

## Package Functions

### 1. helpers.py

`create_folders(folder_name)`

Create folders if the specified path does not exist yet.

`unpad_image(image)`

Removes additional padding from image.

`process_image_rois(directory_path)`

`process_single_skeleton(skeleton_branch_data, image)`

`process_multiple_skeletons(skeleton_branch_data, image)`

`coordinate_transpose(image)`

Transpose coordinates to OT2 space coordinates (pixels to mm).

### 2. metrics.py

`f1(y_true, y_pred)`

Calculate F1 score

`iou(y_true, y_pred)`

Calculate IoU

### 3. data\_processing.py

`roi_extraction(path, image, value)`

Based on the derivative extract area of interest from image.

`set_outside_pixels_to_zero(image, min_x, max_x, min_y, max_y)`

Set pixel values outside of specified bounds to 0.

`width_of_the_plate_p(path)`

Return width of petri dish.

`padder(image, patch_size)`

Pad images in order to prevent shape mismatch during patching.

`pre_process_training(input, output, model)`

Pre-process data to prepare for training.

`convert_to_png(image, path)`  
Convert .tif files to .png

#### **4. features.py**

`predict_image(image, patch_size, segmentation_model, occlusion_inpainter, shoot_model, refinement_steps)`  
Apply model prediction to a specified image.

`save_model_predictions(input_folder, root_segmentation_model, occlusion_inpainter, shoot_segmentation_model, padder, output_folder, refinement_steps)`  
Save model predictions after unpadding and thresholding.

`overlay_root_shoot_masks(input_folder)`  
Overlay predictions over input image.

`measure_images_in_folder(folder_path)`  
Measure primary root\_length of each individual plant.

`retrain_models(model, data)`  
Retrain models periodically based on new data.

`timeseries_analysis(period_folder)`  
Create graphs to visualize growth over-time

`innoculate_landmarks(landmarks)`  
Create and send list of instructions to OT2

`trigger_manual_review(image, graph)`  
Based on growth graph warn user of irregularities for manual, human review