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Implementation of AI-based Waste Classification application for Android

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I. Introduction

Today, one of the main significant global issues of countries is waste management and waste classification. Although most countries are encouraged or required by law to garbage separate collections, many countries still dispose of their waste without classifying it. And in these countries, the government must eventually spend a separate budget to develop waste sorting facilities. In other words, High-accuracy waste classification is vital to the economy of the country and people can assist their economy to a greater extent if waste is classified properly. More significantly, they can leave a better planet for future generations.

II. Main Method

This app uses the camera of the device to detect the object and classify whether it is recyclable or organic waste. As for developing the app, we used Python and TensorFlow for making the ML model and used the Flutter framework for testing the model as a mobile app.

It used the dataset from Kaggle to train the model and it includes over 25k files and has Test and Train files dividing into Organic (O) and Recyclable (R). It achieved almost 90% accuracy. We made a convolutional neural network (CNN) model and convert it TensorFlow Lite model making it easy for conducting a mobile app. Figure 1 below shows how the results of the project in the photos. The app detects the object and classifies whether it is organic or recyclable.
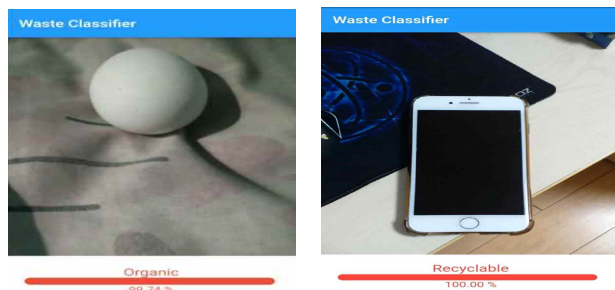

Figure 1. the test result of the developed app.

III. Conclusion

Computer vision tasks such as the categorization of real-world examples for waste classification are not straightforward to complete. In fact, the input to a waste sorting system could be almost anything, but the number of training examples is still deficient [1].

As for future work, we would like to extend this project to classify not only the type of property (organic or recyclable) but also identify glass, paper, cardboard, plastic, metal, and trash, and to get higher accuracy. In addition, we have an idea for the system to classify multiple objects from a single photo or video data. This might benefit recycling operations by allowing them to handle a stream of recycling rather than single items and this can lead to this system being used in waste sorting companies without interacting with human sources for sorting waste.

REFERENCES

[1]   Cenk Bircanoğlu, Meltem Atay, Fuat Beşer, Özgün Genç, Merve Ayyüce Kızrak, "RecycleNet: Intelligent Waste Sorting Using Deep Neural Networks," 2018 Innovations in Intelligent Systems and Applications (INISTA), 3-5 July 2018, DOI: 10.1109/INISTA.2018.8466276