RECYCLEAR

CH2-PS101

Bangkit Academy 2023 Batch 2

MACHINE LEARNING PATH

Nurina Kurnia Dewi

M227BSX1557

Universitas Jember

Subqi Anjaya

M008BSY0465

Universitas Gajah Mada

Ahmad Raihan Putra

M002BSY0009

Institut Teknologi Bandung

CLOUD COMPUTING PATH

Afif Rohul Abrori

C227BSY3929

Universitas Jember

Syafiq Umam Azmi

C152BSY3850

Sekolah Tinggi Teknologi Bandung

MOBILE DEVELOPMENT PATH

Muhammad Januar Alfiansyah

A227BSY2750

Universitas Jember

Ayu Kintan Rahmayani

A301BSX2336

Universitas Perjuangan Tasikmalaya

WHAT IS GOING ON?

Indonesia faces a huge challenge in waste management with a huge volume of waste by 2022. The high volume of waste increases the risk of land and water pollution and damages natural ecosystems. Poor waste management can be a source of disease and create unhealthy conditions for the community.

35.83 million

Tons waste that Indonesia generated in 2022

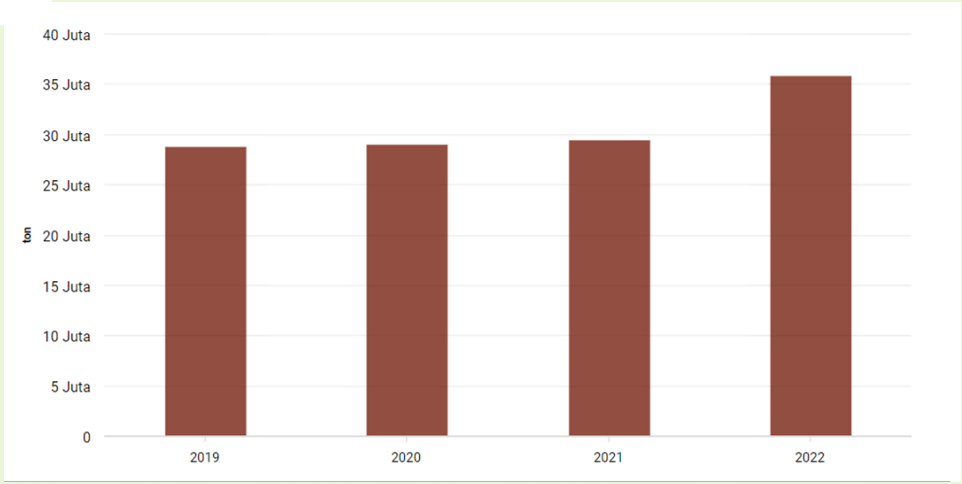
https://databoks.katadata.co.id/datapublish/2023/10/16/sampah-indonesia-bertambah-pada-2022-terbanyak-dalam-empat-tahun

6.47 million plastic waste

Plastic, with a proportion of 18.08% of the total national waste, stands out as one of the largest types of waste in Indonesia after food waste (40.64%)

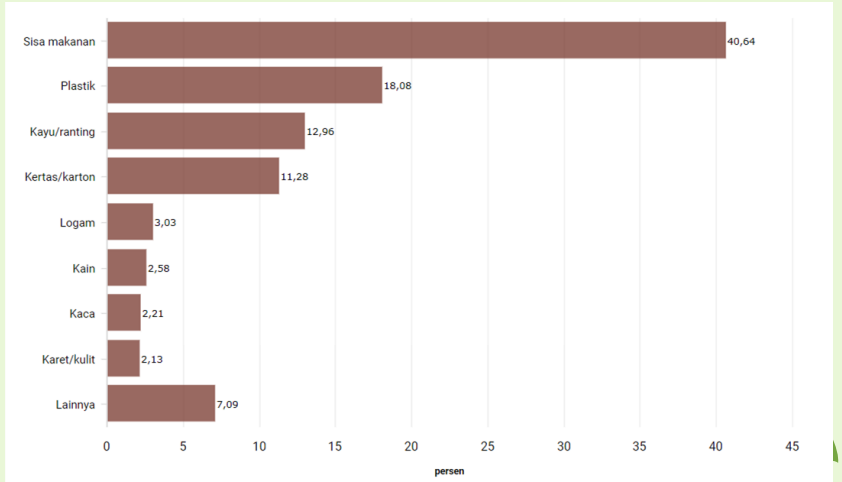
https://databoks.katadata.co.id/datapublish/2023/10/19/indonesia-hasilkan-35-juta-ton-sampah-sepanjang-2022-mayoritas-sisa-makanan

National Waste Volume (2019–2022)



https://databoks.katadata.co.id/datapublish/2023/10/16/sampah-indonesia-bertambah-pada-2022-terbanyak-dalam-empat-tahun

Composition of Waste Generated in Indonesia by Type (2022)



https://databoks.katadata.co.id/datapublish/2023/10/19/indonesia-hasilkan-35-juta-ton-sampah-sepanjang-2022-mayoritas-sisa-makanan

IT STARTED AS A SMALL MOVEMENT. RecyClear was built with the aim of reducing waste, especially plastic. With RecyClear, we can easily separate plastic waste based on its type.

REASON

01

Environmental Awareness

The level of environmental awareness is still lacking

02

Data and Analysis

Inadequate infrastructure

03

Knowledge and Education

Lack of continuing education

04

Community Engagement

Difficulty in collaboration

Based on the knowledge and experience of our team, designing the "RecyClear" application is a positive step to overcome environmental problems and increase public awareness about the importance of recycling. By reviewing existing data in the field, such as the low level of public awareness, so they are not fully aware of the negative impact of plastic waste and the importance of recycling.

