What I Recycle

the mobile App to improve scalability

The educational purpose of the Parki ar minda project is to raise awareness on waste reduction and its more responsible treatment in Georgia. We are committed to improve both the quality of our eco-education and also the *quantity* of knowledge to be provided. Here, in the digital department we take such abstracts like a “quantity of knowledge” quite literally. We count it as *the amount of population that has actually adopted our sustainability guidelines*. In other terms the faster we can scale up our eco-taxi and other services, the more will be the educational outcome. Which means - the more people have the reducing and recycling procedures “up and running” on their minds, the bigger our public knowledge becomes. To partially automate and improve the knowledge distribution among the population and our potential customers we develop the waste recognition machine learning model, and it needs your help.

Waste recognition app

Wouldn’t it be wonderful to automate the compound recognition for wastes, both in industry and households? No need to explain how exactly one needs to recognise branded plastic packages one from another. Instead of manually studying the eco-taxi *guidelines*, let the app do the recognition job?

Not so easy

Modern technology provides powerful tools to automate people's cognitive work, many of which are extremely useful to optimize resource economie and drive the ecological transitions. One of such tools is image recognition, which could automatically provide us only by pointing one’s phone at any package, with the up to date guidance on sorting, and how exactly this thing can be recycled. There is a problem though. The way AI machinery works involves a big flow of data which isn’t secure. A great deal of data has to be constantly gathered from customers, and provided to computer clusters which learn and improve by it, as the recognition model unfolds. Unfortunately common practice is frivolous on the field and most infrastructure providers maintain a grasp on the customers data, which allows it to be abused in many unacceptable ways. These could serve targeted commercials and other influences, including scam and cyber-attacks. Third party data Infrastructure puts users in vulnerability before intruders and the AI itself which, when at scale, may act dangerously misleading on its own.

The way AI machinery involves a big flow of data which isn’t secure by design.

In order to adopt technology safely humans also need to maintain the responsibility for their data. Along with the ecological footprint we need to reduce the harmful data footprint, while

still increasing the automations potential, since we believe that progress persists to be the human's only resilient hope for survival.

But we can make it together

In the traditional approach for cognitive automation, a user is required to send all her related data (like the google search enquiry) online. Similarly the response comes over the internet and is precisely tracked back by the hidden UI elements (e.g. web trackers).
This is how, for example, the Google Lense works, - it is dysfunctional when out of coverage and has no wifi connected.
This in turn doesn't have to be always so. Technically speaking, image (and text) recognition results can be generated and delivered to end customers offline. Lightweight pretrained recognition models, hosted entirely on the user's side, are perfectly capable of their job, just the fitback is lacking. The reason apps like Google Lens maintain strict internet dependency is entirely about the customer's data. Pictures, enquiries and other related (often sensitive) data gathered constantly through the app has to be supplied constantly to the corporate servers for the "business improvement". This data is essential for the monstruos google computer clusters to improve their recognition efficiency. Also it creates massive data flow which exposes a lot about the general public and is far from being safe, for the long term. Worth noting that without Goggle-generated huge datasets, AI progress wouldn't have been taken as far as it has gotten by now.*

> * This reminds the situation with fossil fuels - everybody needs to cut using them, but the very ability to transition to something new owes it all to the civilisation raised upon natural coal entirely.

In order to scale up waste sorting activity and automate waste recognition for end users we implement a responsible machine learning approach. Our customers data isn't sent to a cloud bliendly, instead it is not transferred over the internet never at all. We rely on the offline-first, autonomous data workflow, where the Eco-taxi protects and transports the collected data personally, off grid, combined with the waste logistics. We guarantee your data will not fall into random hands just like we guarantee the recycling is real. Customers' pictures of the recyclable wastes and related data are kept encrypted and "air-gapped" - constantly offline. All data will be transported physically from the users by the same route the waste goes, to our facility, and later, directly to the machine learning provider. With the responsible data paradigm, we protect customers' data like our own. Even better because, not only is it kept protected locally, but also has no internet access to it.

With this we are eager to set an example of the height standard data security in "edge computing" available to the small business and local communities. Environmental thinking has inspired us to seek a particular elegance in taking care about personal data, potentially containing insights about consumption, habits, and important events in personal people's lives.

