GARBAGE CLASSIFICATION USING IBM CLOUD

1.INTRODUCTION

a. OVERVIEW

- In garbage classification there are cardboard, glass, metal, paper, plastic, trash E-wastes total 6 different types of waste materials which are use for recycling
- In this project I have collected 6 types of waste materials
- Here I have 401 images belonges to cardboard , 493 images of glass, 403 images of metal, 593 images of paper, 473 images of plastic and 136 images of trash
- Apply imagedatagenerator functionality to trainset and testset
- Here I have trained the model using CNN learning technique for classification
- Finally test the trained model

b. Purpose

- To reduce the work of humans to classify the waste
- To reduce health problems faced by humans during classifying the waste
- It would reduce the work of classifying garbage items just before recycling because it would be done properly at user level only in better manner
- If we manually implement it at user level ,it is difficult to place different set of dustbins available with proper classification known to every user. automating it would remove human errors.
- To classify the garbage waste by seeing the image

2.LITERATURE SURVEY

a.Existing problem

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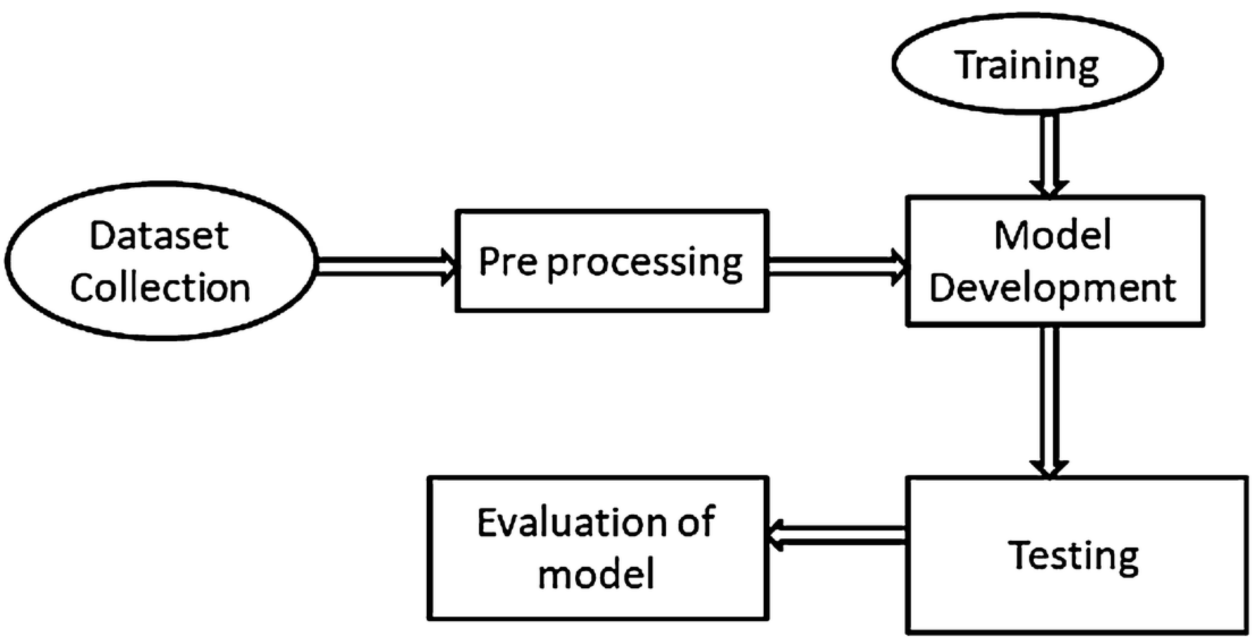
- The common way of managing waste is burning waste and this method can cause air pollution and some hazardous materials from the waste spread into the air which can cause cancer
- The Existing way of separating waste is hand picking ,whereby someone is employed to separate out the different materials. the persons who separates waste is prone to diseases due to harmful substances in the garbage

b.Proposed solution

The Existing problem causes diseases to overcome this problem we proposed a solution. the solution is Automatic Garbage Classification

