

**FOOD  
RECOGNITION**  
BENCHMARK 2022



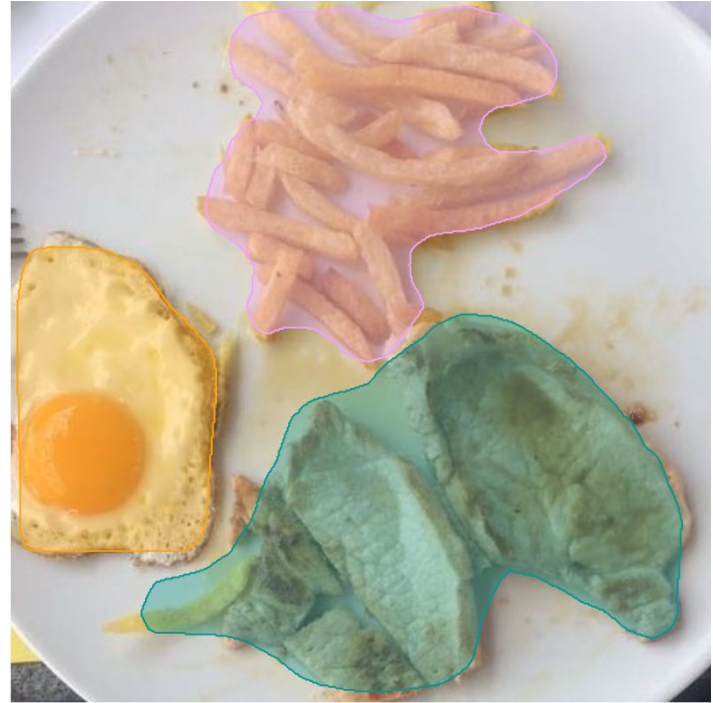
Acharya Kirill, Berkut Kirill, Fomina Anna

# Problem Statement

It is required to make an instance-segmentation of food by photo, namely:

- Segmentation mask for each object
- Object class
- Different objects of the same class are counted separately

The result is evaluated by the Average Precision and Average Recall metrics



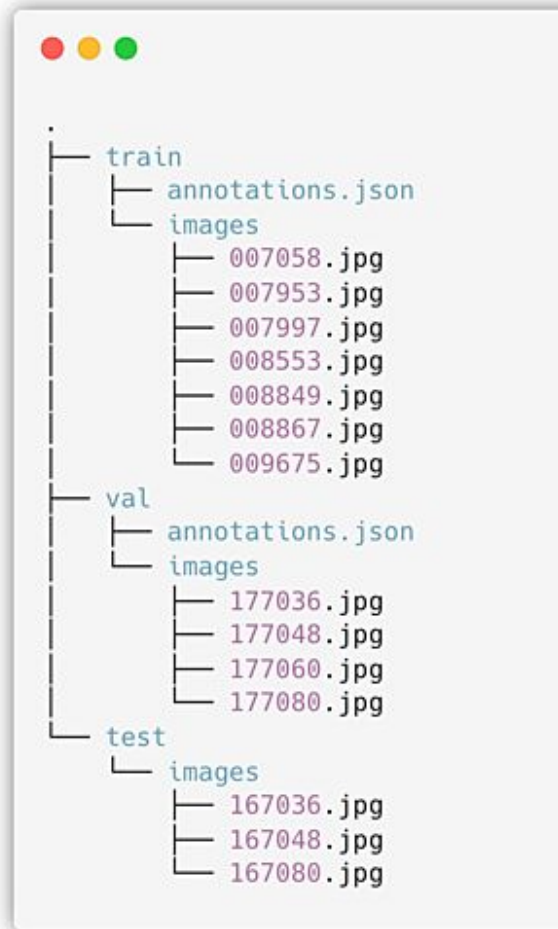
# Dataset Analysis

## Dataset Description:

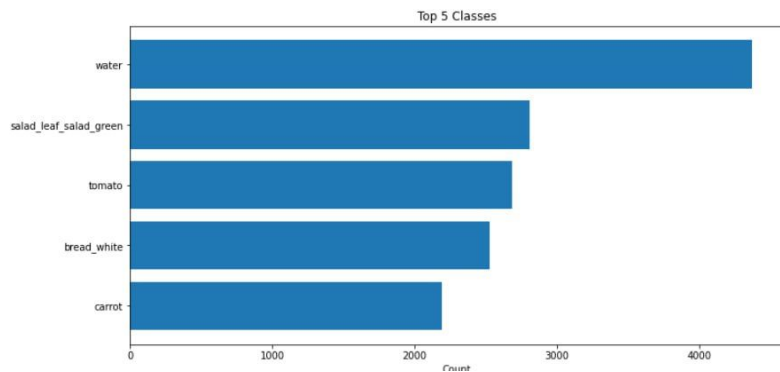
- MyFoodRepo Dataset v2.1:
- 54,392 images with annotations in the train sample
- 946 images with annotations - in the validation
- 2819 test images
- 323 classes

