


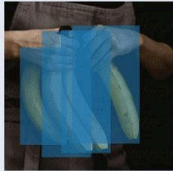
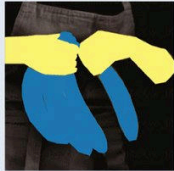

# Annotationem ex Nihilo

Image annotation from scratch using `PyQtGraph` and `FastSAM`

Nathan Jessurun  
Founder, TerraVerum

# Introduction

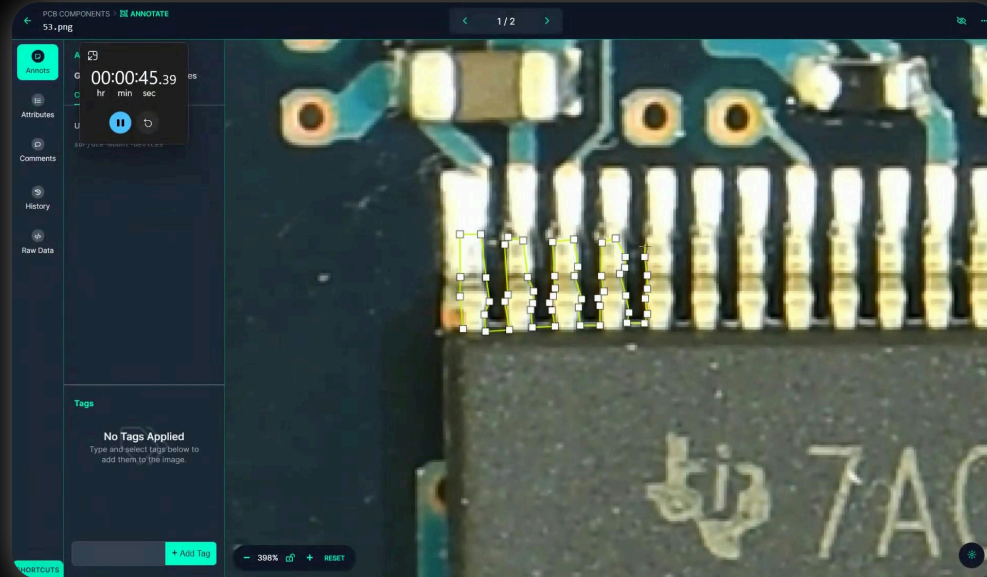
Several types of annotation, most time consuming and informative is **instance segmentation**

Classification	Object Detection	Semantic Segmentation	Instance Segmentation
			
<ul style="list-style-type: none"><li>✓ Presence</li><li>✗ Location</li><li>✗ Count</li><li>✗ Size</li><li>✗ Shape</li></ul>	<ul style="list-style-type: none"><li>✓ Presence</li><li>✓ Location</li><li>✓ Count</li><li>✗ Size</li><li>✗ Shape</li></ul>	<ul style="list-style-type: none"><li>✓ Presence</li><li>✓ Location</li><li>✗ Count</li><li>⚠ Size</li><li>⚠ Shape</li></ul>	<ul style="list-style-type: none"><li>✓ Presence</li><li>✓ Location</li><li>✓ Count</li><li>✓ Size</li><li>✓ Shape</li></ul>
<p>OUTPUT</p> <p>Banana exists: Yes / No</p>	<p>OUTPUT</p> <p>There are 4 bananas</p>	<p>OUTPUT</p> <p>There is banana in these pixels</p>	<p>OUTPUT</p> <p>There are 4 bananas of this shape, size and grade</p>

# Introduction

But \ ८\_८ / **detailed annotation is time consuming!**

(manual timelapse)