3.THEORETICAL ANALYSIS

a.Block Diagram



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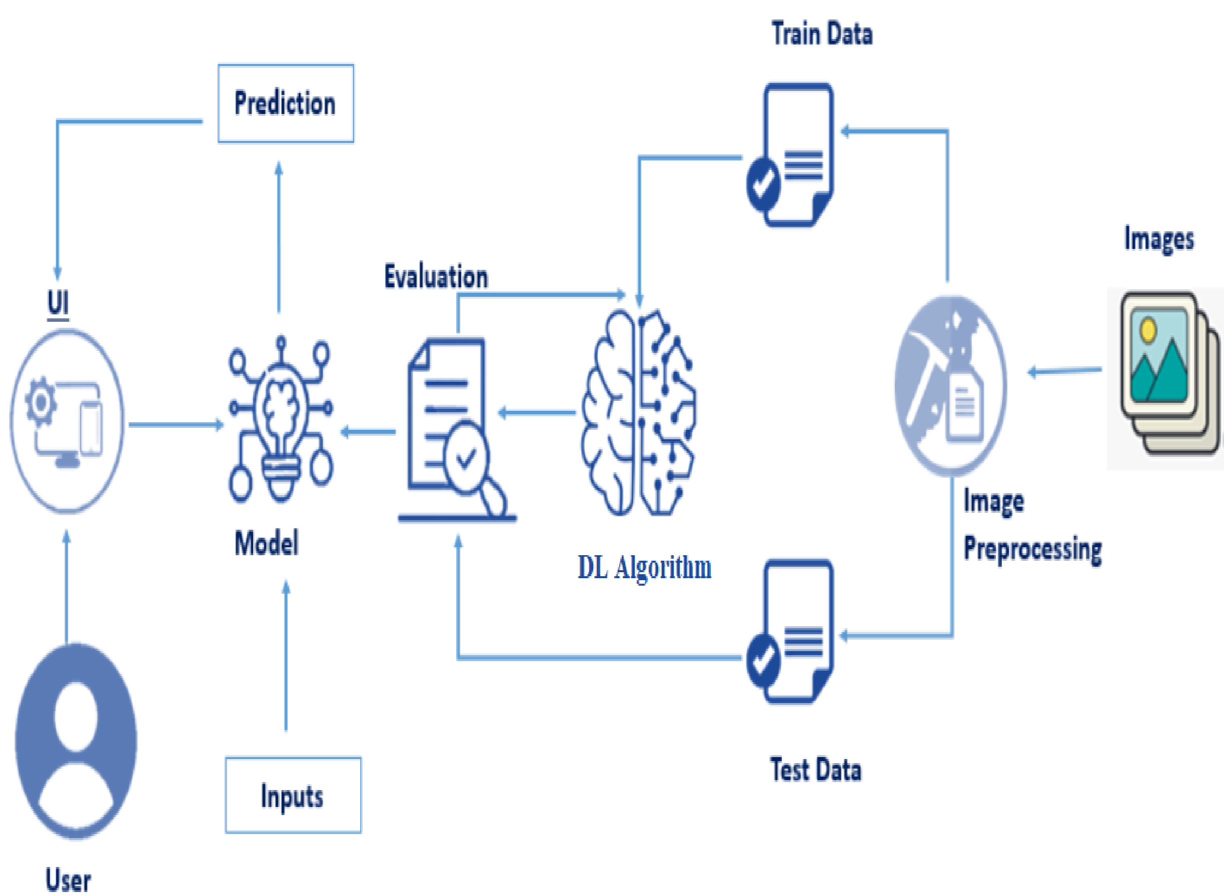
b.Hardware/software designing



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4.EXPERIMENTAL INVESTIGATIONS

1.To investigate performance of a basic CNN, we build a simple CNN architecture to get general inspection, which may help to realize the performance difference between models. This architecture uses 2D convolutional (conv. in short) layers to capture features of images. Since filters of size 3 × 3 allow more applications of nonlinear activation functions and decrease the number of parameters than larger filters [5], the built simple CNN model uses 3 × 3 filters for all the conv. layers. Between 2D conv. layers we add the max pooling layers to reduce dimensions of the input and the number of parameters to be learned. This could preserve important features after conv. layers while preventing overfitting. After the conv. blocks there is a flatten layer, which flattens the feature matrix into a column vector. This allows the model to use two fullyconnected layers at the end to do the classification. In this architecture, we use two activation functions. In all the conv. layers and after the flatten layer we use the Rectified Linear Unit function (ReLU) defined as $y = \max(0, x)$ to introduce nonlinearity into the model, which could avoid the problem of gradient vanishing during back-propagation and has a lower calculation complexity. In the last dense layer, we use the softmax function as activation, which fits the crossentropy loss function well.

