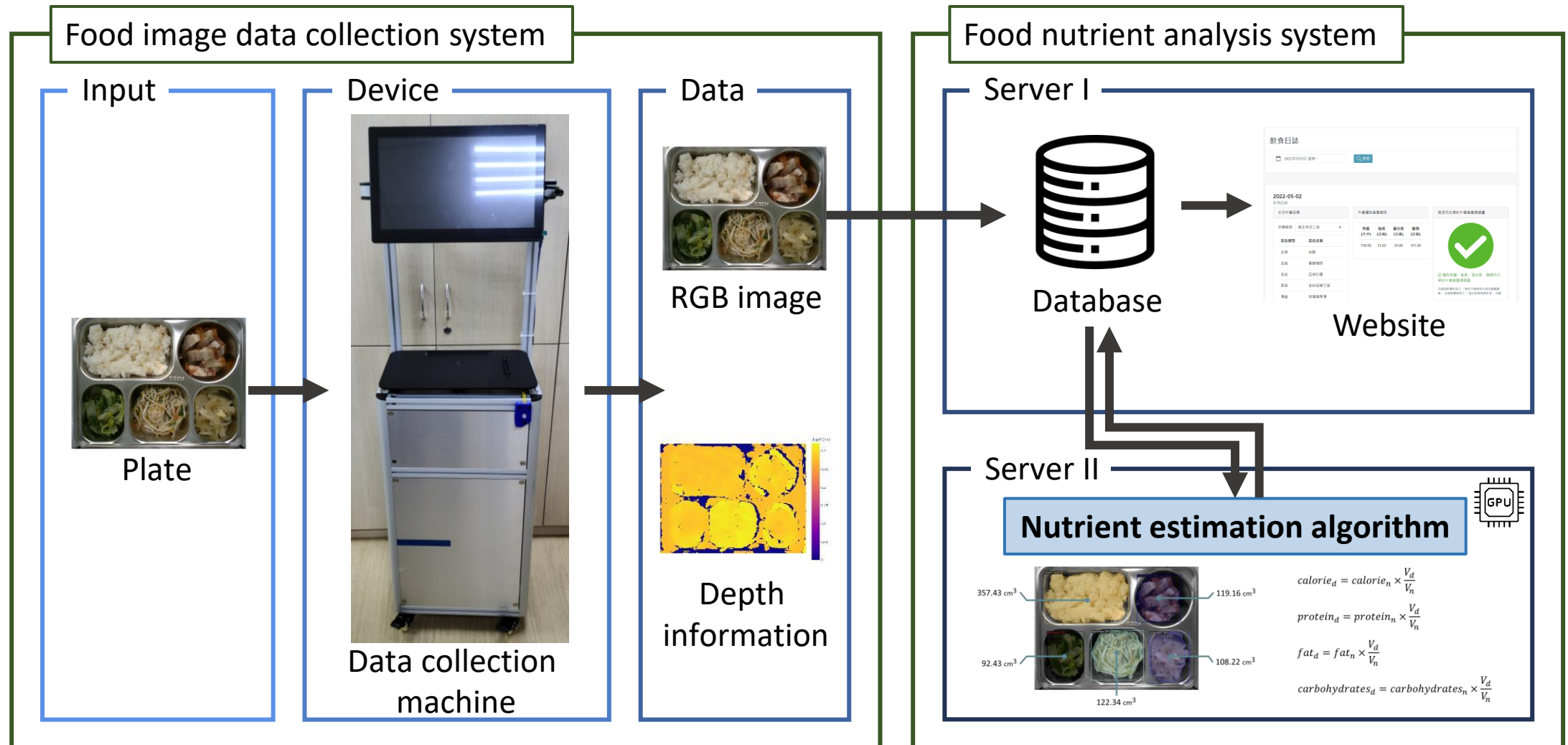


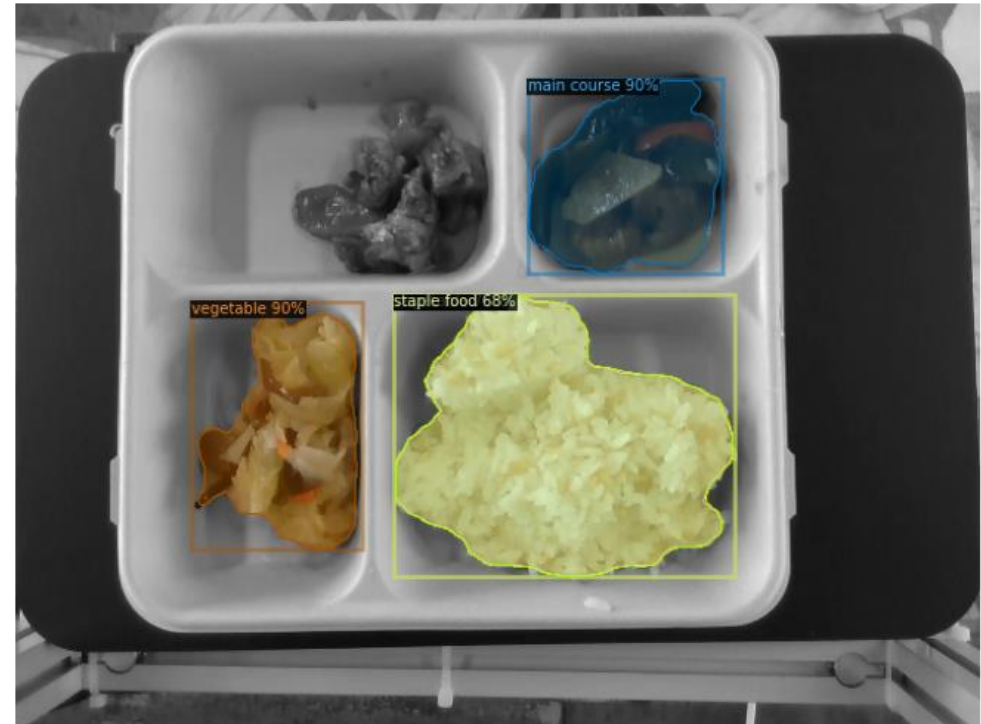
Food Instance Segmentation

Food Nutrient Analysis



Instance Segmentation

- Detecting instances of objects and demarcating their boundaries



Grading

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Test results		15

Data

- Training data
 - 455 images

Category	# instance
staple food	442
main course	434
side dish	394
vegetable	708
total	1978

- Validation data
 - 93 images

Category	# instance
staple food	89
main course	87
side dish	82
vegetable	146
total	404

Download link: https://drive.google.com/file/d/1p5EL-gYd6KKggaHMS4GOXR_DligvcjTI/view?usp=share_link