Here we are rejecting the convenience and common advantage of collecting customers data seamlessly just while using the app. Therefore please help us to obtain the necessary data explicitly by picturing and labeling objects in your recyclables sets. We will then collect your data securely, and keep it offline until the ML, executed under our responsibility. The

resulting models, fine-tuned to the local customers' dataset, will be trained to automatically recognise the waste compounds in the households. Recognition app, when ready, will also be available for autonomous, offline use.

No internet, no corporate servers needed to operate our smart solution, we are building it entirely on open source code with the help of buckitup.app technology, the open ML research, and the data responsibly supplied by our community.

If you want to help us with waste recognition development, please download the What I Recycle mobile app. This tool needs no internet, and is very easy to use. All data produced within the app is stored only on your phone. It will be later delivered to us directly, via the garage or eco-taxi. No third party gets in the way, so the data footprint is minimized. For how to share the data directly and safely with just a web browser see BuckitUp.app description, this tool is available to companies and individuals and requires only Raspberry Pi 4.

With the necessary data and success of the compound recognition safe ML model, the eco-taxi will be able to scale up much quicker by saving on the cognitive friction when educating the new customers. We will also expose the significant sustainable opportunities for data application to other recyclers and responsible businesses around the world.

To help us and participate actively in the waste data collection program please contact the eco-taxi with any questions.

FAQ:

1. Does "What I recycle" recognise waste compounds automatically?

Not yet, this feature will be delivered later, when developed and fine tuned precisely with your help and the data provided by our community. When available it will be supplied to the customers separately and free of charge.

2. Are you going to sell the product built upon my data to other companies?

We may attempt to make profit from the recognition model, but wide adoption of effective waste management is by all means our priority and shouldnt be traded for profit in any case. However your data stays always privat. The resulting model (recognition app) contains only a lightwaited algorithm, such that no particular training data sample can be extracted from it.

3. What personal data do I need to provide to ecotaxi?

We will kindly ask you to take pictures of any objects which you manage to sort for the recycling in your household. When photographed please rectangle the object on the picture and give it a label from the provided list. Please be precise when selecting an object's boundaries. To determine the composite, please refer to our illustrated guide here .

4. What am I getting back in exchange for my data?

In return for the training data our customers will be provided with an app to automate the sorting recognition process. By just pointing a phone's camera onto a waist item it will recognise the compound and show clear instructions on how to sort and recycle it. This might not be the most requested feature to the existing users, but makes it way easier for the new customers to join the community. Scaling of our service potentially makes it cheaper and inevitably more available to anyone. Remember - reducing & reusing is always better.

5. How many pictures need to be collected?

The fair answer is - many, as many as you are capable of, while preserving the quality. Machine learning is a data consuming process, all data we manage to obtain will be put to use and increase the quality of the outcome.

6. What is special in how you collect users' data?

We are exploring the path to take advantage of an AI, and simultaneously keep robots safe for humanity. By locally collecting and storing data we maintain users in charge for the very purpose, and motives behind automatisation. In contrast the mainstream rootins (AB testing e.g.) let robots guide companies' business logic into the fuzzy direction of the undefined general optimisation, representing a multiplicity of existential threats.

7. You state explicitly that you are collecting and storing customers data on your own infrastructure, what is it different from involving the third-party?

Because we are the second party - our customers interact with us directly and all the sensitive data remains within the trusted communication setup, no additional responsibility generated.

Description of the app

What I Recycle helps to picture and label the sorting data for households.

What I Recycle lets you collect images from a household, describing what exact items were sorted for the recycling purposes. The app makes it easy to manually collect visual data, indicate objects and label them with the provided list of compounds. The results stored entirely on the smartphone, no data is ever shared to anyone including the devs. What I Recycle always runs locally and offline, nothing is transferred over the internet.

By using the app you are contributing to the community of people who support responsible waste management by conscientiously sorting and delivering unavoided wastes to the recycling facilities. By collecting data we empower machine learning algorithms to simplify and consequently scale out our sorting routines, which makes household waste recycling more accessible for the broader public. On how to contribute your data safely for the automatic waste recognition model training, while not violating the privacy and keeping the artificial intelligence safe, please see our website - eco-taxi.ge