Wang, Jiaxin, Renninger, Heidi, & Ma, Qin. (2023). StoManager1: Automated, High-throughput Tool to Measure Leaf Stomata Using Convolutional Neural Networks (v.0504.23). Zenodo. https://doi.org/10.5281/zenodo.7686022

StoManager1: Automated, High-throughput Tool to Measure Leaf Stomata Using Convolutional Neural Networks

Select or type in image input & output path **Step1**

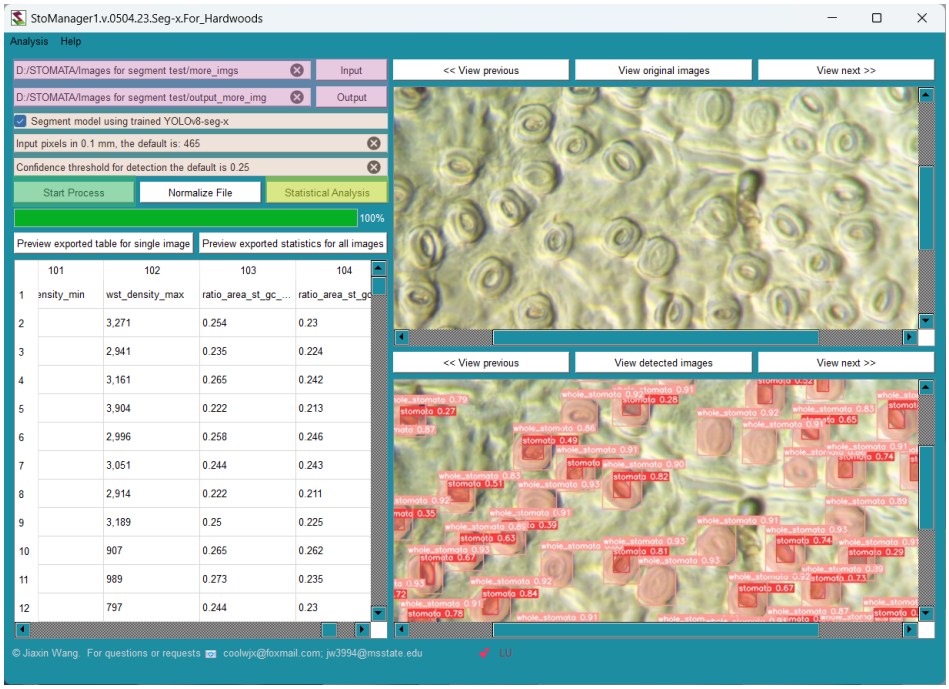
Step2 Select models and set images resolution info and give the threshold for detection

Press start process **Step3**

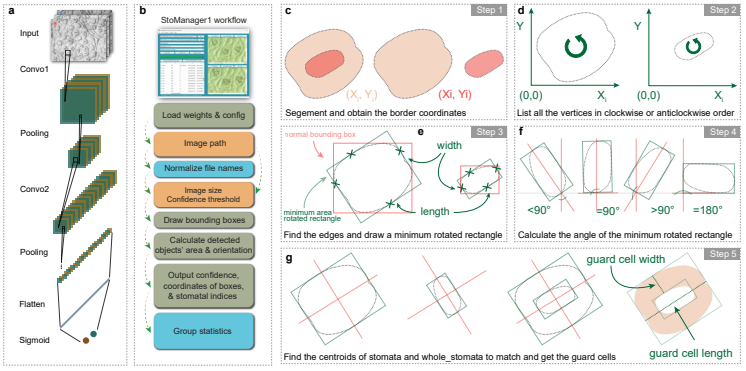
Step4 Do Statistical analysis

View the table and image output **Step5**

- Feed image that has stomata in it.
- Use independent paths for input and output
- GPU version works 30-40 times faster than CPU version, but you must have a GPU with cuda11.7 installed correctly.
- More training will be conducted to enhance the capability for more species.



Schematic diagrams of model training processes (a), detection workflow (b), and segmentation model pipeline for stomatal metrics measuring (c, d, e, f, g).



Ouput variables	Defination
ori_img_shape	the original image shape, e.g., (1024, 768)
class_wst	class of whole_stomata, e.g., "1"
number_wst	total number of whole_stomata
index_wst	index of whole_stomata
box_w_wst	bounding box width of whole_stomata
box_h_wst	bounding box height of whole_stomata
area_wst	the area of whole_stomata
width_wst	the width of whole_stomata
length_wst	the length of whole_stomata
var_area_wst	the variance of whole_stomata area
var_width_wst	the variance of whole_stomata width
var_length_wst	the variance of whole_stomata length
centroid_wst	the centroid of whole_stomata
class_st	class of whole_stomata, e.g., "0"
number_st	total number of stomata
index_st	index of stomata
box_w_st	bounding box width of stomata
box_h_st	bounding box height of stomata
area_st	the area of stomata
width_st	the width of stomata
length_st	the length of stomata
var_area_st	the variance of stomata area
var_width_st	the variance of stomata width
var_length_st	the variance of stomata length
centroid_st	the centroid of stomata
guardCell_length	guard cell length
guardCell_width	guard cell width
guardCell_area	guard cell area
guardCell_angle	the orientation of guard cell
var_angle	the variance of stomatal orientation
var_width_guardCell	the variance of guard cell width
var_length_guardCell	the variance of guard cell length
wst_density	whole_stomata density in a given image
ratio_area_st_gc	the area ratio of stomata to guard cell

What's new in this version?

1. *Substantially improved group analysis speed.*
2. *Added Toy dataset for users to play around.*
3. *Updated line-edit default text. Fine-tuned weights for Hardwoods.*
4. *Enhanced detection capacity for blurred images.*
5. *Implement segment mdoels for directly measuring stomatal metrics.*
6. *Enhanced version with more stomatal metrics measured with theoretical algorithms!!*