Is there any existing product/research before us?

Similar? Yes, but...

Exactly the same? NO

Identification by looking at case studies **in previous projects** is that there is **a lack** of clarity in the **target market or customer segmentation** that will be addressed. Target market or **customer segmentation can change over time**. Therefore, it is important to **continuously monitor the market and make adjustments** if necessary

IMPLEMENTATION

- Make recycling practices easier with the help of AI.
- Providing an excellent feature of plastic waste type recognition.

Object Detection

Real-Time Scanning Feature

Image Classification

Scanning Feature with Image Capture/Upload

IMAGE CLASSIFICATION

Preprocessing

```
[ ] BATCH_SIZE=32
    IMAGE_SIZE=300

    dataset = tf.keras.utils.image_dataset_from_directory(base_dir,
                                                          shuffle=True,
                                                          batch_size = BATCH_SIZE,
                                                          image_size = (IMAGE_SIZE, IMAGE_SIZE))
```

```
Found 402 files belonging to 6 classes.
```

```
[ ] classes = dataset.class_names
    classes
```

```
['HDPE', 'LDPE', 'PET', 'PP', 'PS', 'PVC']
```

```
Model: "RecyClear_InceptionV3"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 input_31 (InputLayer)       [(None, 300, 300, 3)]     0

 inception_v3 (Functional)   (None, 8, 8, 2048)        21802784

 global_average_pooling2d_1  (None, 2048)              0
 8 (GlobalAveragePooling2D)

 dropout_18 (Dropout)        (None, 2048)              0

 dense_30 (Dense)            (None, 6)                 12294

=================================================================
Total params: 21815078 (83.22 MB)
Trainable params: 12294 (48.02 KB)
Non-trainable params: 21802784 (83.17 MB)
_________________________________________________________________
```

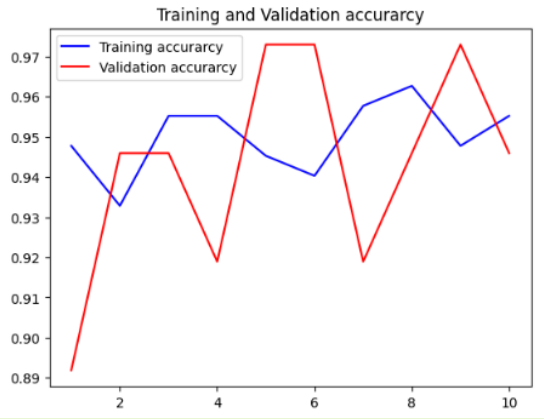
Display Image

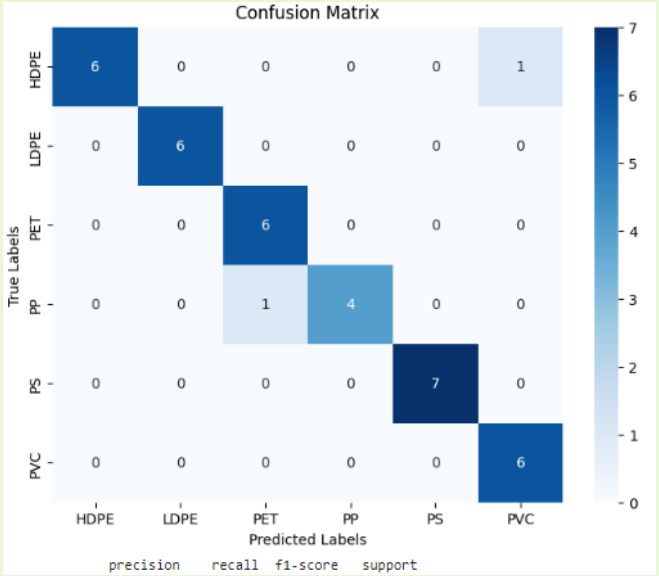
```
[ ] plt.figure(figsize=(10,10))
    for image,label in dataset.take(1):
        for i in range(8):
            ax = plt.subplot(5,5,i+1)
            plt.imshow(image[i].numpy().astype("uint8"))
            plt.title(classes[label[i]])
            plt.axis("off")
```


```
def create_data_generators(base_dir, batch_size):
    # ImageDataGenerator for training with preprocessing and augmentation
    train_datagen = ImageDataGenerator(
        rescale=1./255.,
        rotation_range=20,
        width_shift_range=0.2,
        height_shift_range=0.2,
        shear_range=0.2,
        zoom_range=0.2,
        horizontal_flip=True,
        fill_mode='nearest'
    )
```

Dataset Object Detection

RESULT IMAGE CLASSIFICATION





	precision	recall	f1-score	support
HDPE	1.00	0.86	0.92	7
LDPE	1.00	1.00	1.00	6
PET	0.86	1.00	0.92	6
PP	1.00	0.80	0.89	5
PS	1.00	1.00	1.00	7
PVC	0.86	1.00	0.92	6
accuracy			0.95	37
macro avg	0.95	0.94	0.94	37
weighted avg	0.95	0.95	0.95	37