Process



ANNOTATION



MODEL
CONSTRUCTION



ANNOTATION
FORMAT
TRANSFORM



MODEL TRAINING



EVALUATION

Annotation

1. Install labelme

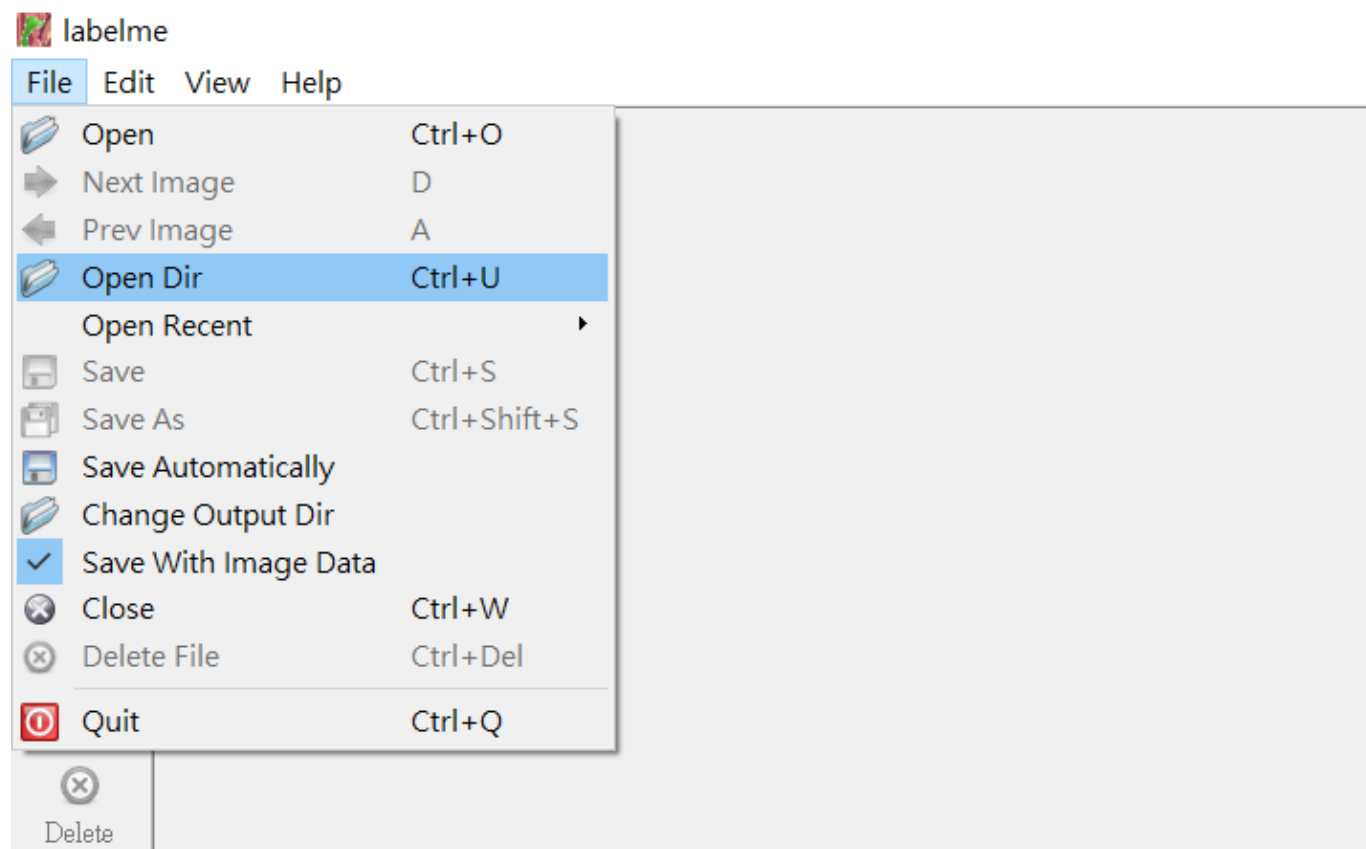
Installation

There are options:

- Platform agnostic installation: Anaconda