2.In empirical experiments [6], researchers found that very deep convolutional neural networks are difficult to train. The accuracy may become overly saturated and suddenly degrade Therefore, the residual network was proposed to diminish this problem. In the ResNet proposed in [6], the residual block tries to learn the residual part of the true output. It uses the shortcut connection of identity mapping to add earlier parts of the network into the output. Such shortcuts won’t add extra parameters or extra complexity. But the residual part is much easier to be trained than original functions in empirical experiments.

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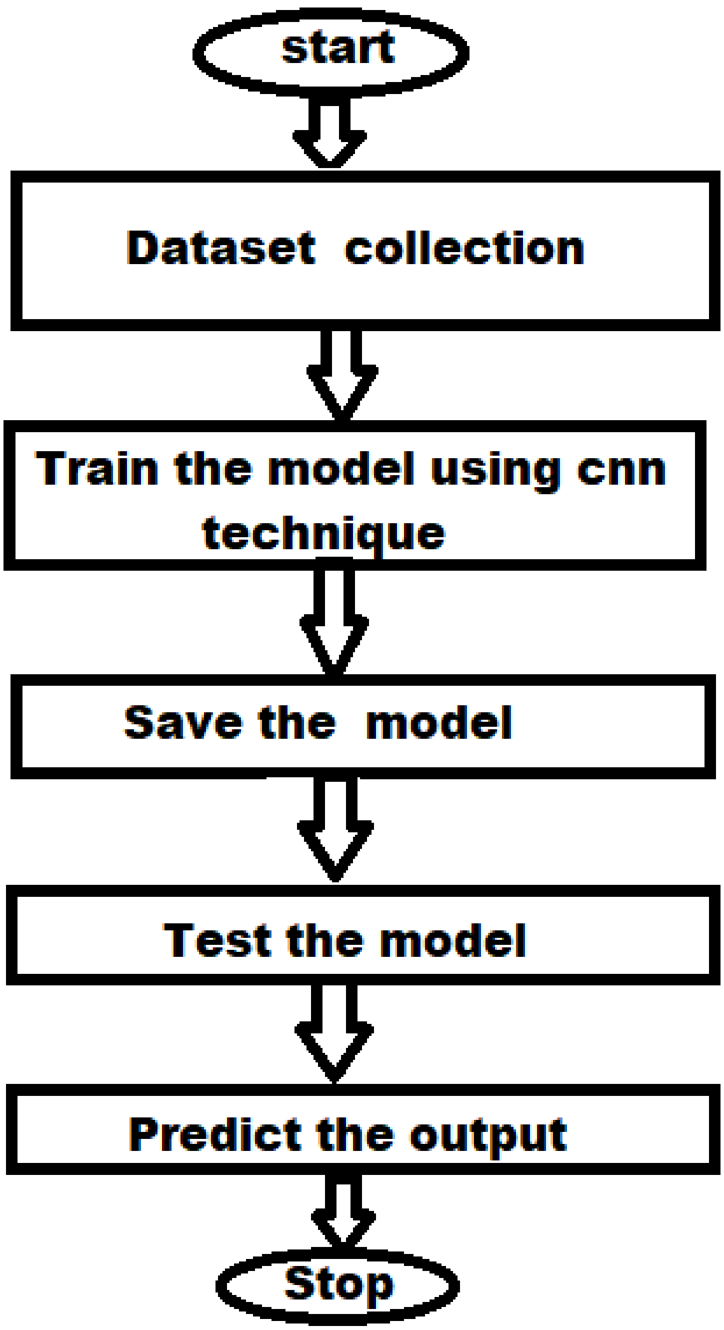
5.FLOWCHART



