

# Interactive Texture GUI for semi-supervised feature detection

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## MOTIVATION

Supervised learning methods can provide very accurate results. However, **the accuracy is highly dependant on the training data sets**, which need to be large enough to be representative. That is, correct classification will occur if that case is contained in the training set.

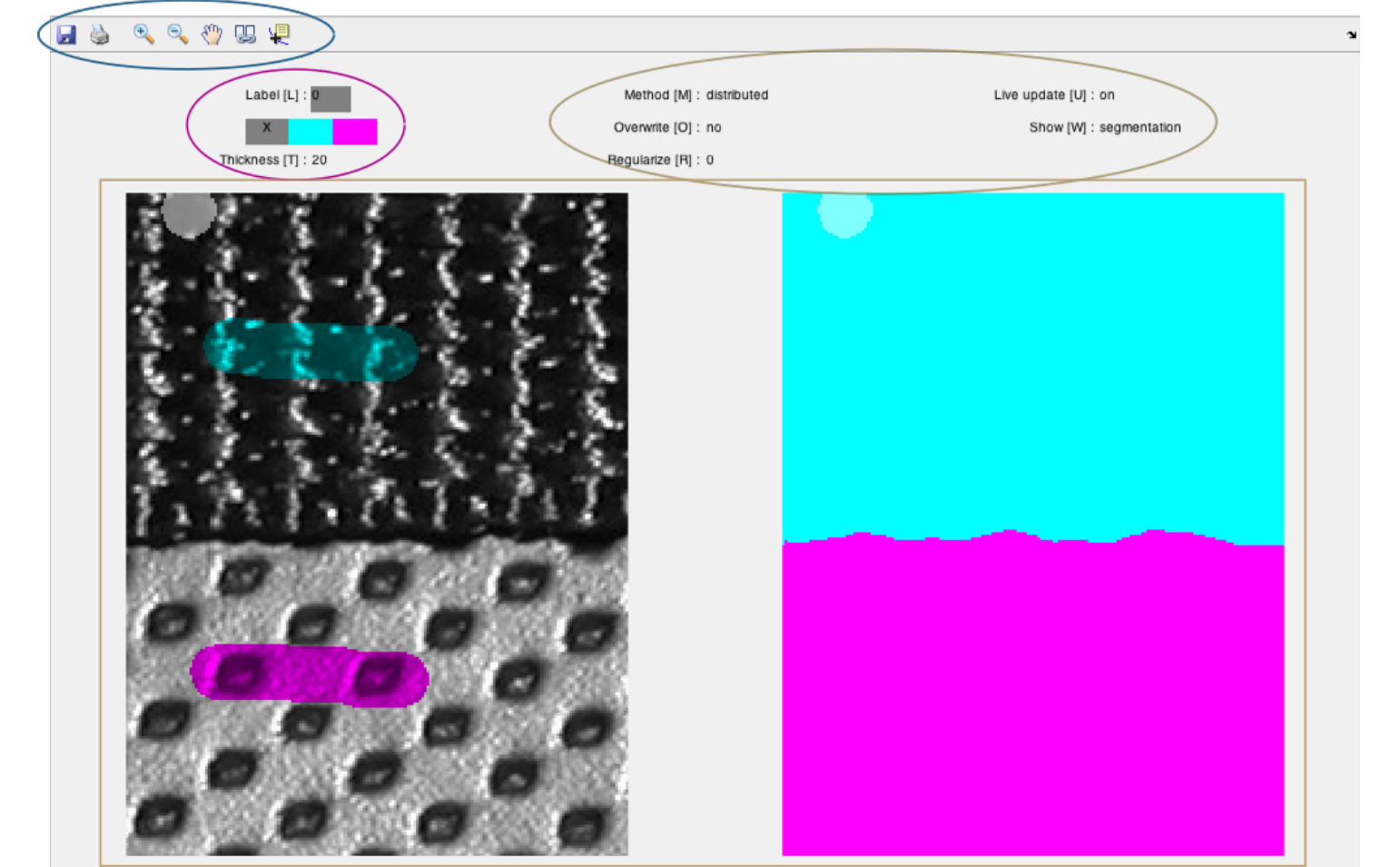
Creating these data sets can be very **time consuming** and sometimes an **expert is required** to perform this task. Consequently, it can be very **expensive** to obtain adequate results.

