Fraunhofer
MEVIS

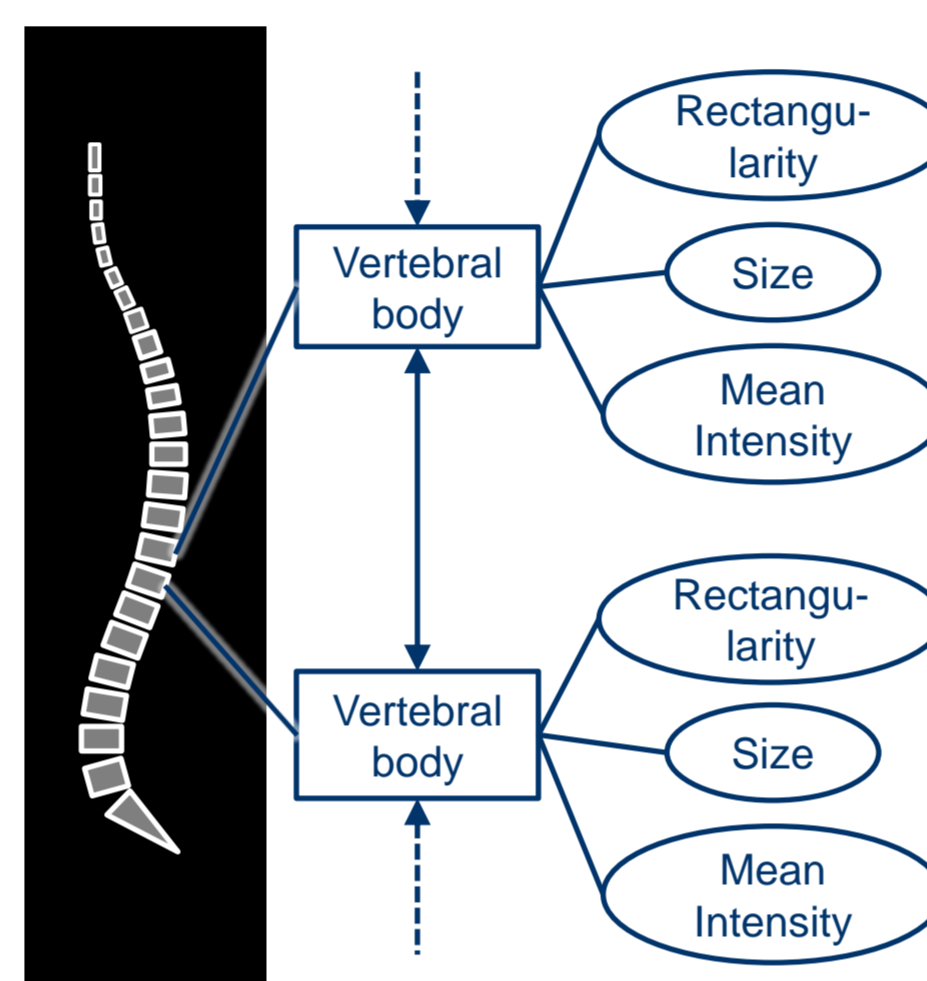FRAUNHOFER INSTITUTE FOR MEDICAL IMAGE COMPUTING MEVIS

OBJECT-BASED IMAGE