PROJECT SPONSOR

University of Canberra
Human Centered Technology
Research Centre
Dr. Matthew Vestal

Pixel Master
Image Annotation Tool

Empowering users to effectively annotate images with high accuracy and ease of use.

Group 16 - 11522 - 24S1

Tien Dat Nguyen (u3234033)
Mingze Song (u3248851)
Niranjan Shah (u3246250)
Eojin Ra (u3245625)

01. Background & Executive Summary

Our project is driven by our sponsors' needs for an image annotation and labeling tool. Our main aim is to develop a tool that effectively recognizes and labels waste objects. Thereby contributing to waste management research. Using advanced algorithms and segmentation models.
Our tool **streamlines the annotation process** making object identification and labelling efficient within input images.

"Hi, Pixel Master team!
I'm a researcher from UC, and
we need an image annotation tool
for image segmentation tasks.
We want to use it across our
research teams.
Thanks a bunch!"

"We'd be happy to help you out"

02. Scope of Project

"Let's develop a user-friendly web-based interface for annotating and labelling images"

01 Implementing manual image annotation and labelling

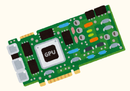
02 Implementing multiple segmentation and Supporting common image file formats

03 Allowing user to download annotated masks and labels

04 Providing documentation and user manual to assist users in utilizing the tool effectively

03. Resources

The application uses Segment Anything Model (SAM) developed by Meta for the object detection task.



Hardware
- OS (Window, macOS, Linux)
- CPU (x86_64 Intel core)
- GPU (GeForce RTX 3050 8GB)
- RAM (8GB)
- Storage (8GB)
- Display (1920 x 1080)

Software
- Python (3.10) - Backend
- Streamlit - Frontend
- Pycharm, VS Code
- GitHub
- Docker

04. Development & Deployment

What did we develop?

- Single / Multiple Object Segmentation
- Multispectral Image Processing
- Frontend and backend components
- Interactive UI/UX
- Model integration

"We took.. an Agile approach!"

What did we test?

A detailed manual testing strategy is conducted to evaluate UI/UX, model performance, and functionality

How did we deploy?

We deployed the app using Docker, pushing the image to Docker Hub so we can deploy it easily on the cloud or on local setups, making sure it's consistent and scalable.
With a smooth user experience no matter where it's run!

Build image → Streamlit, Meta → Push image → docker → dockerhub → Pull image → Start a Docker container to run the app

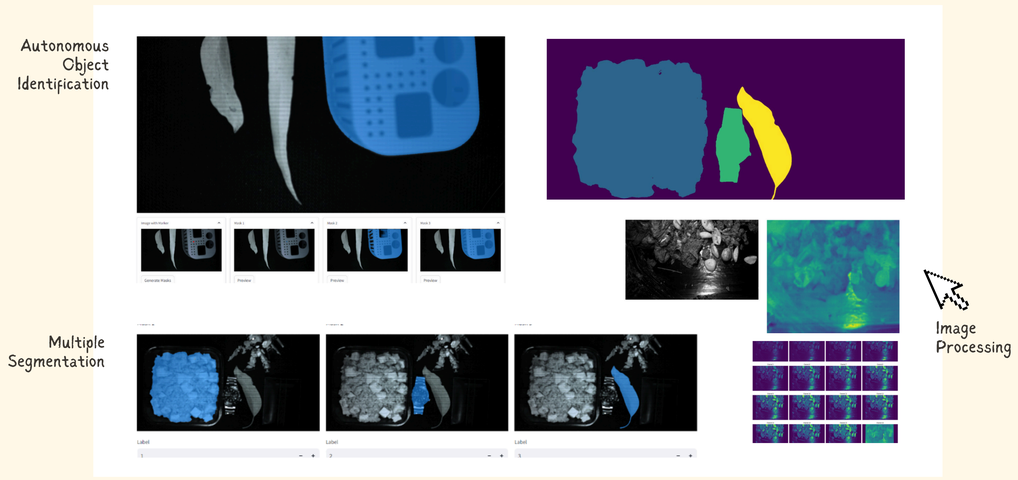
05. Results & Key Findings

what we acheived!

Autonomous object identification streamlines annotation by automatically detecting objects, multiple object labeling enables labeling of several objects in a single image for comprehensive dataset creation, and advanced image processing supports multispectral and thermal imaging for specialized requirements.

Key findings

1. Meta's SAM handles segmentation on any domain without needing more training data
2. Better GPU results to better processing times in image segmentation
3. Storing the model output in local session state decreases the rendering time of streamlit



06. Recommendation

Enhance UI / UX → Implement User Authentication and Authorization → Protect intellecture property

Streamlined Workflow (CI/CD Pipeline) → Optimize image processing algorithm

07. Conclusion

Our project's culmination marks a pivotal advancement in image annotation and labeling, offering a user-friendly web-based tool that revolutionizes academic research processes. Through meticulous planning and collaborative efforts, We've addressed the need for **Automation and Efficiency** providing a viable solution to manual annotation challenges. By democratizing image processing technology, our tool **empowers students and researchers,** fostering innovation and progress across diverse fields.

Awesome!