## TASK

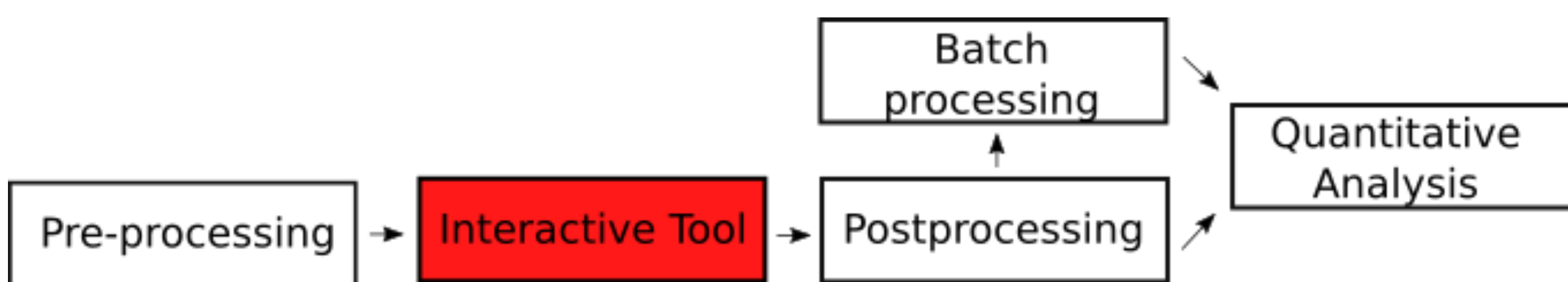
We have developed a feature detector that requires **minimal user interaction** while maintaining the accuracy of the results. The results are computed in **real time** using a method based on learning a dictionary of image patches (for more information see [1], [2] and [3]).

### Why semi-supervised and not fully automatic?

Because the tool needs to be **flexible**, allowing the user to define the classes. That way, our Interactive GUI can be used to address a **variety of problems**.



