Assisted Ground truth generation using Interactive Segmentation on a Visualization and Annotation Tool

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Contribution: Interactive Segmentation In Firefly

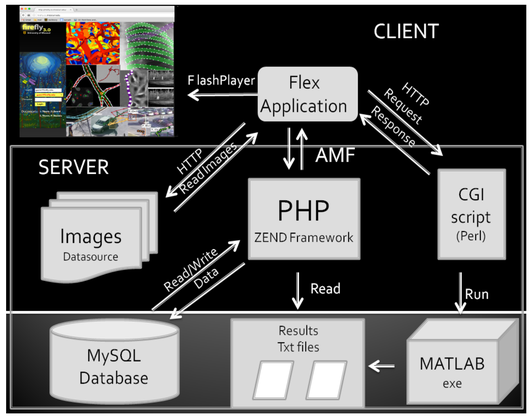
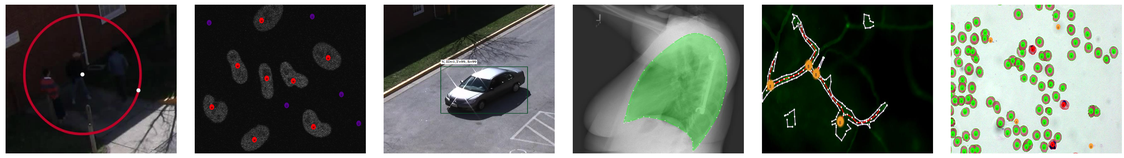


Figure 1: Architecture of Firefly.

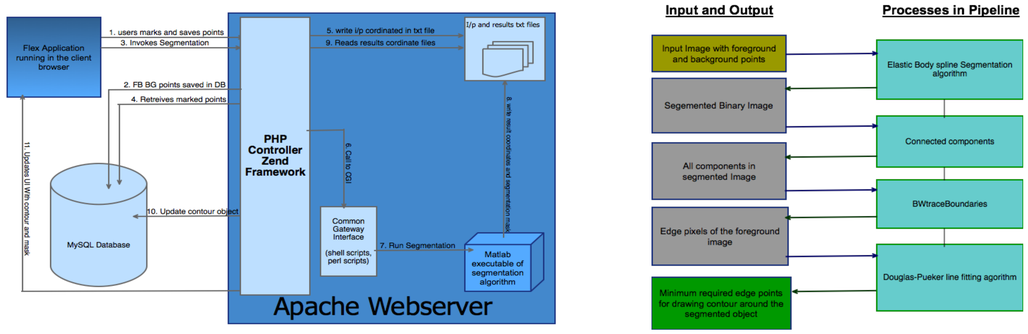
- Firefly: Rich interactive web-based tool for annotation and ground truth generation.
- Uses Model View Controller Design pattern. Abode flex in the front end. PHP on Apache server for controller logic. MySQL for saving the annotations, authentication and authorization details [1].
- Integrated interactive segmentation algorithm [2] with Firefly for assisted ground truth generation.
- Automatically generates contour for the segmented result using line fitting algorithm [3].



(a) Circle (b) Points (c) Box (d) Polygon (e) Polyline (d) Freeform

Figure 2: Various annotation tools are available in Firefly.

Interactive segmentation work flow in Firefly



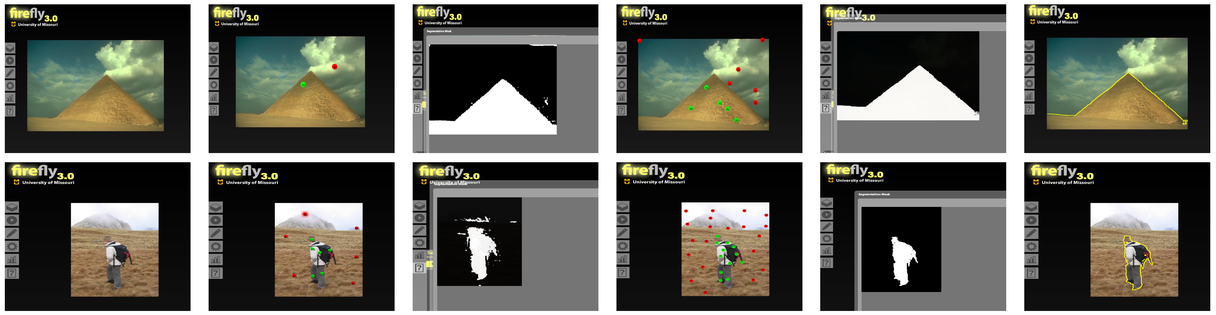
(a) (b)

Figure 3: (a) Interactive segmentation framework in Firefly. (b) Process flow pipeline of the interactive segmentation framework.

Websites And More Information

- Firefly: `http://firefly.cs.missouri.edu`
- CIVA Lab: `http://cell.missouri.edu`
- Download the poster @ figshare: `https://dx.doi.org/10.6084/m9.figshare.4036245.v1`

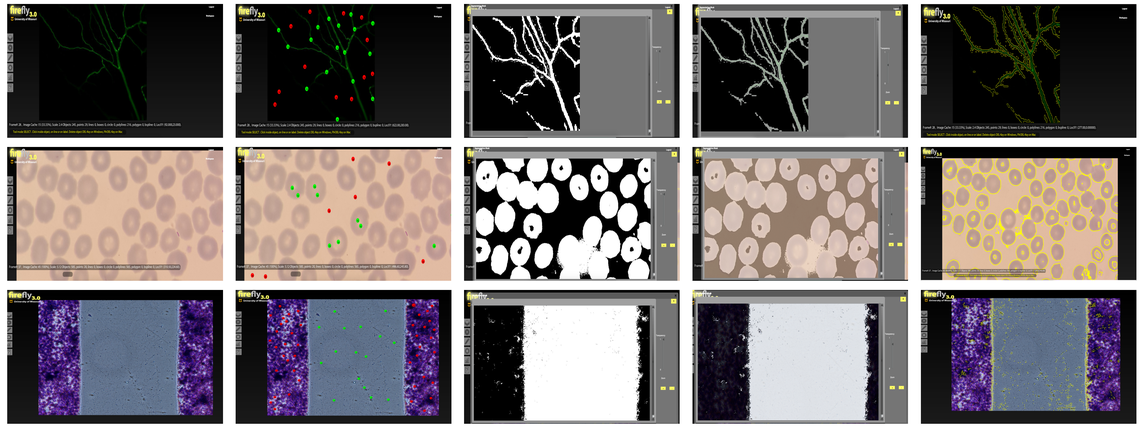
Interfacing Firefly With Interactive Segmentation



Input | Initial fg - bg | Segmentation | Refined fg - bg | Segmentation | Annotation

Figure 4: User interaction with Firefly to generate segmentations and annotations.

Segmentation Results On Biomedical Images



(a) Input (b) Clicks c) Segmented d) Transparency e) Annotated

Figure 5: Interactive segmentation and ground truth generation on biomedical imagery [4, 5, 6].

References

[1] R. Singh. Web-based interactive editing and analytics for supervised segmentation of biomedical images. MS. dissertation, University of Missouri-Columbia, USA, 2014.

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[3] D. H. Douglas, T. K. Peucker. Algorithms for the reduction of the number of points required to represent a digitized line or its caricature. *Reflections on Influential Articles from Cartographica*, John Wiley & Sons, Chichester, UK, 2011.

[4] S. Meena et al. User driven sparse point based image segmentation. *IEEE ICIP*, 2016.

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