AI MODEL CARD

Institute of Analytics
The Global Body for Analytics

Model name

Biodegradable Garbage Classification

Model date and version

Built July 20, 2024
No numbered versioning. The model was trained in July 2024 and has not been updated since.
All parties registered as a user of this model will be informed by email if we release an update.

Overview Model type

Pre-trained categorization model
This model categorizes waste into two categories: Organic and Recyclable. Biodegradable Garbage Classification uses a Convolutional Neural Network (CNN) to classify waste types using images. It was trained on a dataset of 22,564 waste images from various sources, dating from January 2020 to June 2024. The dataset was labelled manually into 'O' for Organic and 'R' for Recyclable categories.

Questions or comments

Please send any questions to:

envirobotics.nepal@gmail.com

Primary intended users

- Waste Management Groups for efficient sorting and recycling processes.
- Environmental organizations for monitoring waste classification accuracy and improvements.

Primary intended uses

To identify and classify waste into Organic and Recyclable categories, thereby informing decisions on waste sorting and recycling approaches.

Out of scope uses

Biodegradable Garbage Classification is intended for low-stakes uses such as improving waste management processes. It should not be used for decisions that have a real-world effect on individuals, such as monitoring personal habits or regulatory compliance.

Limitations

- The Biodegradable Garbage Classification algorithm only supports images processed with the specified pre-processing steps and augmentations.
- The Biodegradable Garbage Classification is not updated in real-time; hence, changes in waste appearance due to new materials may not be reflected.
- Factors affecting classifications include the quality of images and variations in waste appearance

Metrics

The model is optimized for recall over precision, ensuring that it captures all potential recyclable waste but may include some organic waste as false positives.

Training and evaluation data

The dataset was exported via Kaggle.com on July 10, 2024, and includes 22,564 images. For further inspection of the training data, please contact: envirobotics.nepal@gmail.com

Quantitative analysis

Accuracy and Reliability

- The model achieved an accuracy of 71.33% in the first epoch, improving to 99.18% by the final epoch, with a validation accuracy peaking at 90.49%.

Precision

- Precision for the recyclable label was 76%, indicating a moderate level of false positives.

Recall

- Recall was 93%, indicating a high likelihood of identifying all recyclable items correctly.

These metrics are within our benchmark criteria, but limitations should be considered when making decisions.

Ethical considerations

The intended use of this dataset is for low-stakes decisions related to waste sorting and recycling. No personally identifiable information was included in the train and test data sets. The role of any sensitive information (such as waste type or source) was not investigated.
The model's accuracy is based on data up to July 25, 2024. Further work is needed to determine if the algorithm still generalizes to current waste types.
The model does not capture information on waste with limited engagement with the specified preprocessing steps and should not be generalized to such waste types.

Feedback

All users are encouraged to share concerns or comments about the performance of the algorithm.
You should receive an email from the team soon with information on how your comments will be processed and any teams that it will be escalated to. We thank you for your support in developing our data processes.

Additional notes and any other relevant factors

None