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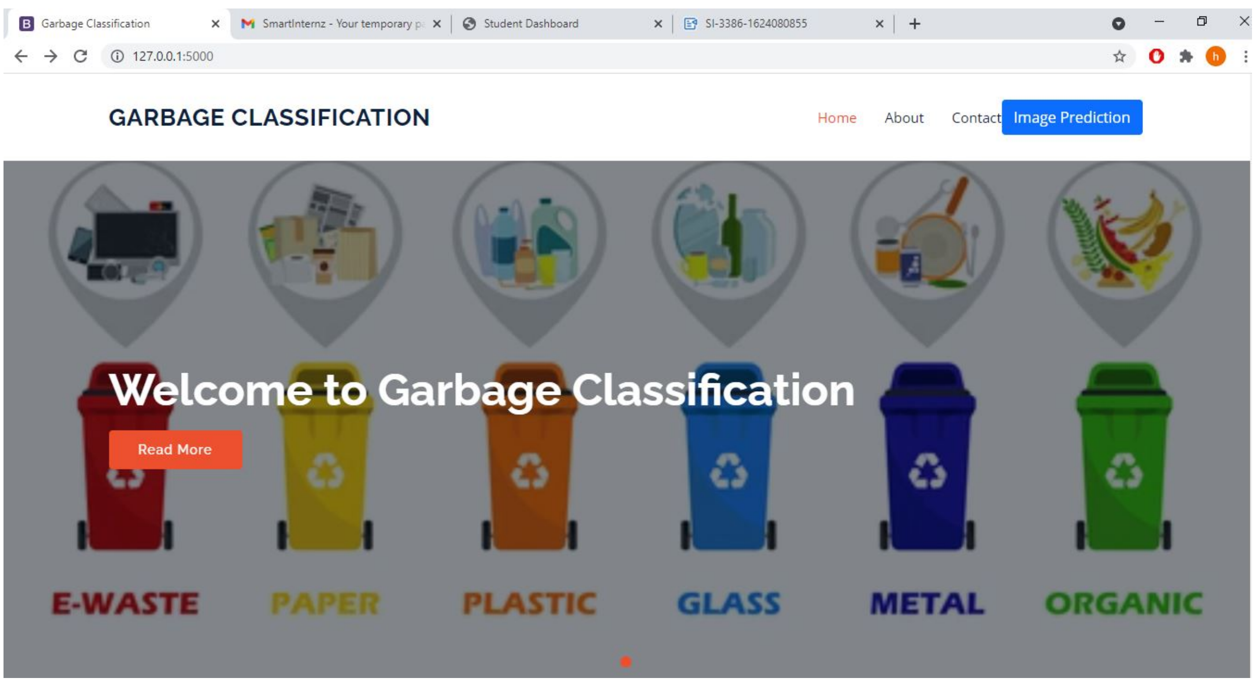
6.RESULT

In this project, we will be building a deep learning model that can detect and classify types of garbage. A web application is integrated with the model, from where the user can upload a garbage image like paper waste, plastic waste, etc., and see the analyzed results on UserInterface.



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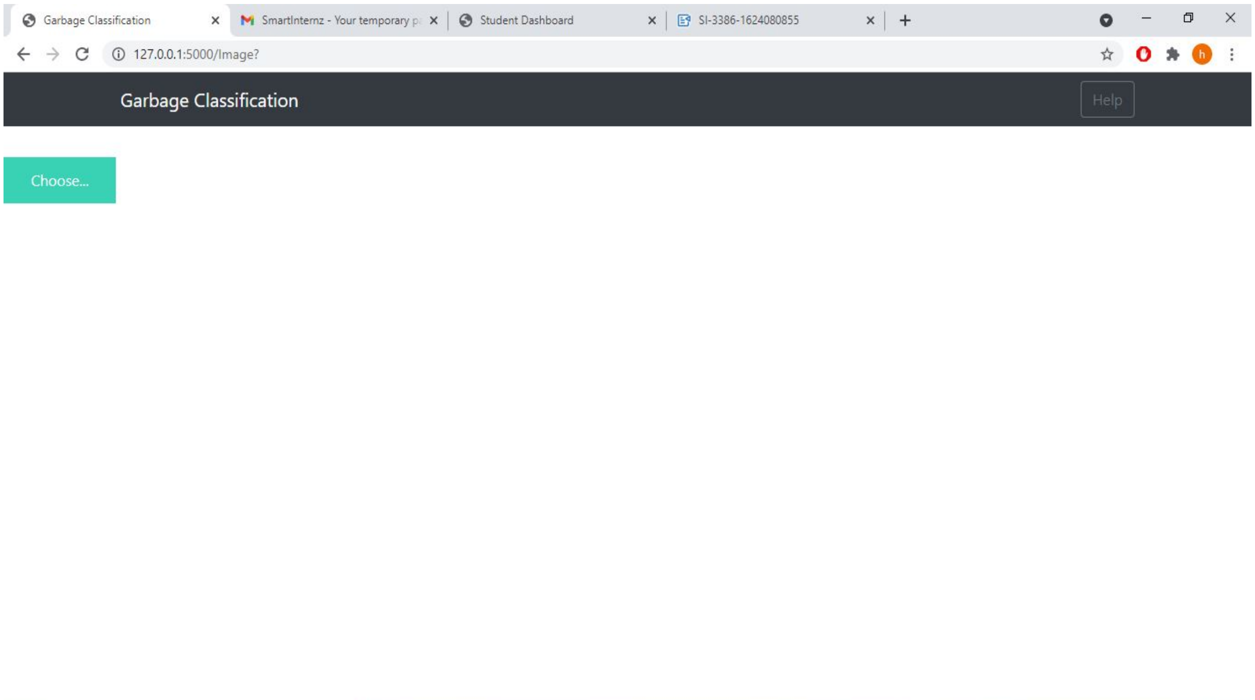