- Platform specific installation: Ubuntu, macOS, Windows
- Pre-build binaries from the release section

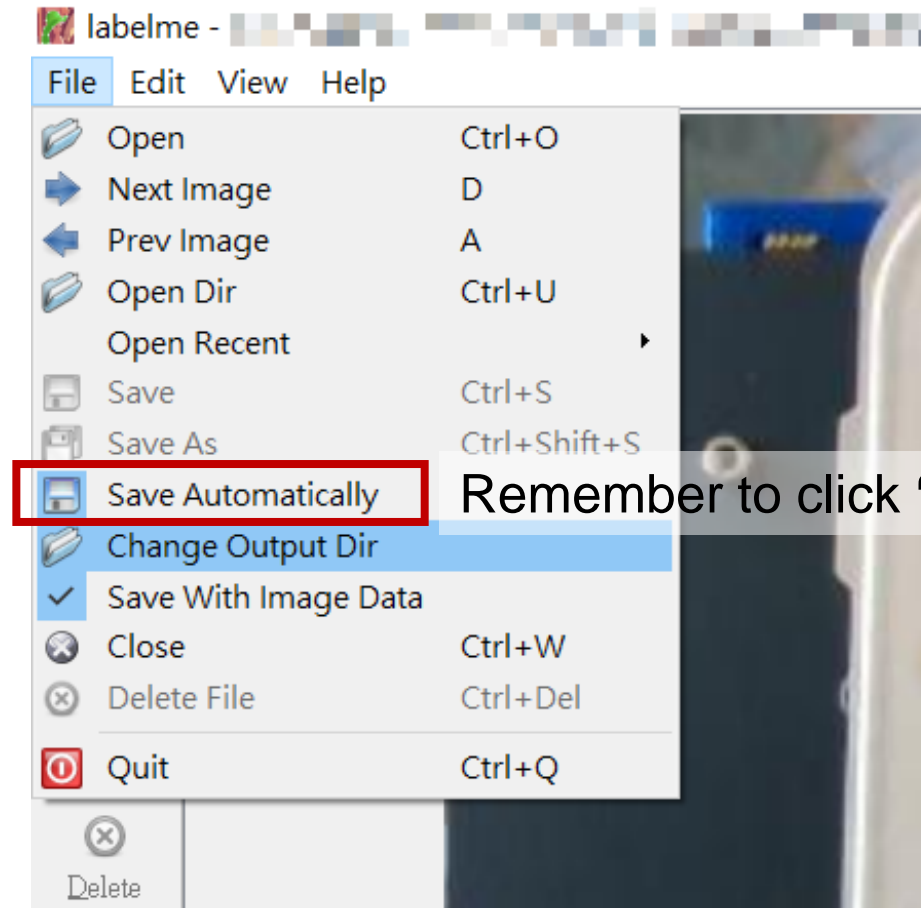
Annotation

2. Open image directory



Annotation

3. Change output directory



Remember to click “**Save Automatically**”