Image Classification - Plastic Waste.ipynb

CODE OBJECT DETECTION

Load Dataset After Labelling

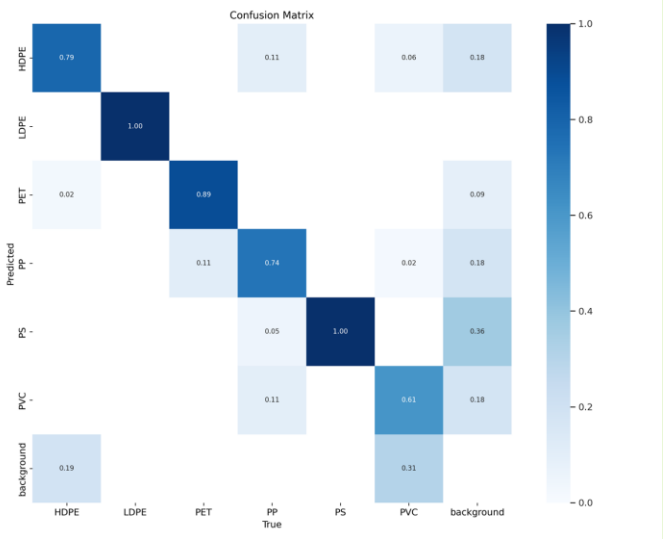
```
# Setting up the environment for the datasets
os.environ["DATASET_DIRECTORY"] = "/content/datasets"
```

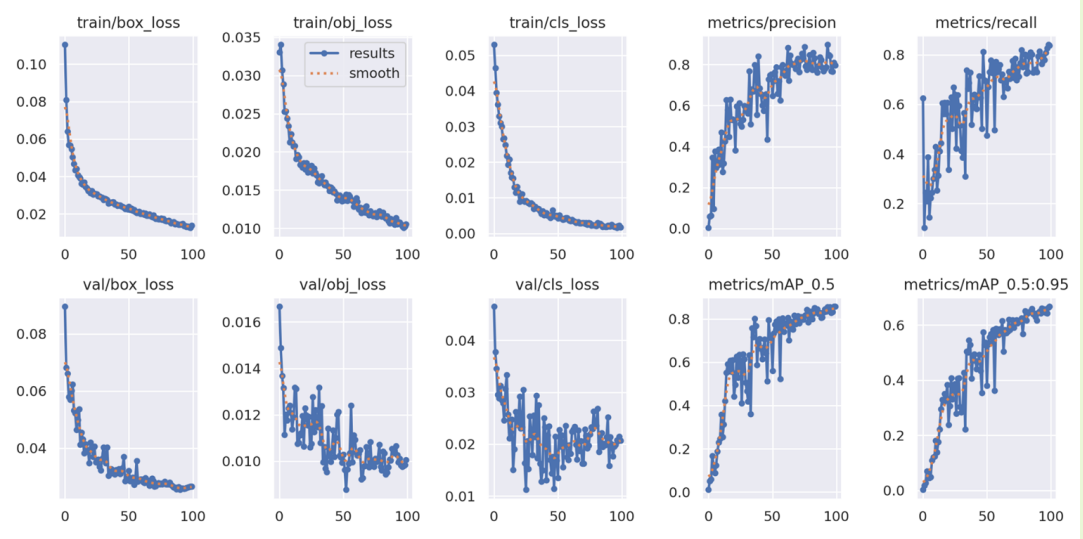
```
# Download datasets after labelling from Roboflow

!pip install roboflow

from roboflow import Roboflow
rf = Roboflow(api_key="h1mX7JhTftc6fQEhAkoj")
project = rf.workspace("nurina-kurnia-idmpn").project("sampah-plastik-owguw")
dataset = project.version(13).download("yolov5")
```

```
Validating runs/train/exp/weights/best.pt...
Fusing layers...
Model summary: 157 layers, 7026307 parameters, 0 gradients, 15.8 GFLOPs
                 Class     Images  Instances          P          R      mAP50   mAP50-95: 100% 2/2 [00:01<00:00,  1.64it/s]
                   all         85        138      0.797      0.837      0.857      0.667
                  HDPE         85         42      0.815      0.786      0.796      0.579
                  LDPE         85         11      0.926          1      0.995      0.864
                   PET         85          9      0.748      0.889      0.925       0.73
                    PP         85         19      0.823      0.736      0.808      0.661
                    PS         85          8      0.589          1      0.903      0.661
                   PVC         85         49       0.88      0.612      0.718      0.508
Results saved to runs/train/exp
```