ANALYSIS AND ITS APPLICATION TO BIOMEDICAL IMAGING
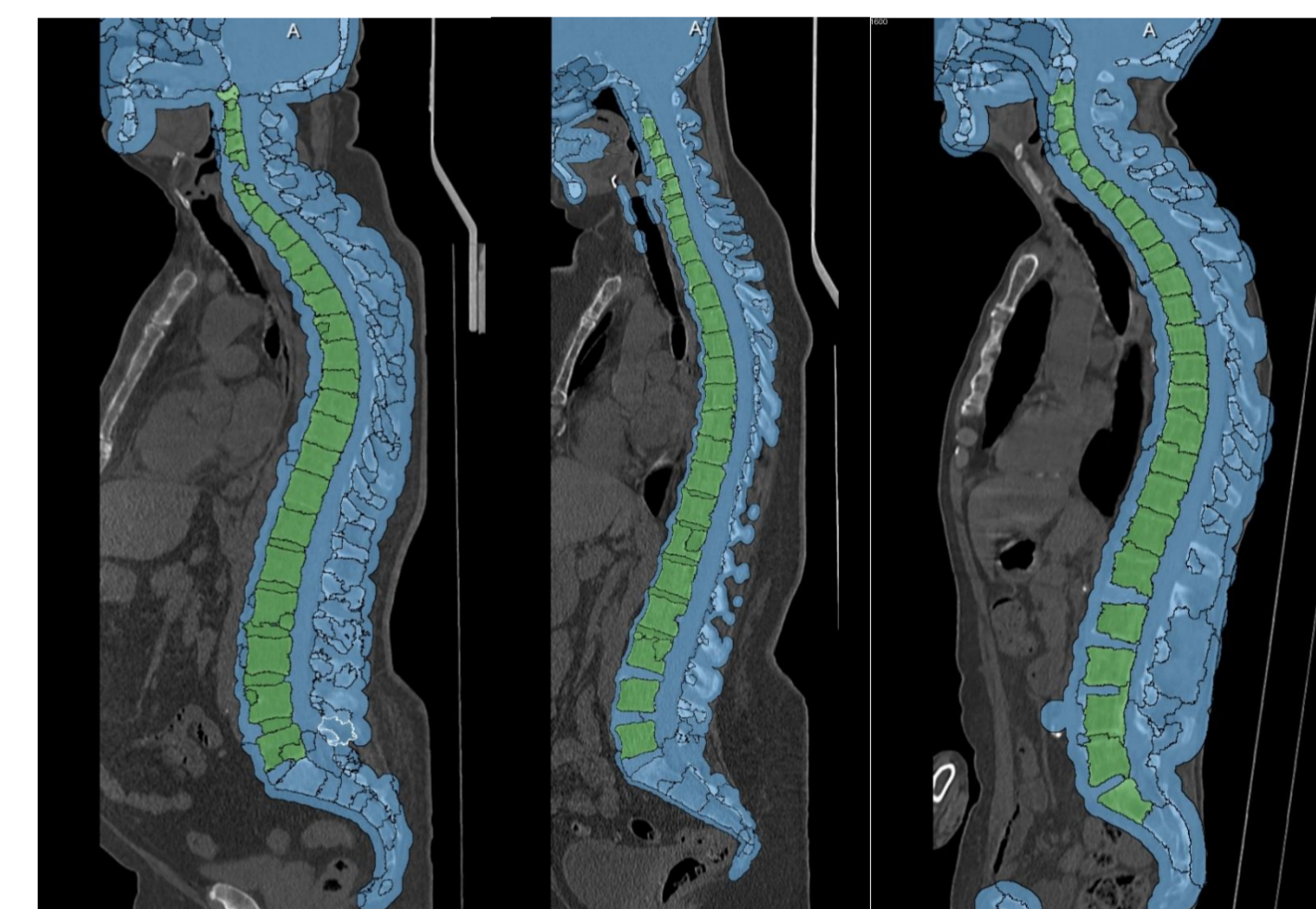
Schwier M., Chitiboi T., Homeyer A., Hahn H.