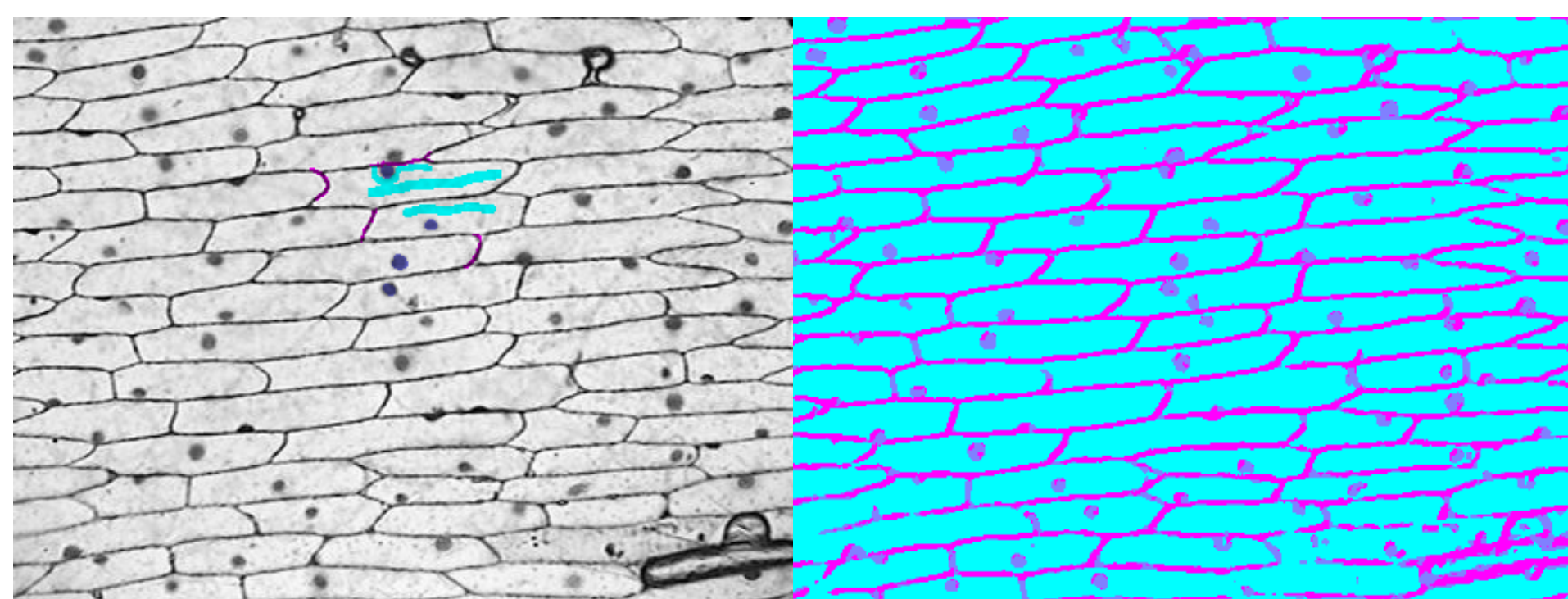
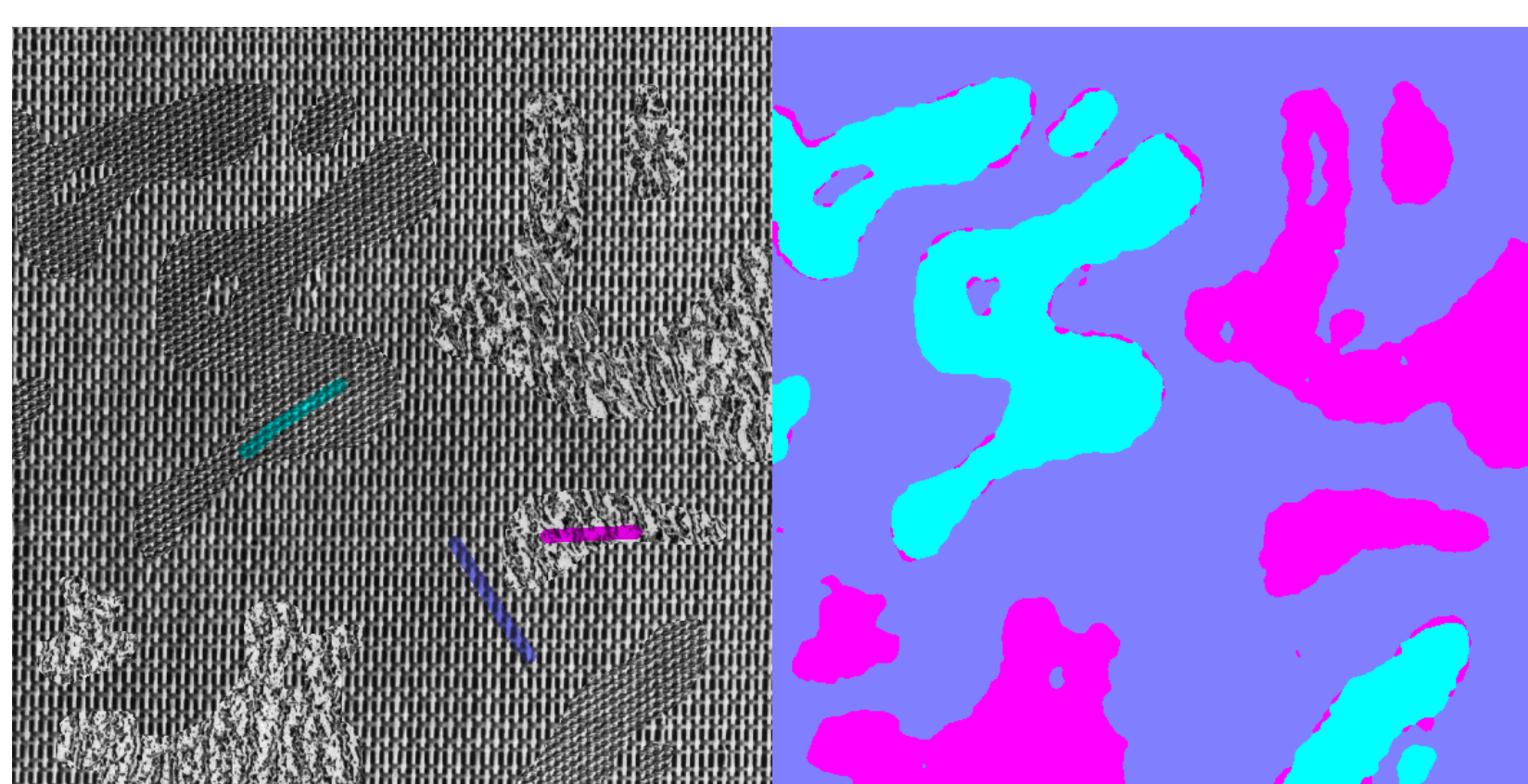
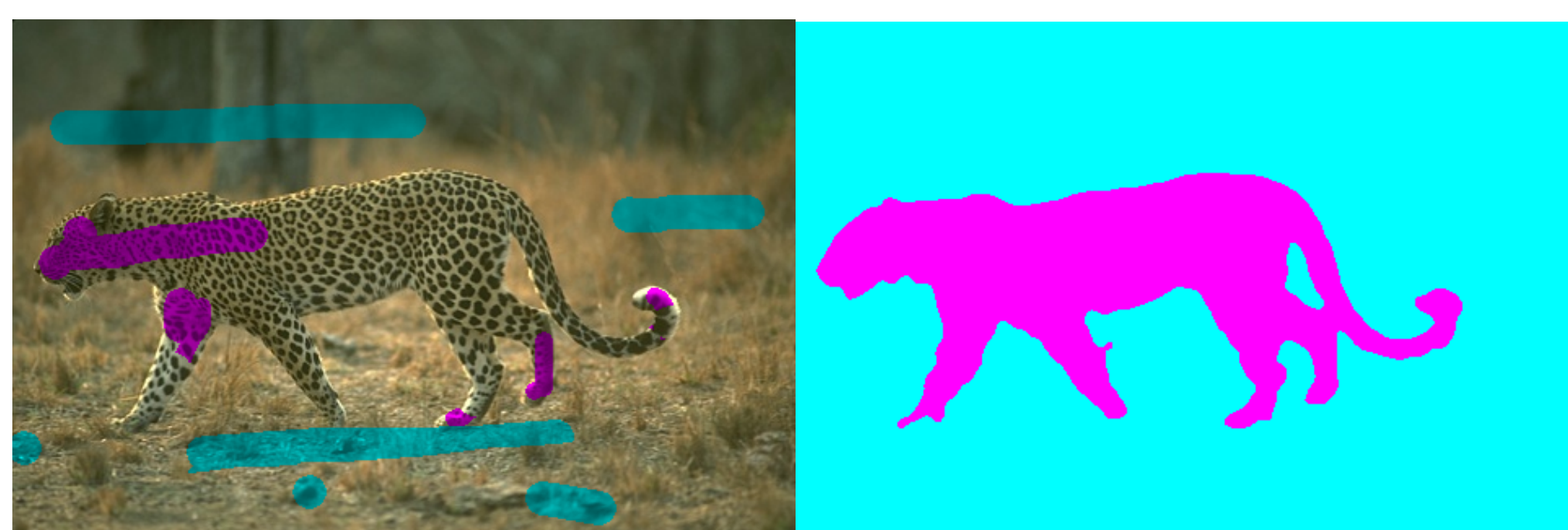
The Interactive GUI can be in some cases used **alone** for feature detection and/or image segmentation. Note that in this case the only information that is used is the intensity of the image. There is also the possibility of integrating the Interactive GUI in an **image processing pipeline**.