## Issues with data:

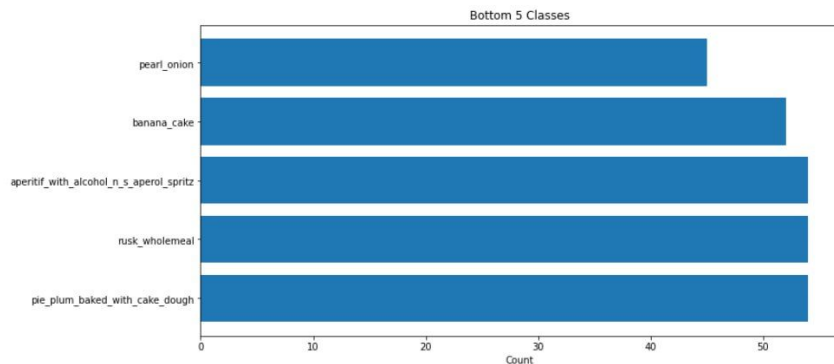
- Class imbalance
- Segmentation masks are not very accurate
- There are errors in the annotations
- Pictures of different sizes
- A large number of classes



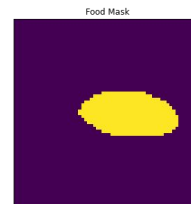
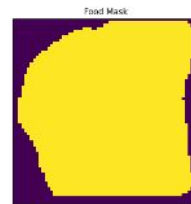
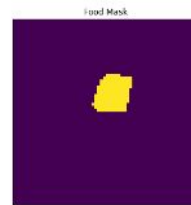
# Dataset Analysis



First 5 classes by number of images

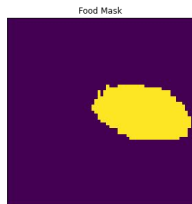
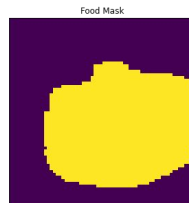
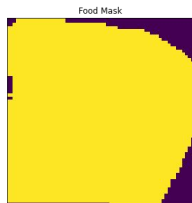
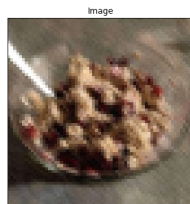
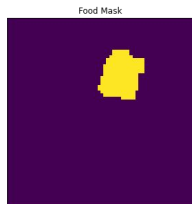


Last 5 classes by number of images



Examples of images with masks

# Data Augmentations



## Applied Augmentations:

- Horizontal and vertical flips
- Turns up to 60 degrees
- Noise
- Blur
- Random Contrast
- Random brightness
- Crops

# Solution Timeline

## 1) Segmentation Models Pytorch

- Dataset and data augmentation
- FPN + ResNet50 (pre-trained on imagenet) - trained, learned slowly, metrics did not grow
- Augmentations were reduced, the image size was made 64x64 - it began to learn faster, but the metrics did not grow
- PSPNet+EfficientNet-B7 (pre-trained on imagenet) - trained, the result is slightly better

## 2) MMDetection

- Mask\_R-CNN+ResNet50-FPN - the most successful option, selected as the final solution

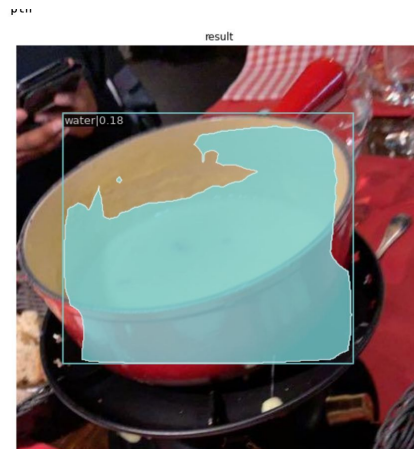
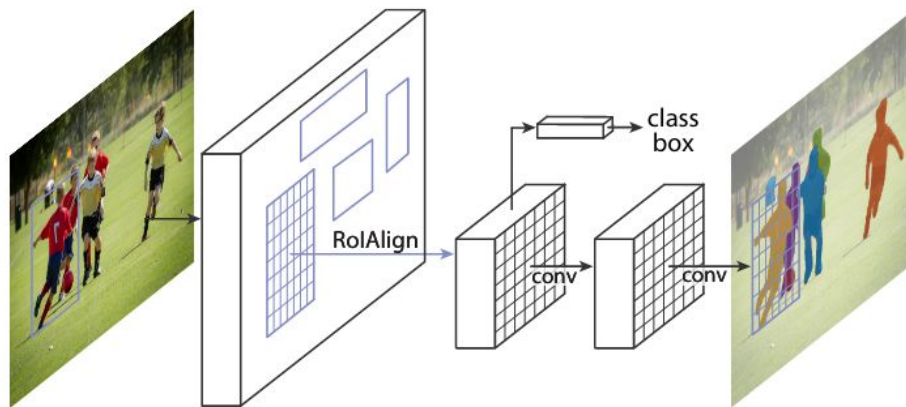
# Final solution

Mask R-CNN+R-50-FPN

We managed to train only a few epochs, we assume that with additional training, higher metrics will be achieved

For now:

Average Precision: 0.005  
Average Recall: 0.017



ID	Participant	Status	AP	AR	Message
231088	kirill6	graded	0.003	0.012	Graded successfully!

# Team

## Kirill Acharya

- 1) FPN+ResNet50
  - using the Segmentation Models framework
  - Training and Testing the Model
- 2) Presentation creation

## Anna Fomina

- 1) Augmentations
  - Baseline augmentations
  - Testing
  - Experiments
- 2) PSP+EfficientNet-B7
  - Using the Segmentation Models Framework
  - Training and Testing the Model

## Kirill Berkut

- 1) Data preprocessing
  - downloading and data management
- 2) Mask\_R-CNN+ResNet50-FPN
  - using the MMDetection framework
  - dataset creation
  - Training and Testing the Model

[Link to the Project on Github](#)