ABSTRACT

Object-based image analysis (OBIA) is a powerful concept, lifting image analysis from the limitations of the pixel-based representation which is merely dictated by capturing and storing devices. The idea is to partition the image into regions which become the base units for image analysis and create a graph-based representation of the image. Regions exhibit a wealth of features and information about their spatial context. In this poster we present the OBIA concept and its successful application to biomedical image analysis.
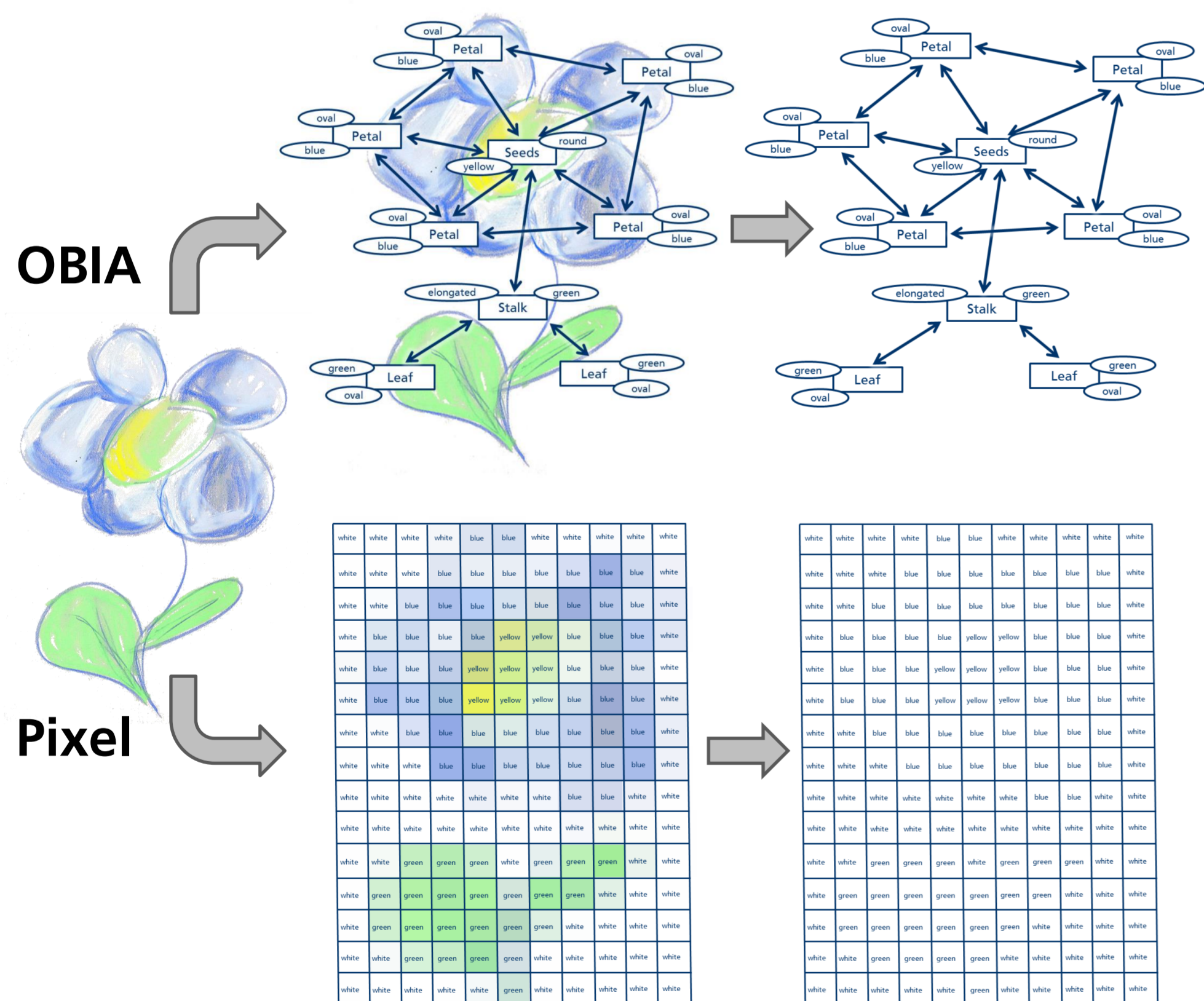
OBIA VS PIXEL REPRESENTATION

OBIA

Pixel

OBIA Framework

- Pure C++ library
- KISS principle
- Feature Extraction
- Classification
- Object Handling
  - Query
  - Relations
  - Hierarchies
- ARG data model

