AUTOMATIC RECOGNITION OF FRESHWATER ALGAE (*Oscillatoria sp.)* USING IMAGE PROCESSING TECHNIQUES WITH ARTIFICIAL NEURAL NETWORK APPROACH

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ABSTRACT

Cyanobacteria can be used as indicators to offer relatively exclusive information pertaining to ecosystem condition. Cyanobacteria react quickly and predictably to a broad range of pollutant. Thus provides potentially constructive early caution signals of worsening environment and the possible causes. Therefore the aim of this study is to develop an image processing and pattern recognition methods to detect and classify *oscillatoria* genus from Cyanobacteria found on tropical Putrajaya Lake (Malaysia). Computer-based image analysis and pattern recognition methods were used to construct a system that is able to identify, and classify selected Cyanobacteria genus automatically. An image analysis algorithm was implemented to contrast, filter, isolate and recognize objects from microscope images. Image preprocessing module used to contrast images, to remove the noise, and to improve image quality. Segmentation module used to isolate the different objects found in input image. A combination of Feed forward artificial neural network (ANN) with feature extraction module was used to train and recognize oscillator images. System accuracy was measured by using manual and automated classifying methods, and developed system showed a great accuracy system reach to 90%.

Keywords: Automated system; *Oscillatoria ps*; Image processing; recognition; Classification; Neural Network.

ABSTRAK

Cyanobacteria boleh digunakan sebagai petunjuk untuk menawarkan maklumat yang agak eksklusif yang berkaitan dengan keadaan ekosistem. Cyanobacteria bertindak balas dengan cepat dan boleh diramal untuk pelbagai jenis pencemar. Oleh itu memberikan isyarat amaran awal berpotensi membina persekitaran yang semakin teruk dan punca-punca yang mungkin. Oleh itu, Tujuan kajian ini adalah untuk membangunkan pemprosesan imej dan kaedah pengiktirafan corak untuk mengesan dan mengklasifikasi genus oscillatoria dari Cyanobacteria dijumpai pada tropika Putrajaya Lake (Malaysia). Kaedah pengiktirafan berasaskan komputer analisis imej dan corak telah digunakan untuk membina satu sistem yang mampu untuk mengenal pasti dan mengelaskan genus Cyanobacteria terpilih secara automatik. Algoritma analisis imej telah dilaksanakan Sebaliknya, penapis, mengasingkan dan mengiktiraf objek dari imej mikroskop. Modul pra pemprosesan imej menggunakan imej Sebaliknya, untuk menghapuskan hingar tersebut, dan untuk meningkatkan kualiti imej. Modul segmentasi yang digunakan untuk mengasingkan objek yang berbeza yang terdapat dalam imej input. Gabungan Feed rangkaian neural ke hadapan tiruan (ANN) dengan modul pengekstrakan ciri telah digunakan untuk melatih dan mengiktiraf imej pengayun. Ketepatan sistem telah diukur dengan menggunakan kaedah mengklasifikasikan manual dan automatik, dan sistem yang dibangunkan menunjukkan sistem ketepatan yang hebat sampai ke 90%.

Kata kunci: Automasi sistem; Oscillatoria id; Imej pemprosesan; pengiktirafan; Klasifikasi Rangkaian Neural.

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