL OF EXAMINERS

I certify that a Panel of Examiners has met on 29 October 2016 to conduct the final examination of Norharyati Binti Md Ariff on her Master of Science thesis entitled "Optic Cup and Optic Disc Segmentation Using Improved Selfish Gene Algorithm" in accordance with Universiti Teknologi MARA Act 1976 (Akta 173). The Panel of Examiners recommends that the student be awarded the relevant degree. The Panel of Examiners was as follows:

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own works, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations of Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Glaucoma is a disease that is defined by the pressure increased with the eyeball, causing severe damage to the optic nerve. One of the symptoms in glaucoma disease detection is an increased fluid pressure, which in the long term will damage the eye's optic nerve and it may in the worst case lead to blindness. Blindness due to optic nerve damage is irreversible unless it is intervened with proper treatment. In view of this, eye screening is important for early detection. Currently, the very important indicator for accessing the progression of glaucoma is the cup-to-disc ratio (CDR). Due to the complexity of Cup to Disc Ratio (CDR) measurement where the visibility of the boundary between optic cup and optic disc with high density vascular in the optic region, this research explores the methods that can detect the optic cup and optic disc by using digital fundus image as a cheaper solution for an eye screening. Image processing techniques were employed to segment and extract the optic cup and optic disc for glaucoma detection purpose. This study performed using a new bio-inspired algorithm; Selfish Gene Algorithm (SFGA) for optic cup and optic disc segmentation. In addition, this new algorithm is compared to color channel multi-thresholding segmentation and artificial intelligence segmentation based clustering method such as Adaptive Neuro-Fuzzy Inference System (ANFIS) and Fuzzy cMeans (FCM). From the results and analysis obtained from this research, it is established that improved SFGA is outperformed ANFIS, FCM, and Color Channel Multi-thresholding. Therefore, SFGA has potential to greatly improve outcomes for the current technology.