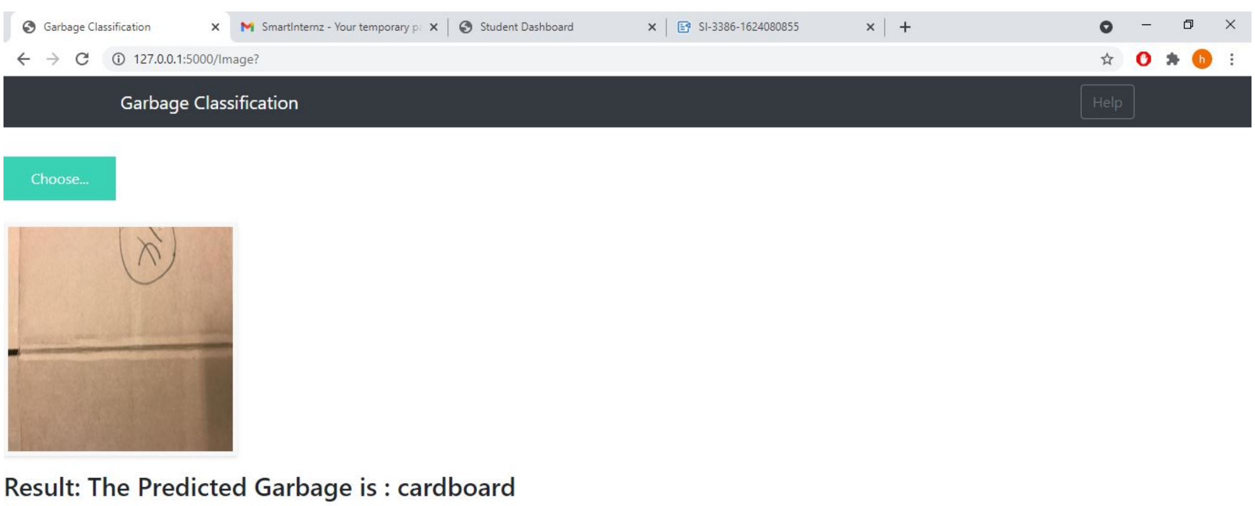

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7. Advantages & Disadvantages

Advantages

1. reduce the amount of garbage disposal and treatment equipment
2. reduce the treatment cost
3. reduce the consumption of land resources, and have social, economic, and ecological benefits

Disadvantages

1. The process is not always cost-effective
2. The resultant product has a short life
3. The sites are often dangerous
4. The practices are not done uniformly
5. Waste management can cause more problems

8. Applications

1. Application of convolutional neural networks for the identification of waste equipment.
2. High recognition and classification accuracy of the selected e-waste categories ranged from 90 to 97%.
3. Ease in requesting e-waste collection by taking and uploading e-waste pictures.
4. Supporting e-waste collection planning.

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9. Conclusion

In this paper, a framework (EnCNN-UPMWS) based on an ensemble learning strategy of three CNNs (GoogLeNet, ResNet-50, and MobileNetV2) and integration with the unequal precision measurement weighting strategy (UPMWS) was presented for HSW classification. In the proposed EnCNN-UPMWS model, three different types of CNN models are separately trained and saved. During training, the UPMWS is used to compute the weights for individual models. The three trained classifiers are then combined by adding the weighted predicted probability vectors together to obtain the final result for test samples. To evaluate the performance of the developed framework, it was compared with existing SOTA models in terms of four metrics (accuracy, F1-score, weighted F1-score, and macro F1-score) on two waste image datasets, namely FourTrash and TrashNet. In addition, the use of the majority voting method in the ensemble was also compared with the UPMWS

10. Future Scope

Waste Management is basically all those activities, which are required to manage waste from its beginning to the final disposal. Waste Management majorly includes things like the collection, transport, treatment, and the ultimate disposal of waste with a high level of monitoring and regulation

11. Bibliography

https://drive.google.com/drive/folders/1swJ83OqhhhG_zbTCPm8EynqNXO79S-mG?usp=sharing