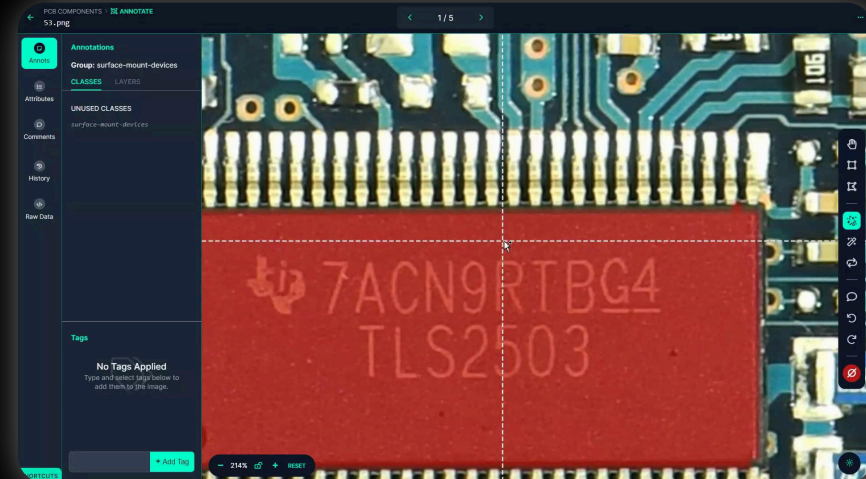


# Introduction

Assistance tools help, but are often **paywalled**, **perform poorly**, or expect **detailed project workflows**

(Pretrained SAM)

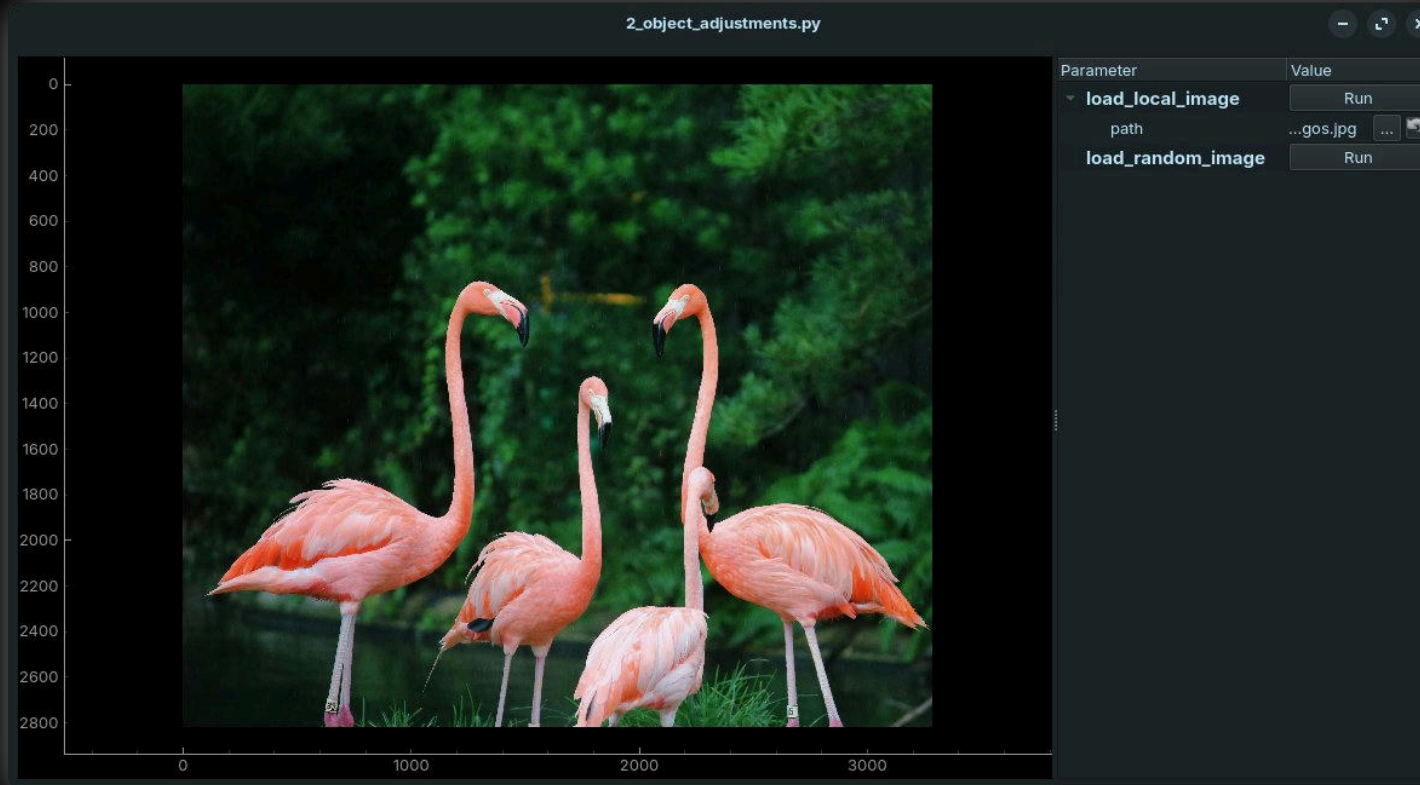
Free	Pro	Enterprise
Ideal for early-stage startups and academics/researchers	Get ready to scale your most sophisticated AI projects and MLOps needs	Best suited for well-established, recurring, and high-volume AI projects
<a href="#">Startup</a> <a href="#">Academic</a>	✓ Annotation automation (Magic tools)	
<b>Basic features</b>	<b>All of Free +</b>	<b>All of Pro +</b>
<ul style="list-style-type: none"><li>✓ Image editor (supports image, video, PDF, and DICOM upload)</li><li>✓ Video, text, and audio editors</li><li>✓ Project management</li><li>✓ Team and user management</li><li>✓ Integrations with AWS, GCP, and Azure</li><li>✓ Simple analytics</li><li>✓ Up to 3 users</li><li>✓ Up to 5000 items</li><li>✓ Email support</li></ul>	<ul style="list-style-type: none"><li>✓ Annotation services</li><li>✓ Gen AI, LLM, and custom editor</li><li>✓ Tiled and multilayer image editors</li><li>✓ Annotation automation (Magic tools)</li><li>✓ AI data management and curation</li><li>✓ Data versioning and debugging</li><li>✓ Python SDK</li><li>✓ Advanced insights</li><li>✓ Unlimited users</li><li>✓ AI customer success</li></ul>	<ul style="list-style-type: none"><li>✓ Annotation services with guaranteed SLAs</li><li>✓ PDF, DICOM, time series, HTML, and custom editors</li><li>✓ MLOps toolkit</li><li>✓ Custom integrations</li><li>✓ Private user groups</li><li>✓ SSO and MFA</li><li>✓ Dedicated AI solutions manager</li><li>✓ Dedicated pipeline engineer</li><li>✓ ML consulting</li><li>✓ Unlimited annotations</li><li>✓ Enterprise customer support (24/7)</li></ul>