Dataset Object Detection

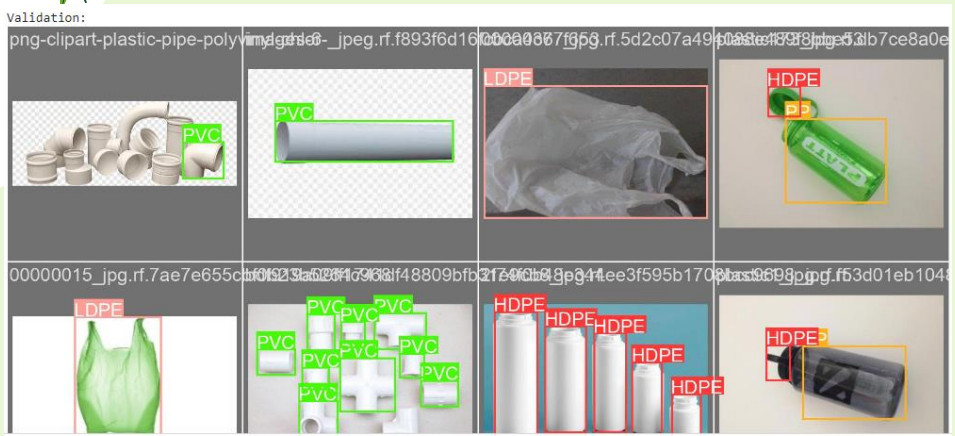
RESULT OBJECT DETECTION



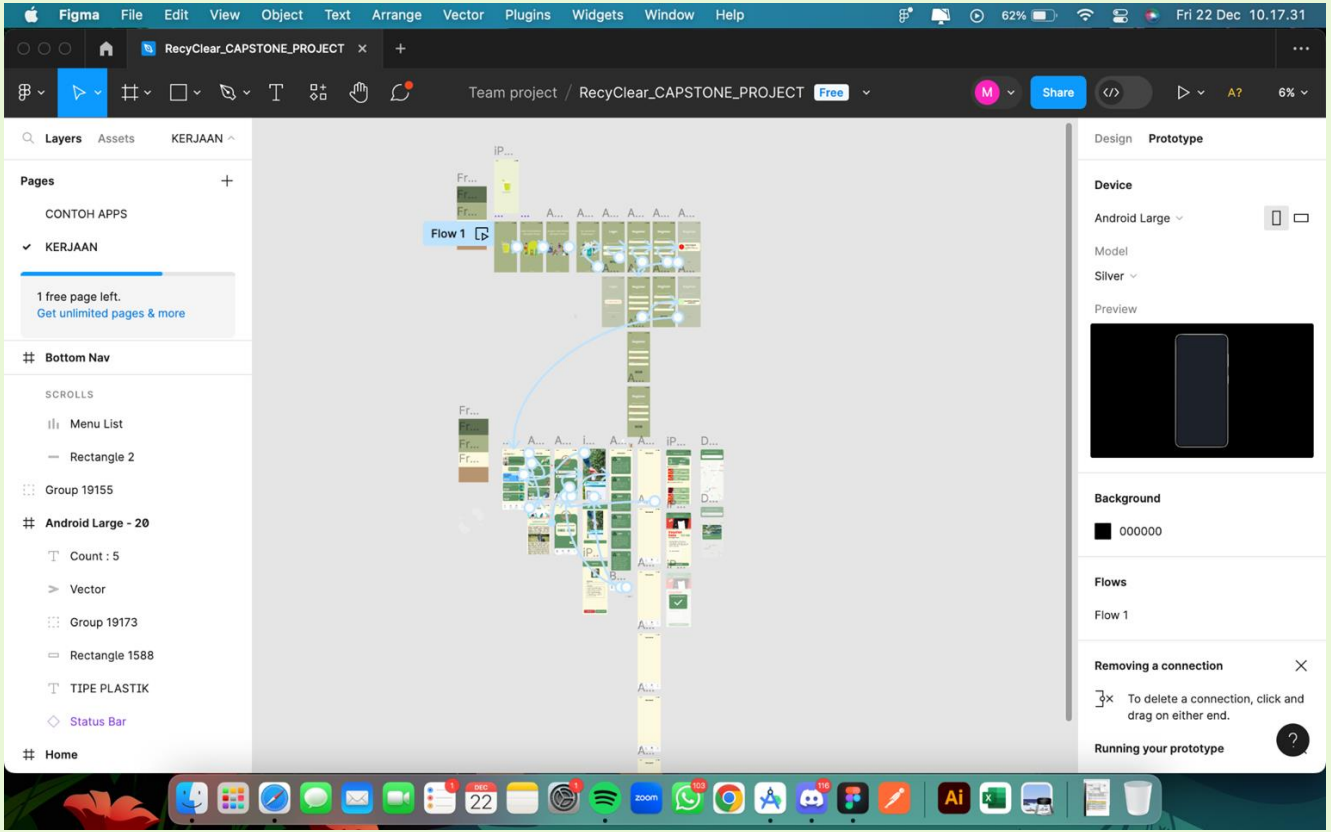


[Object Detection - Plastic Waste.ipynb]

