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**Project Created at Hack-n-Code 3.0**

Waste Classifier

*Developing a cleaner and healthier tomorrow*

*Confused with what to do with your trash? Can’t tell whether particular waste is recycle or not? Worry no more, & let us lend you a hand. Our program is designed to assist you with classifying waste and provide various labels which help determine a further course of action for that kind of waste. Join us in this mission for a better tomorrow.*

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Waste Classifier

1. **ABSTRACT**

**My friends, waste management is one of the most important steps to city planning because without prior waste management and disposal you can't make a urban city clean and hygienic.**

Now after collection of waste, all waste can't be treated in a same way or same place. It have to be segregated. Now this is the main and most important step of waste management. Without proper segregation, no waste management plan can actually work.

Once the waste are segregated, different type of waste are taken to different unit for disposal or recycling. All this is completely impossible with proper waste management techniques.

Planning the waste management and recycling for all of the rubbish produced in this country is an enormous task which involves both logistical planning and scientific knowledge and understanding in order to balance the impact on the environment and the cost effectiveness of the process.

**2.1 MOTIVATION**

Our dedication to our project is motivated by our drive to find a viable solution for the proper management and recycling of waste. Effective management of waste is a critical need in today’s time.Our program is built to assist in the segregation of waste based on the foundation of machine learning, supported by the core concepts of image processing and convolutional neural networks.

**2.2 PURPOSE**

As often it may be difficult to correctly identify the type of waste and possible measures to recycle or dispose waste. The application is intended to help this process and provide broad labels to types of waste in the present build. It may be incentivized for users as well by providing a reference to sites where they may be remunerated for their waste, e.g E-waste such as old mobile phones to encourage use of the program and inherently contribute to a better environment and planet for the larger populace.

1. **SOFTWARE USED**

**3.1 MODULES USED**

1. Python 3
2. OpenCV 3 w/ Python extensions
3. numpy
4. sklearn
5. keras
6. imutils
7. Pickle
8. Tkinkter
9. Pillow
   1. **ADDITIONAL IMPLEMENTATIONS**

* TensorFlow
* Os
* Glob

Captcha Breaker

1. **SOFTWARE AND CODE**

**4.1 GITHUB REPOSITORY**

The project can be found at: <https://github.com/owaisjh/WasteClassifier>

The main directory consists of:

* **Extract.py -** Isolates contours and assigns labels to the images.
* **Training\_model.py -** Trains the neural network model.
* **Summary.py -** Gives a summary of the training process.
* **Waste\_classifier.py -** Uses the trained model to predict the type of waste.
* **Waste\_model.hdf5 -** Stores the parameters of the generated model
* **Model\_labels.dat -** Assigns the predicted text as labels to solved Captchas
* **Readme.md -**  An overview of the GitHub repository

The current working model of the project is not publicly available outside of GitHub.

**4.2 Utilised Methods**

**4.2.1** **Computer Vision and Image Processing**

**4.2.2** **Convolutional Neural Network**

1. **USE AND DEMO**

**To train:**

python3 Extract.py

python3 trainng\_model.py

**To Run:**

python3 interface.py

1. **FUTURE SCOPE**

**6.1 DEPLOYMENT/RELEASE**

The current version may be considered a preview build. A pre-alpha release is planned for the near future.

**6.2 BASIC MODIFICATIONS**

Firstly, the size of the training data set will be increased and it will be trained to identify varieties of waste so as to improve its accuracy score. Secondly, dynamic machine learning can be used so that whenever a new waste image is introduced to the program, immediately the program is trained with that image.

**6.3 FEATURE ADDITIONS**

Creation of user-friendly application which will have additional features such as location of nearest waste disposal center, and a tracker of amount of different types of waste generated by a person and his family and incentives for disposing the waste effectively.

1. **BUG REPORTS AND CHALLENGES**

**7.1 VIEWING EXPERIENCE**

The current version is designed only for stable use on a Computer.

**7.2 AVOIDING ERRORS**

* Currently limited to attributing exactly 5 labels.
* Attempting to test captchas with multiple contours(objects) will result in error and failure to execute. Currently limited to processing exactly 1 object in the image due to limitations of available training data

*Programme: Bachelors in Technology(’22),*

Developed By

Team ARDSOH,

VJTI **Waste Classifier**