

UNIVERSITI TEKNOLOGI MARA

**REAL TIME WASTE MATERIAL DETECTION
USING REGION-BASED CONVOLUTIONAL
NEURAL NETWORK (RCNN)**

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ABSTRACT

Waste material could be classified into few categories whether it is plastic, paper, glass and others including general waste. Nowadays, there is an approach by providing recycle bin that sort the recyclable waste material into its own category. However, there could sometimes mistakes in sorting the waste material into a correct category. In this research, a real time waste material detection using Region-based Convolutional Neural Network (RCNN) is developed. Methodology in this system consist of dataset development, pre-processing, classification and evaluation. In dataset development, all the images of paper, plastic and glass will be collected and kept in a folder. Next, the dataset will undergo pre-processing that creates bound box around the images. Then it will be trained by using RCNN model. Tensorflow and Anaconda virtual environment will be setup. A camera will detect the object and display each of the object detected in a windows. Each object detected will have a bound box around it and a text showing what is the category. For the evaluation, the overall result from conduction several test is the prototype is capable of classification up to 99% accuracy at most and not lower than 66%. The result of the classification also can be increased by training more data set. This system will be a stand-alone type system so that it could be adaptive to any platform. Last but not least, this research can be expanded more in future by continuing the system implementation. The system is expected to be implemented into every recycle bin around the world.

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CHAPTER 1

INTRODUCTION

1.1 Background of study

The welfare of our environment is very important. It needs to be contained in order to keep the future generation in healthy living environment. However, it is not that simple to make sure that it is contained. There are lot of factors causing it. The issue of waste material disposal management has recently gained widespread attention in virtually all states of Malaysia. With the communities facing rapidly increasing disposal costs, the opinion leaders denouncing the amount of materials thrown away as environmentally and ethically unsound, the lawmakers struggling for sustainable solutions. (Jereme et al. 2015)

Malaysia started the privatization of waste management operation in 1994(M. Budzik et al,2002). Gradually waste collection and public space cleansing service are being taken over by Alam Flora Sdn Bhd. To smooth the process, the consortia were instructed to take over the solid waste management over an interim period. The full-flash privatization is still to be determined by the government pending legislation based on the new National Waste Bill. Until the privatization is fully implemented, most aspects of solid waste management will be continued to be in the realm of Local Government.

Recycling means to compost and regenerate materials for original purpose or for other purposes . Recycling should be seen therefore as the means by which we seek to minimize the environmental impact of both raw material production and waste disposal. The popular meaning of recycling in most developed countries has come to the widespread collections and reuse of various items such as newspapers and drinks bottles. They are collected and