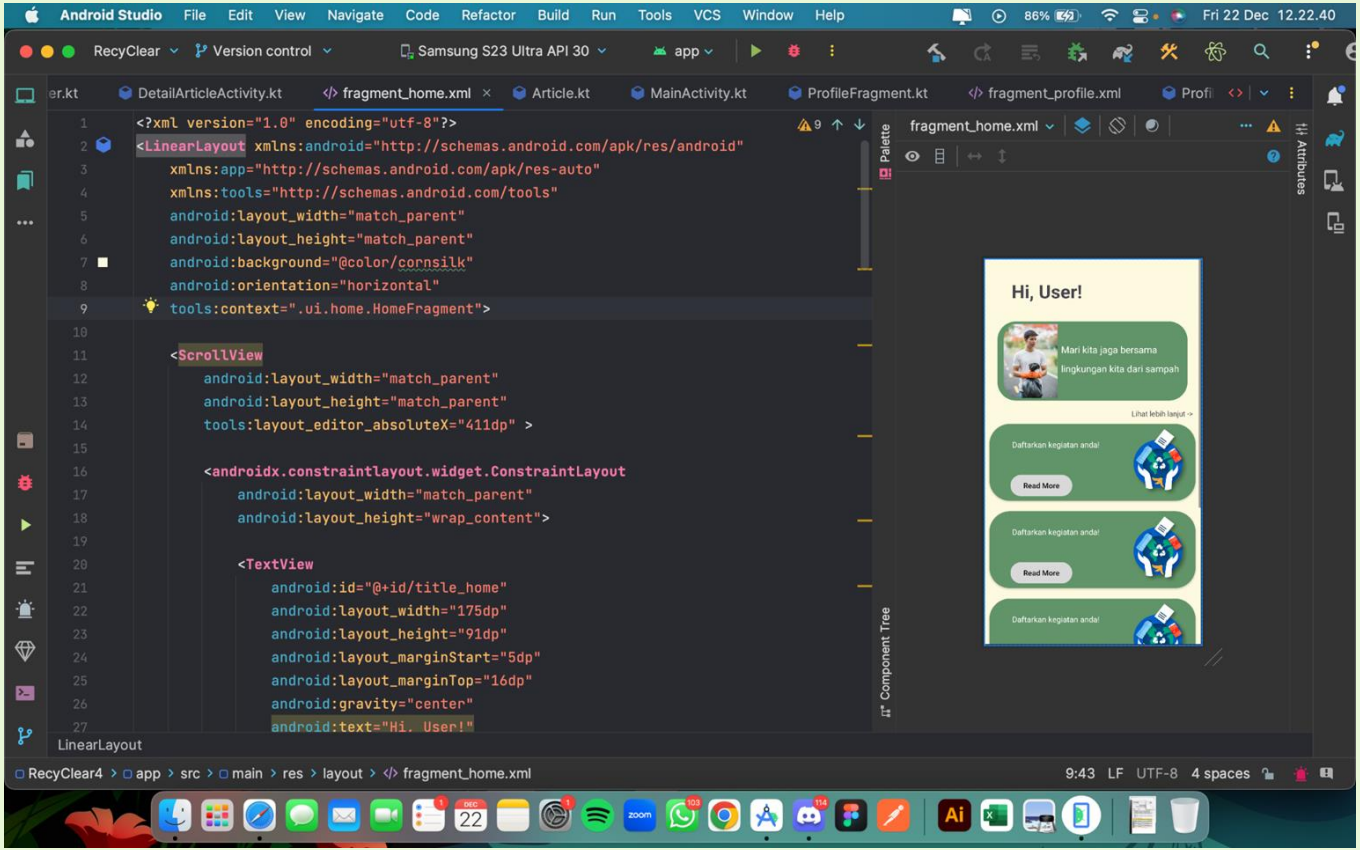
RESULT OBJECT DETECTION



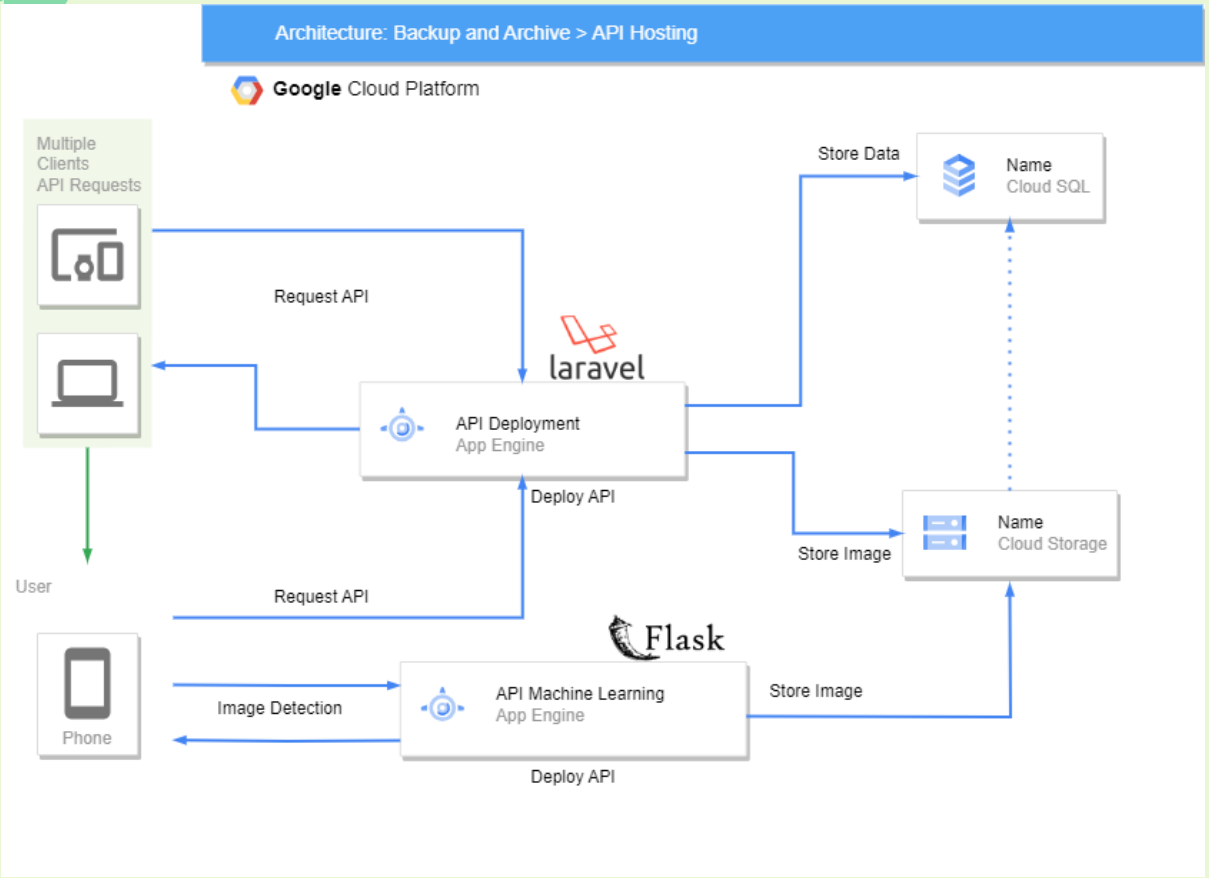
Mobile Development

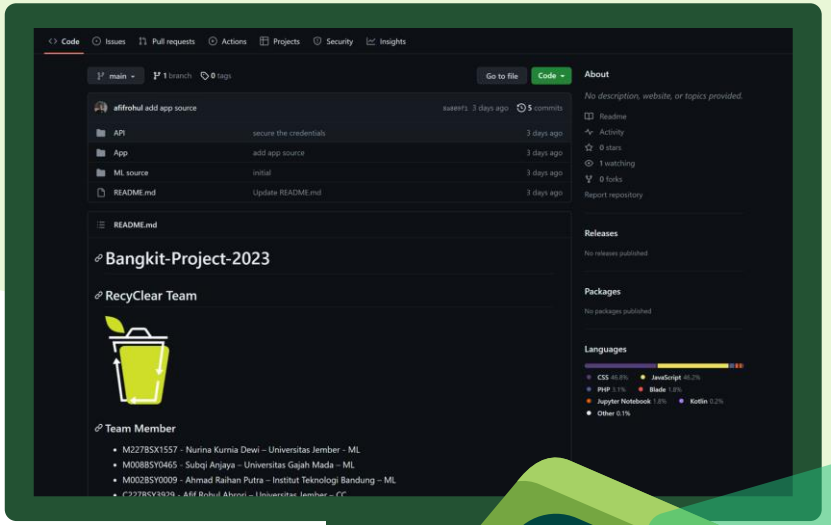


Mobile Development



RecyClear Architecture





RECYCLEAR DOCUMENTATION

Visit Our Github Project:

https://github.com/afifrohul/RecyClear-Bangkit-Project-2023

GET TO KNOW MORE ABOUT RECYCLEAR

WHAT IS RECYCLEAR?

RecyClear is an application that help **young generation** to **separate plastic waste** based on its type which will earn **points** and can be redeemed for various interesting **vouchers**.

OUR SOLUTION

01 SOLVE PLASTIC WASTE PROBLEM

We want to make recycling practices easier and more interesting with the help of AI.

02 FEATURES

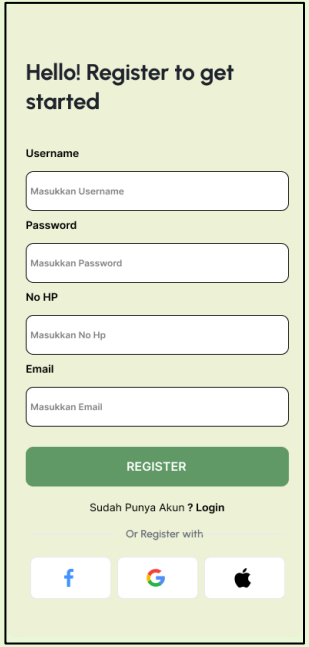
- Sorting plastic type using ML (Image Classification and Real-time Object Detection)
- Points system and rewards
- Educational content on plastic waste types
- User-friendly interface

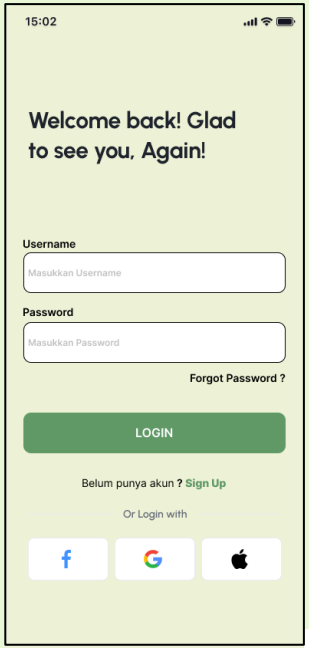
RECYCLEAR


15:02
RecyClear

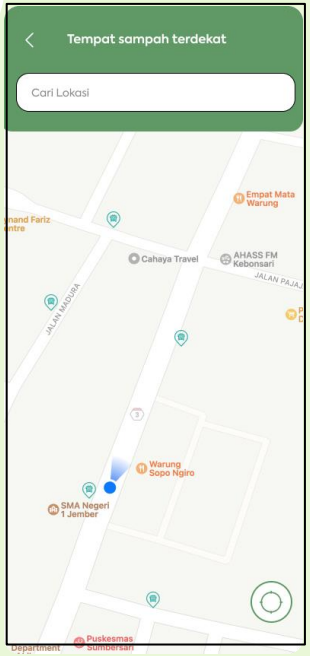

15:02
Halo Nurina
Yuk Bantu bersihkan Lingkungan
Satu sampah yang kau buang ke tempatnya, akan menyelamatkan seluruh alam semesta
