

OBJECT DETECTION

PROBLEM STATEMENT

Build a system that is able to segment the area containing an object in a given image automatically.

Framework

- Prepare the data
- Choose the method and tools
- Train the model
- Test the model

DATA



21 images: 18 for training and 3 for testing



PREPARE THE DATA

The screenshot shows a software interface for data preparation. On the left, there is a sidebar with a 'Region Shape' section containing icons for rectangle, circle, polygon, and other shapes. Below that is a 'Project' section with a text input field containing 'via_project_12May2019_16f'. Underneath is a list of files, each with a number in brackets followed by a filename (e.g., [1] FINSE-08_000001.JPG). The list is filtered by a 'regular expression' field. At the bottom of the sidebar is a 'Region Annotations' table with two rows, each with a 'display_name' column and a text input field containing 'flower'. The main area of the interface shows a large image of a grassy field with two yellow bounding boxes around small white flowers. At the bottom of the interface, there is a black bar with white text that reads 'Import Summary: [0] new files, [33] regions, [0] malformed entries'.

PREPARE THE DATA

Annotation file: via_region_data.Json

```

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```



9 MAY 2019

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POSTDOC



CHOOSE THE METHOD

Object detection API from tensorflow

- https://github.com/tensorflow/models/tree/master/research/object_detection
- Capable of localizing and identifying multiple objects in a single image
- Pre-trained models
 - Tensorflow detection model zoo
 - https://github.com/tensorflow/models/blob/master/research/object_detection/g3doc/detection_model_zoo.md
 - We choose: faster_rcnn_resnet50_fgvc
 - Fine tune this pre-trained model using our data



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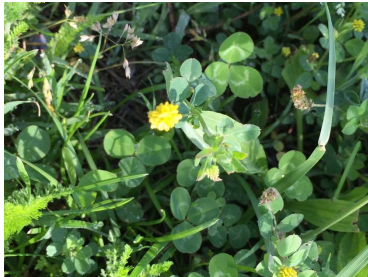
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THE SELECTED PRE-TRAINED MODEL

Trained on iNaturalist database

- <https://www.inaturalist.org>
- https://github.com/visipedia/inat_comp
- Over 8,000 species, 450,000 images



TRAINING

- Convert data format
 - <https://github.com/rky0930/via>
- Edit configuration file for the pre-trained model
- Fine tune the pre-trained model

RESULTS



RESULTS (IMAGES FROM OTHER LOCATIONS)



EVALUATION METRICS

1. Intersection over Union (IoU)

$$\bullet \text{IoU} = \frac{\text{Prediction} \cap \text{Gourd Truth}}{\text{Prediction} \cup \text{Gourd Truth}}$$

2. True positive (TP): the IoU score of a prediction is **ABOVE** a pre-defined value.

3. False positive (FP): the IoU score of a prediction is **BELOW** a pre-defined value.

4. False negative (FN): there is no prediction associated with a gourd truth.

5. Precision: $\frac{TP}{TP+FP}$

6. Recall: $\frac{TP}{TP+F}$