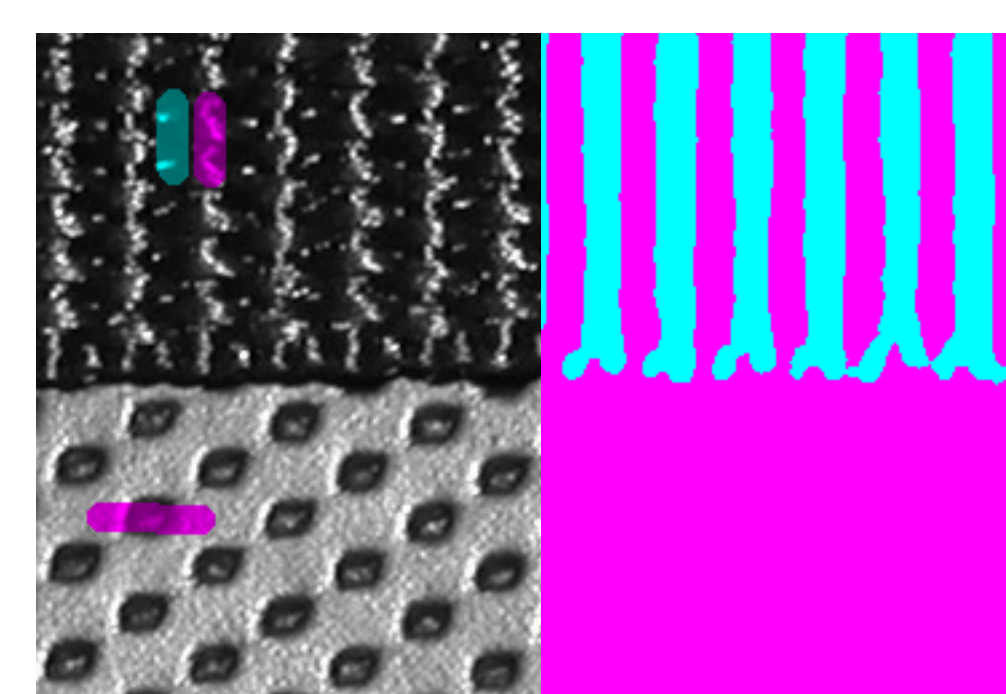
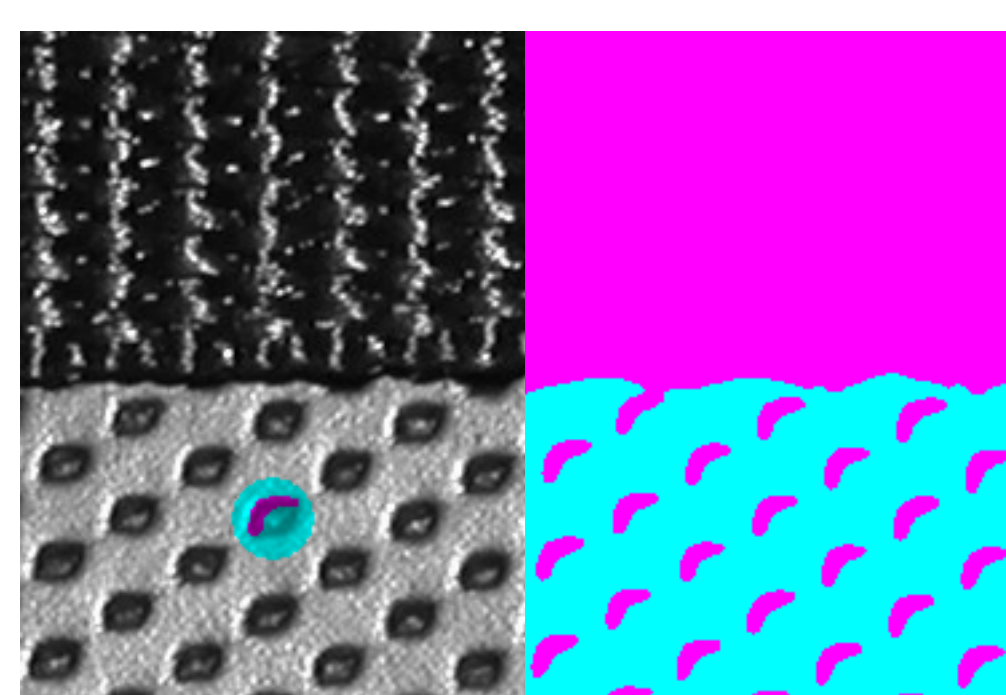
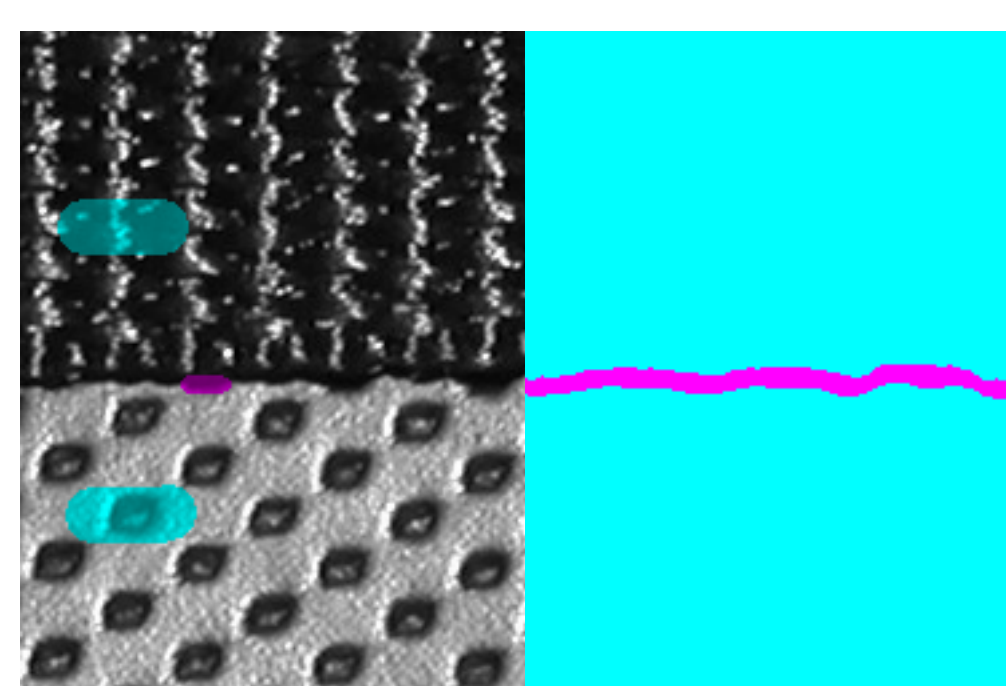
The **pre-processing** step can be used to remove artefacts or to calculate and add extra information (other than intensity), e.g. SIFT features. An example of **post-processing** will be shown below. **Batch processing** can be used to analyse a 3D volume, a time varying image or even a similar data set. Finally, some **quantitative analysis** can be performed to extract some numbers from the images.