Cari Tempat Sampah
Tukarkan Poin Anda
Leaderboard
Program Kebersihan
Daftar Sosialisasi Peduli Lingkungan
Read More
Daftar Kegiatan Membersihkan Sungai Bersama
Read More


15:02
Artikel
Cari artikel...
Artikel Inovasi Pengelolaan Sampah untuk mengurangi potensi Banjir
Read More
Artikel Mengenal Fitur Pencarian Lokasi Tempat Sampah
Read More
Aplikasi Inovasi pengelolaan sampah
Read More
Artikel Memudahkan Pengelolaan Sampah dengan Aplikasi Tempat Sampah yang User-Friendly
Read More


Hello! Register to get started
Username
Masukkan Username
Password
Masukkan Password
No HP
Masukkan No Hp
Email
Masukkan Email
REGISTER
Sudah Punya Akun ? Login
Or Register with


15:02
Welcome back! Glad to see you, Again!
Username
Masukkan Username
Password
Masukkan Password
Forgot Password ?
LOGIN
Belum punya akun ? Sign Up
Or Login with

RECYCLEAR


Tempat sampah terdekat
Cari Lokasi
Empat Mata Warung
Cahaya Travel
AHASS FM Kebonsari
JALAN MADURA
Warung Sopo Ngiro
SMA Negeri 1 Jember
Puskesmas Sumbersari


PLASTICOS
LATAS
PAPELES Y CARTONES
Tempat sampah daerah Jalan Pajajaran Blok A
Jenis Sampah Yang dibuang
Sampah Organik, dan Anorganik
Lokasi
Scan


pada kotak scanner ya!