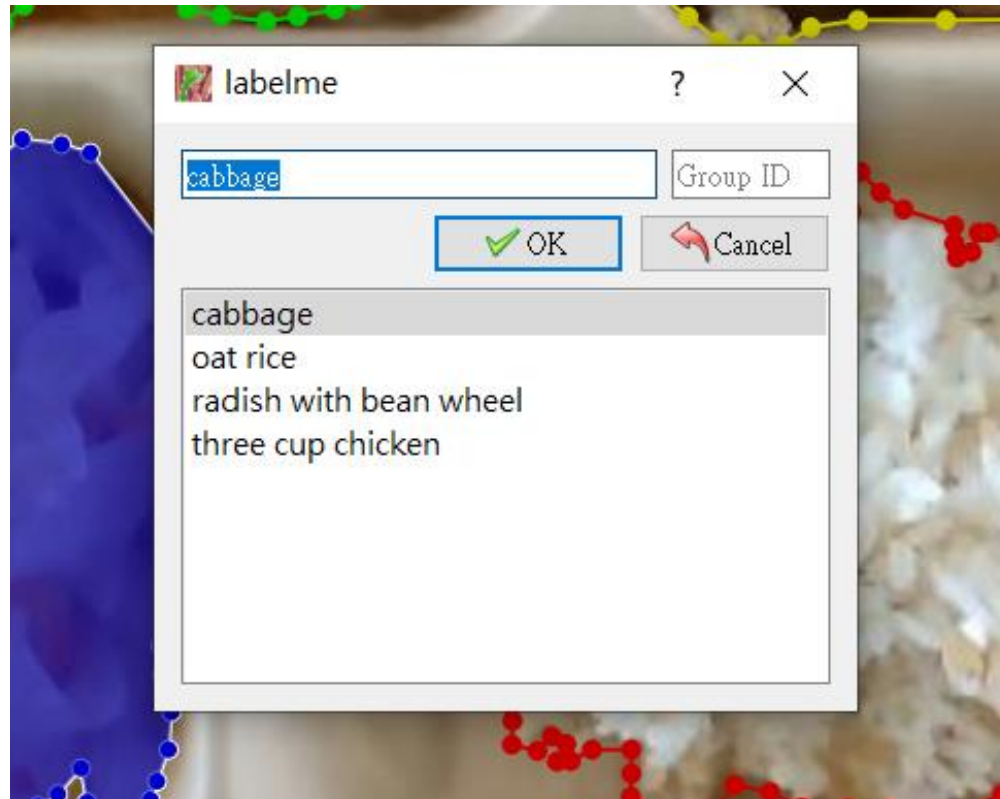
Annotation

4. Click “Create Polygons” and mark along the food contour



Annotation

5. After marking, set the label of the food



Annotation

6. If tray is empty, skip it



Annotation

- For more label information, please refer to:
<https://github.com/huang0819/food-segmentation#label>

Model Construction

- Select instance segmentation model
 - [EVA](#), [GitHub](#)
 - [Mask DINO](#), [GitHub](#)
 - [Swin Transformer V2](#), [GitHub](#)
 - ...

Annotation Format Transform

- Check the format specified by your model
- In this tutorial, we used COCO dataset format

ROOT

```
... version: "4.5.13"  
... flags: [Object]  
+ shapes: [Array]  
... imagePath: "..\\img\\2022:  
... imageData: "/9j/4AAQSkZJ  
... imageHeight: 480  
... imageWidth: 640
```

```
20221123174818_357_0.json  
20221123174858_265_0.json  
...
```



ROOT

```
+ images: [Array]  
+ annotations: [Array]  
+ categories: [Array]
```

dataset.json

Model Training

- Sample code: [Mask R-CNN](#)



Detectron2

- [More model structures:](https://github.com/facebookresearch/detectron2/blob/main/MODEL_ZOO.md)
https://github.com/facebookresearch/detectron2/blob/main/MODEL_ZOO.md
- Do not use test data during model training

Evaluation

- Use the trained model to predict test data and generate reports
- Evaluation sample code:
<https://gist.github.com/huang0819/3f6bf5b8d0f0ad5c8954c9d0ce559f02>

```
Average Precision (AP) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.719
Average Precision (AP) @[ IoU=0.50      | area= all | maxDets=100 ] = 0.859
Average Precision (AP) @[ IoU=0.75      | area= all | maxDets=100 ] = 0.820
Average Precision (AP) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.252
Average Precision (AP) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.484
Average Precision (AP) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.784
Average Recall    (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 1 ] = 0.706
Average Recall    (AR) @[ IoU=0.50:0.95 | area= all | maxDets= 10 ] = 0.763
Average Recall    (AR) @[ IoU=0.50:0.95 | area= all | maxDets=100 ] = 0.763
Average Recall    (AR) @[ IoU=0.50:0.95 | area= small | maxDets=100 ] = 0.250
Average Recall    (AR) @[ IoU=0.50:0.95 | area=medium | maxDets=100 ] = 0.524
Average Recall    (AR) @[ IoU=0.50:0.95 | area= large | maxDets=100 ] = 0.825
```

Any questions ?