Semi-Supervised Semantic Annotator (S3A): Toward Efficient Semantic Image Labeling

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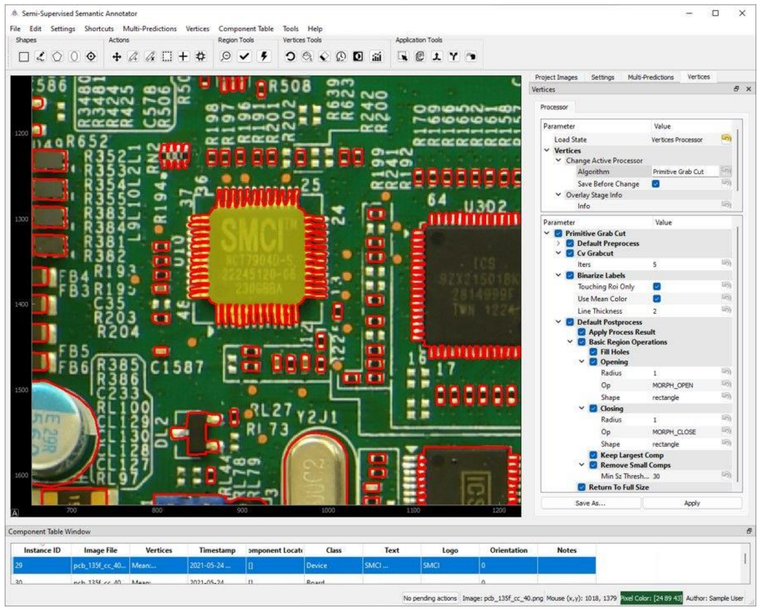
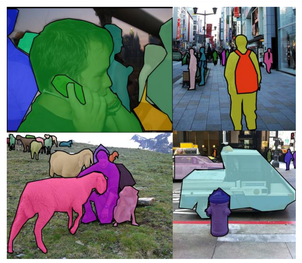
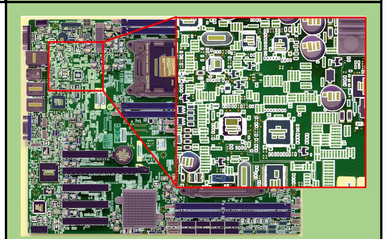
Summary

- Semantic segmentation is often bottlenecked by large images, cluttered scenes, and/or complex object shapes
- S3A addresses each issue to provide rapid data collection with significant feedback along the way
  - Flexible and extendable across analysis domains
- **Try it out: `pip install "s3a[full]"`**
- Available online: https://gitlab.com/s3a/s3a

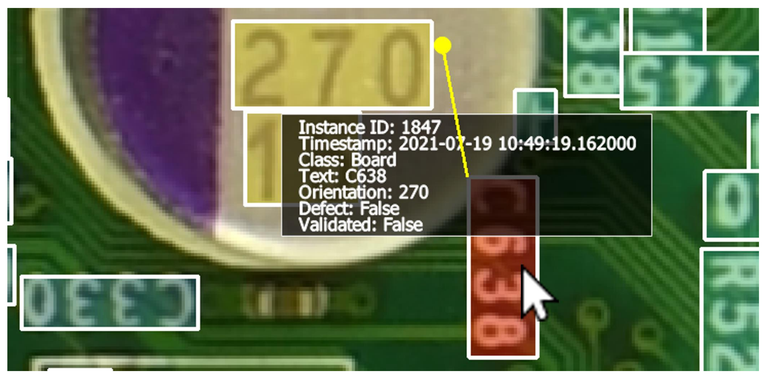
GUI at a glance



Normal tool-assisted segmentation	Enabled by S3A
	
• Few foreground objects • Small scenes • Simple object geometries	• Thousands of objects • Large images • Significant region complexity

Application Overview

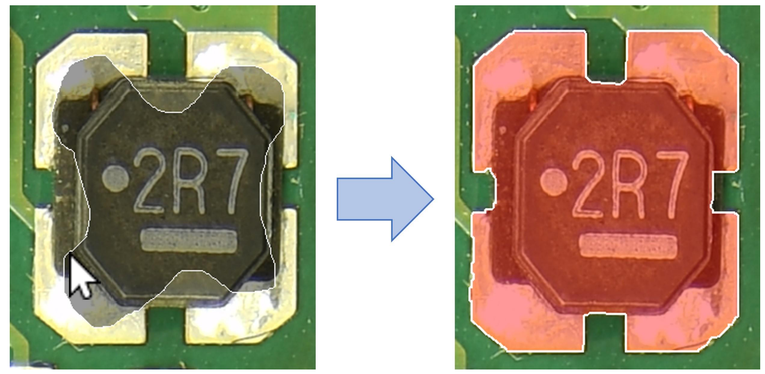
- Processing framework allows for real-time feedback and parameter adjustment
- Custom plugins allow easy metadata collection, customization, and input sanitation
- Flexible export mechanisms fit well into ML training pipelines
  - S3A can incorporate these trained models



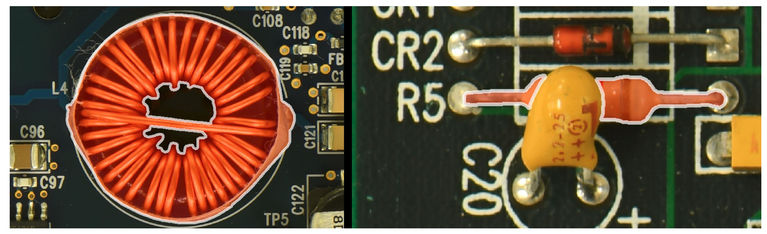
Case Study: PCB Annotation

- Optical inspection of printed circuit boards (PCBs) plays a critical role in hardware assurance
- Defects, alterations, etc. can be identified through analyzing objects on the board's surface
- PCB annotation requires **numerous, complicated annotations**!

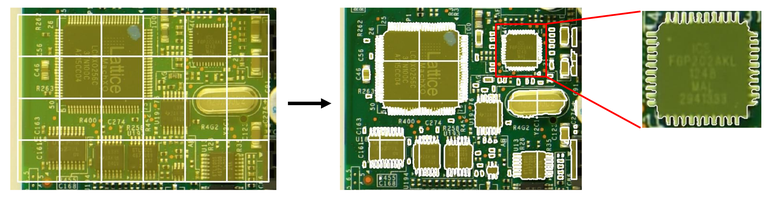
Rapid, adaptive segmentation



Arbitrarily complex shapes



Neural network integration



Future Work

- Intuitive algorithm building with tools like Orange
- Image navigation assistance: minimap, smart pan
- Analyzing human annotation: predict ideal human behavior for unseen images