Informasi
Lokasi Tempat Sampah :
Tempat sampah daerah Jalan Pajajaran Blok A
Jenis Pembuangan Sampah
sampah daur ulang
Upload Foto Bukti Pembuangan
Upload Foto
Konfirmasi


Informasi
Lokasi Tempat Sampah :
Tempat sampah daerah Jalan Pajajaran Blok A
Jenis Pembuangan Sampah
Sampah Anorganik
Upload Foto Bukti Pembuangan
Konfirmasi

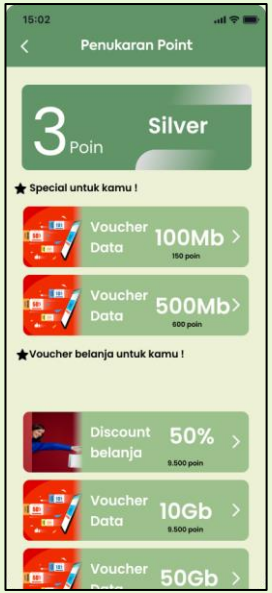
RECYCLEAR


15:02
Terima Kasih Telah Membuang Sampah
5
Selamat anda mendapatkan 5 point terus kumpulkan banyak poin dan dapatkan hadiah yang menarik
Lihat Point


15:02
EVENT Pandawara
Pembersihan sungai didaerah
Jompo
TERDAFTAR !
01-05-2023
09:00
EVENT Pandawara
Pembersihan sungai didaerah
Jompo
Jompo
01-05-2023
09:00
EVENT Pandawara
Pembersihan sungai didaerah
Jompo
Jompo
01-05-2023
09:00
EVENT Pandawara
Pembersihan sungai didaerah
Jompo
01-05-2023
09:00

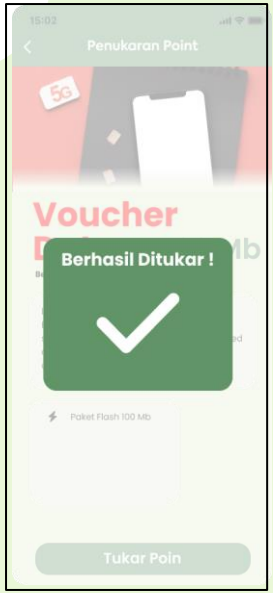

15:02
Leaderboard
1 Udin 120 Point online
2 William 100 Point online
3 Bilqis 95 Point offline
4 Hadi 90 Point online
5 Jane 70 Point offline
6 Olivia 68 Point online
7 Sam 65 Point online
1 Udin 120 Point

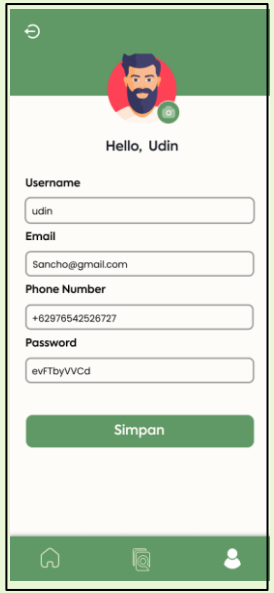

15:02
Artikel
Aplikasi Inovasi pengelolaan sampah!
Inovasi dalam pengelolaan sampah saat ini semakin diperlukan untuk mengurangi dampak buruk yang ditimbulkan dari jumlah sampah yang semakin bertambah. Pengguna akan diberikan poin ketika membuang sampah pada tempat yang disediakan. Poin ini dapat ditukar dengan reward yang telah tersedia
Lorem ipsum dolor sit amet consectetur. In justo egestas sapien aliquam pharetra id. Eget sodales turpis rhoncus pulvinar sem ipsum vitae non. Vitae urna rhoncus enim praesent dignissim sem. Sed etiam viverra donec condimentum faucibus sed pretium. Risus mattis sed cras non pharetra quam euismod. Ut mi egestas faucibus commodo facilisis. Luctus elementum sit montes urna malesuada commodo nisl congue. Morbi est gravida viverra viverra vitae quis felis feugiat. Sit pellentesque tincidunt senectus sagittis volutpat faucibus egestas amet fames. Senectus quis vel lorem tincidunt arcu. Duis porta est massa sed ultricies. Viverra pellentesque at cras vitae in aliquam ipsum. Vitae congue sapien mauris facilisis.