# Tutorial Components

1. Create a window that loads an image from a file
2. Segment the current image using FastSAM
3. Enable object-by-object adjustments
4. Save annotations and edit history
5. Enable manual adjustments using a brush
6. Future work: incorporate metadata & postprocessing

# Window Loading an Image

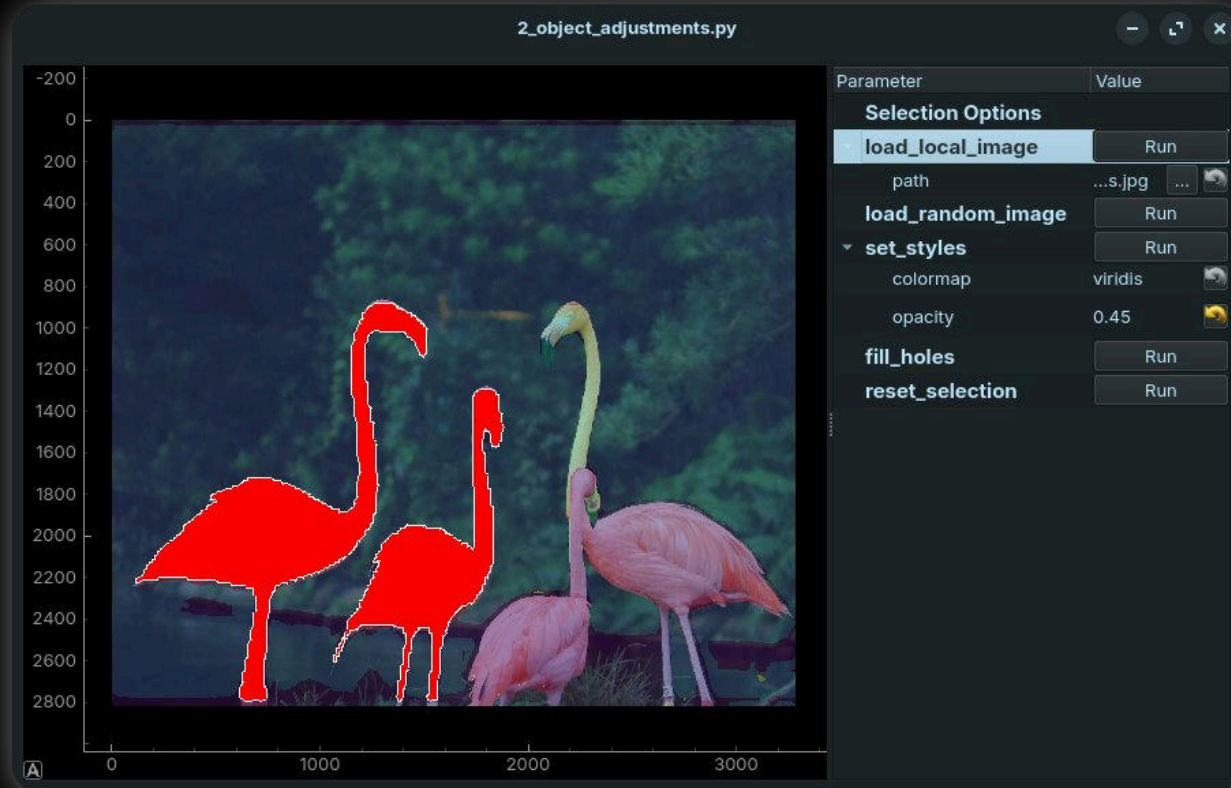


# Predictions using Ultralytics FastSAM





# Enabling User-Specified Regions





# Persisting User Edits

In progress...

# Enabling Brush Adjustments

In progress...

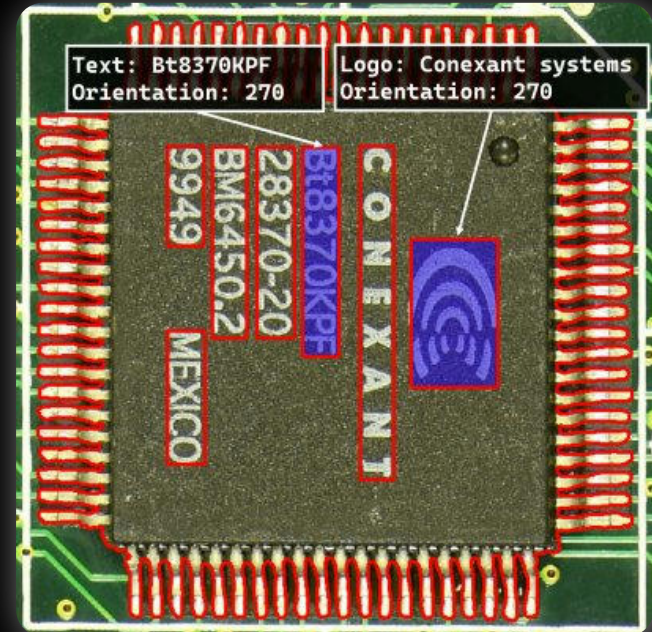
# Future Work

Regions are only part of the story. We also need:

**Metadata** (class, tags, comments, ...)

Postprocessing

Annotation management



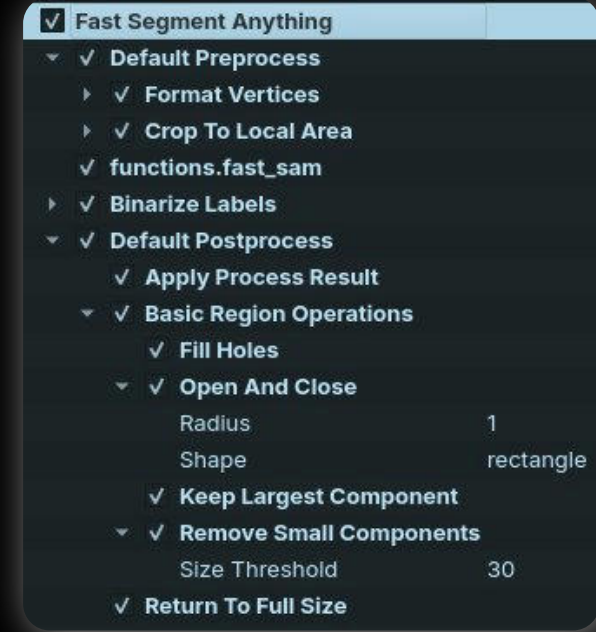
# Future Work

Regions are only part of the story. We also need:

Metadata

Postprocessing (Filtering, grouping, ...)

Annotation management



# Future Work

Regions are only part of the story. We also need:

Metadata

Postprocessing

**Annotation management** (copy/delete, bulk edits, ...)



The screenshot shows a top-down view of a green printed circuit board (PCB) with several components. Five components are highlighted with blue labels: R1089, R1110, R1112, R1114, and R1115. Below the image is a table with 5 columns: 'tor', 'Class', 'Text', 'Orientation', and 'Notes'. The table contains 7 rows of data, including the highlighted components and two other components, C771 and C769.

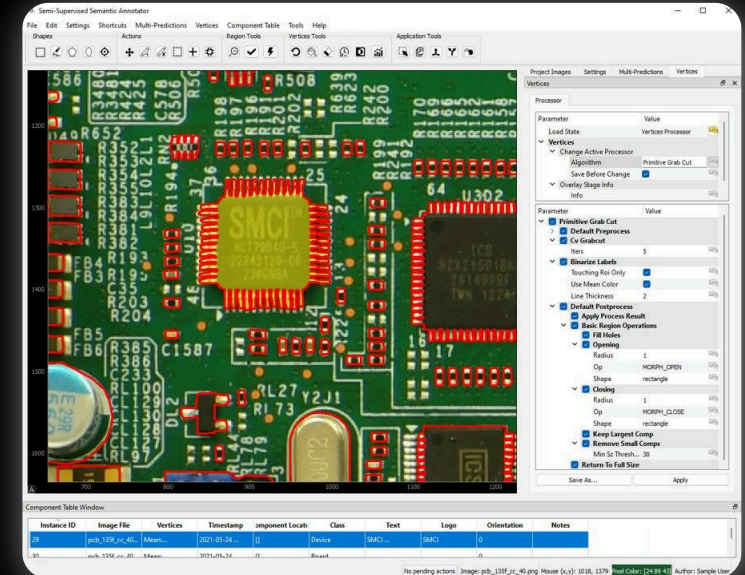
tor	Class	Text	Orientation	Notes
	Board	R1089	0	CL: Missing ...
	Board	R1110	0	
	Board	R1114	0	CL: Missing ...
	Board	R1112	0	
	Board	R1115	0	CL: Missing ...
	Board	C771	90	
	Board	C769	90	

# Future Work

These are available within [S3A](#): an open-source labeling tool

Integrate **FastSAM** (or any algorithm you wish) in **3\* lines of code!**

```
def wrap_fast_sam(image: np.ndarray):  
    label_mask = fast_sam(image)  
    return dict(labels=label_mask)
```



# Conclusion

In progress...