## Flexibility to:

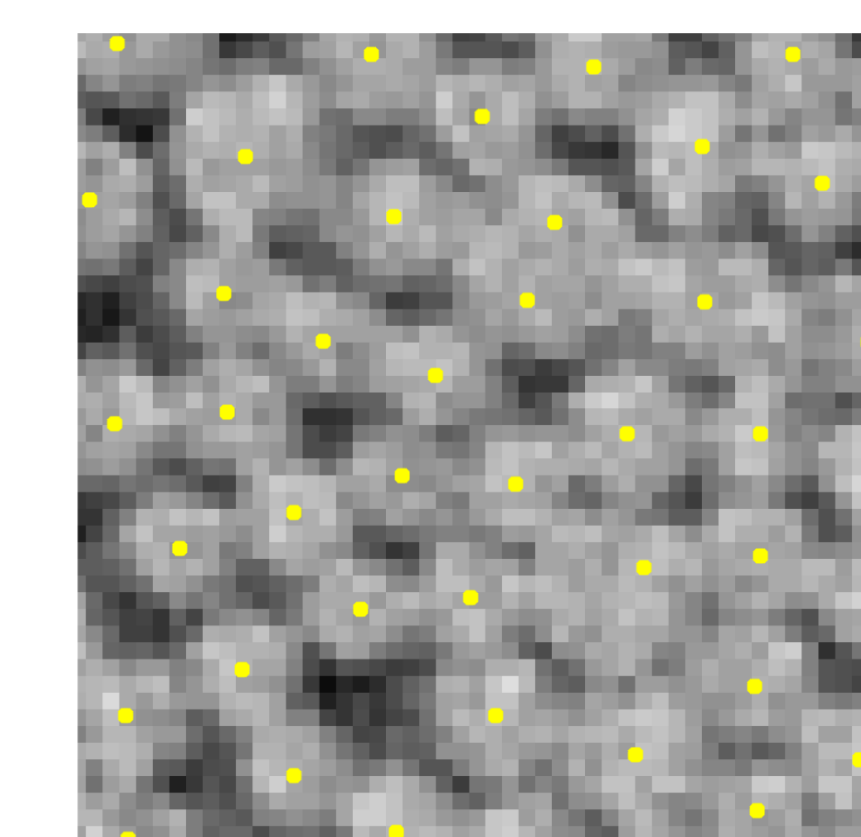
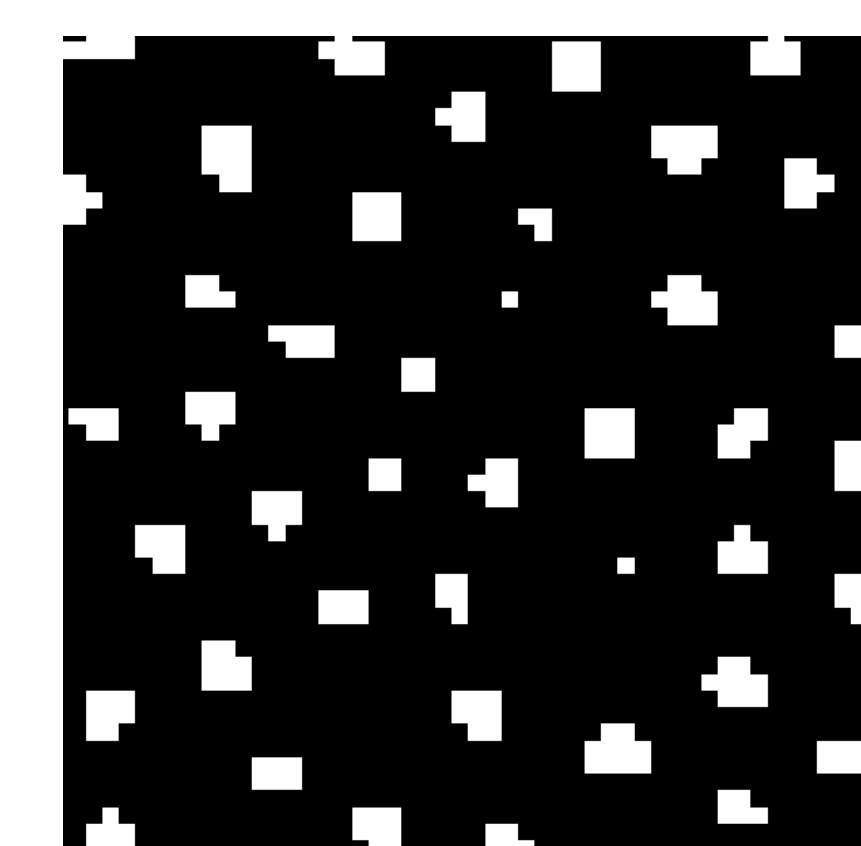
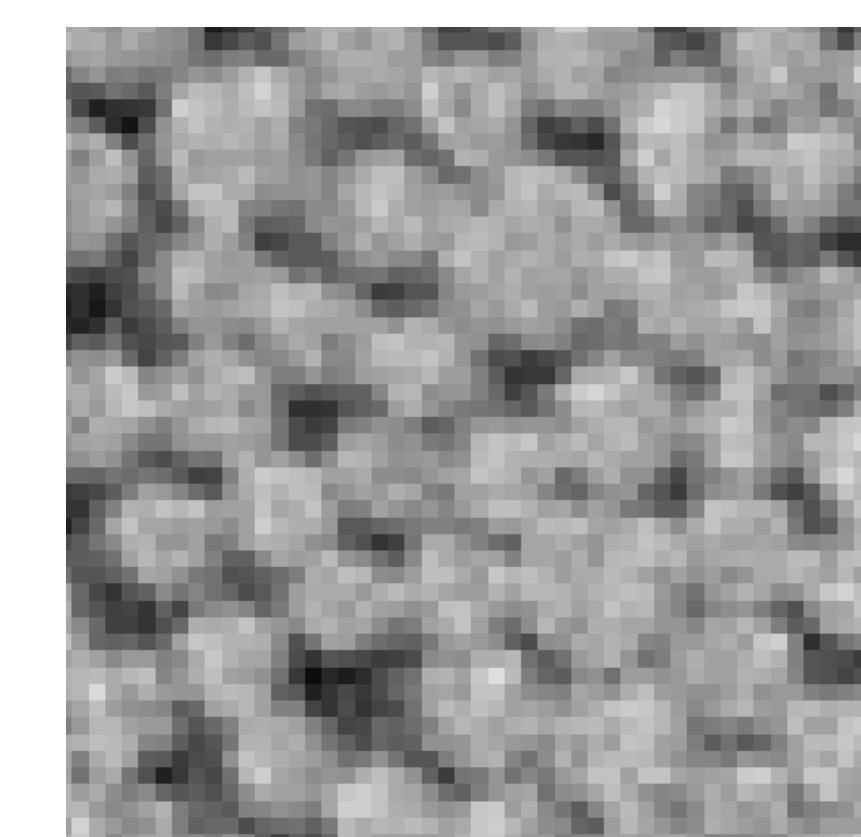
### 1. Analyse different datasets



### 2. Find different features



## Post-processing example



Interactive Tool

Post-processing

## Look out for Software release, end of Summer 2016!!

(Note that a basic experience of Matlab is needed for the stand-alone version)

**Experienced Matlab users**, the application is also targeted for you!

Benefit from our tool and expand its applications by integrating it into an image processing pipeline!

## References

- [1] Dahl, A.L. and Larsen, R., 2011. Learning dictionaries of discriminative image patches. In *22nd British Machine Vision Conference*.
- [2] Emerson, M.J., Jespersen, K.M., Jørgensen, P.S., Larsen, R. and Dahl, A.B., 2015, June. Dictionary based segmentation in volumes. In *Scandinavian Conference on Image Analysis* (pp. 504-515). Springer International Publishing.
- [3] Emerson, M.J., Jespersen K.M., Dahl, A.B., Conradsen, K., Mikkelsen, L.P., 2016 April. Individual fibre segmentation from 3D X-ray computed tomography for characterising the fibre orientation in unidirectional composite materials. Under submission in *Composites Part A*.