15:02
Penukaran Point
3 Poin
Silver
Special untuk kamu !
Voucher Data 100Mb 150 poin
Voucher Data 500Mb 600 poin
Voucher belanja untuk kamu !
Discount belanja 50% 9.500 poin
Voucher Data 10Gb 9.500 poin
Voucher 50Gb


15:02
Penukaran Point
5G
Voucher Data 100 Mb
Berlaku hingga 12-01-2024
Lorem ipsum dolor sit amet consectetur. Egestas ipsum quis dolor posuere id. Sem semper feugiat purus libero velit. Faucibus sed at lectus facilisis ut velit orci dolor. Nunc velit orci lacus magna tellus.
Paket Flash 100 Mb
Tukar Poin

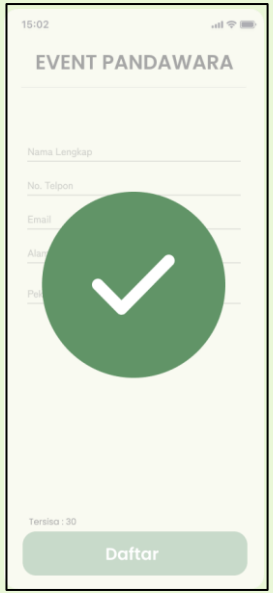
RECYCLEAR


Penukaran Point
Voucher
Berhasil Ditukar !
Tukar Poin


Hello, Udin
Username
udin
Email
Sancho@gmail.com
Phone Number
+62976542526727
Password
evFTbyVVCd
Simpan


Yuk lihat event kamu !
EVENT PANDAWARA
Jompo
Pendaftaran
01-05-2023
05-05-2023
Waktu
08:00
Kuota Peserta
50
Tersisa : 30
Daftar


EVENT PANDAWARA
Nama Lengkap
No. Telpon
Email
Alamat
Pekerjaan
Tersisa : 30
Daftar


EVENT PANDAWARA
Tersisa : 30
Daftar


TERDAFTAR !
EVENT Pandawara
Pembersihan sungai didaerah
Jompo
Jompo
01-05-2023
09:00

TARGET MARKET

Age range
17 - 25 Years Old

Profession
College student

Roles
Every college student who is actively studying and organizing in the campus environment.

Specific attributes or linkings, hobbies
No specific attributes or linkings, hobbies

WHY DO YOU NEED US?

Purpose-driven

Help in efficient waste segregation, reducing environmental pollution due to improper disposal of plastic waste.

Data-driven

Indonesia produced 35.83 million tons of waste in 2022.

Government Reasoning

Align with government initiatives for sustainable waste management and support their efforts in reducing plastic pollution.

Stakeholders related to and benefitted from your solutions

Help waste management companies or recycling facilities simplify operations by providing pre-sorted waste.

MARKETING STRATEGY

01

Collaboration with campuses or universities

02

Environmental Education Campaign.

03

Relevant Social Media Marketing

04

Partnership with Recyclers or Recycling Companies.

Comparison with similar service/apps

COMPARISON	RECYCLEAR	OCTOPUS
App operates well	✓	✓
Real-time object detection	✓	✗
High accuracy of prediction using pictures	✓	✗
Collaboration with business people, cleaning teams, and local governments	✓	✗
Location for the nearest waste collection point	✓	✗

SWOT Analysis

Strengths

The use of machine learning allows the app to sort waste with a high degree of accuracy, minimizing sorting errors

Weaknesses

Vulnerable to technical glitches or limited access to technology that may affect the functionality of the application.

Opportunities

Reach more users with proper education and effective marketing strategies, especially among the younger generation.

Threats

As technology develops rapidly, other apps that have better and more features are likely to become our competitors.

POSSIBLE PILOT/TRIAL IN THE NEXT 6 MONTHS

Needed Resources	**Personnel**	Mobile Developer: Responsible for coding and implementing new features. Quality Assurance Tester: Ensures the application's functionality and stability.
	Tools	Project Management Software, Collaboration Platforms, Cloud Hosting Services, Analytics Tools, and Marketing Tools.
Structural/ Member's Role		CEO : Nurina Kurnia Dewi COO : Afif Rohul Abrori CFO : Subqi Anjaya CMO : Ayu Kintan Rahmayani CTO : Muhammad Januar Alfiansyah CBO : Ahmad Raihan Putra

PROJECT TIMELINE

January

- Conduct market research
- Identify potential partners for collaboration
- Gather and analyze user feedback

February

- Implement necessary upgrades and new features
- Improving the UI
- Improve the plastic waste recognition feature

March

- Launch a beta version
- Collect feedback

April–May

- Make improvements and adjustments
- Conduct thorough testing
- Prepare complete documentation

June

- Design marketing strategies that engage students
- Launch the app

PROJECT MILESTONE

Milestone 1

January

Research completed, partners identified, and prototype feedback analyzed

Milestone 2

February

App upgrades and new features implemented

Milestone 3

March

Beta version launch

Milestone 4

May

Enhancements based on beta feedback until the app is ready for launch.

Milestone 5

June

App approved by university administration and officially launched

BUDGET PLAN

No	Description	Total
INCOME		
1	Cash	USD 10.000
	Total Income	**USD 10.000**

No	Description	Total
EXPENSES		
1	Team Salary	USD 3.825
2	Research/Ops	USD 1.100
3	Marketing and Sales	USD 1.000
4	Future Development / R&D	USD 1.000
5	Other Expenses (taxes, reserves)	USD 1.650
	Total Expenses	**USD 10.000**

No	Description	Total
INCOME		
1	Cash	USD 10.000
2	Sell plastic waste to a recycler or recycling company	USD 7.000
3	Partnerships with	USD 1000 per partner x 5 target partner = USD 5000
	Total Income (A)	**USD 22.000**

No	Description	Total
EXPENSES		
1	Team Salary	USD 3.825
2	Research/Ops	USD 1.100
3	Marketing and Sales	USD 1.000
4	Future Development / R&D	USD 1.000
5	Other Expenses (taxes, reserves)	USD 1.650
	Total Expenses (B)	**USD 10.000 (6 months) x 2 = USD 20.000**

SUSTAINABILITY:

Profit Projection Per Year

Total Revenue (A-B)
USD 2.000

RecyClear

Empowering Plastic Waste Recycling for a Clearer Future

THANK YOU!

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