SPINE DETECTION IN CT

Contextual Concept

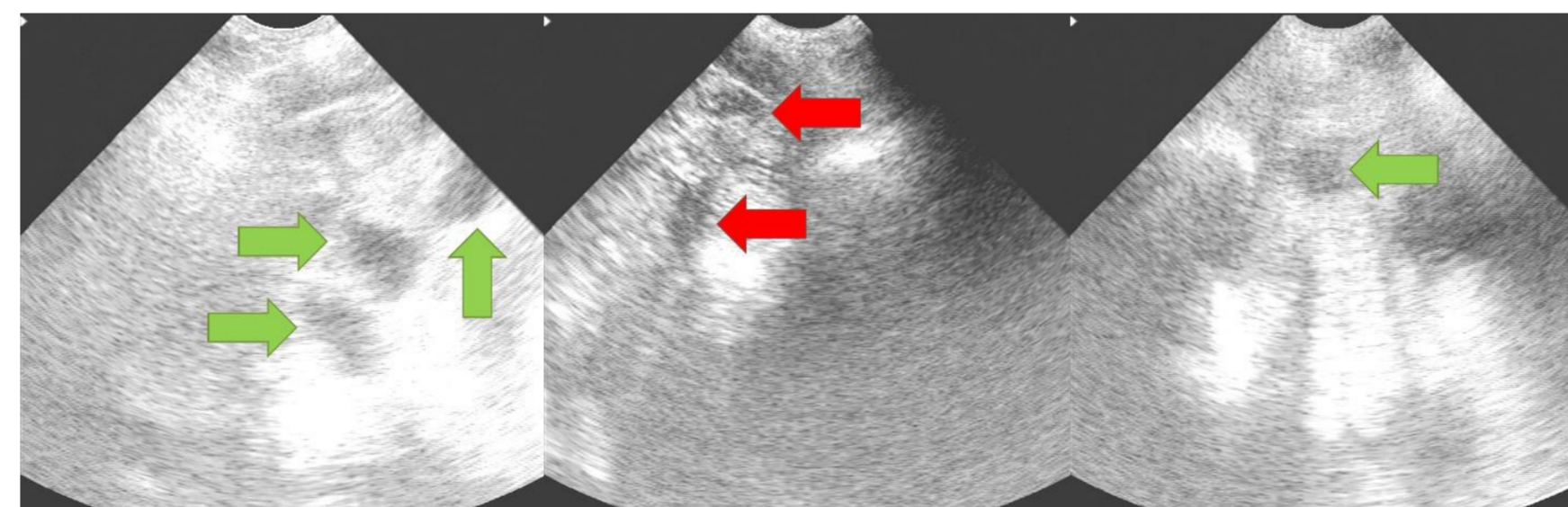*Results: Sensitivity 96%, Precision 98%*
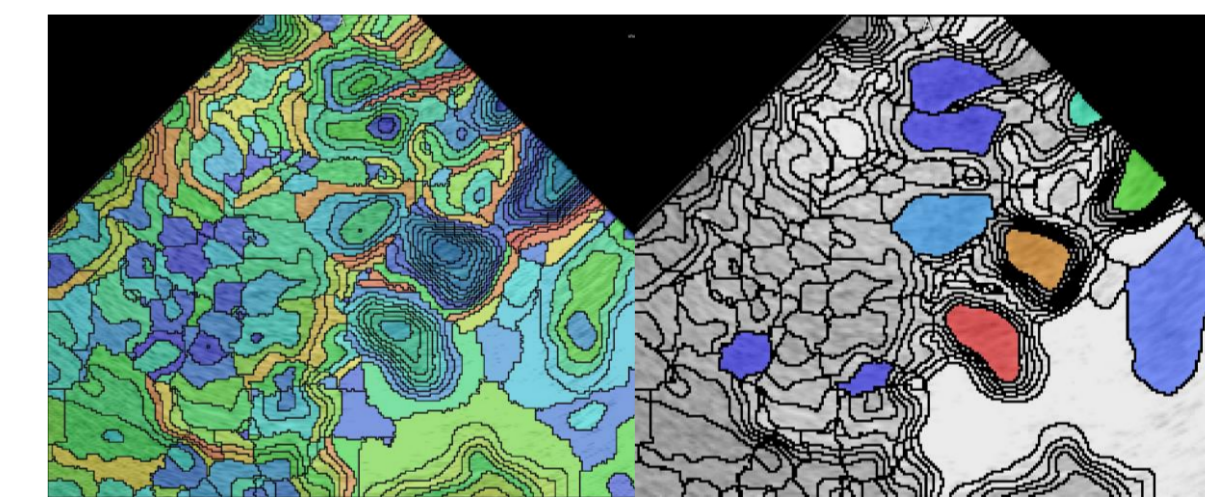
PREGNANCY DETECTION IN PORCINE ULTRASOUND
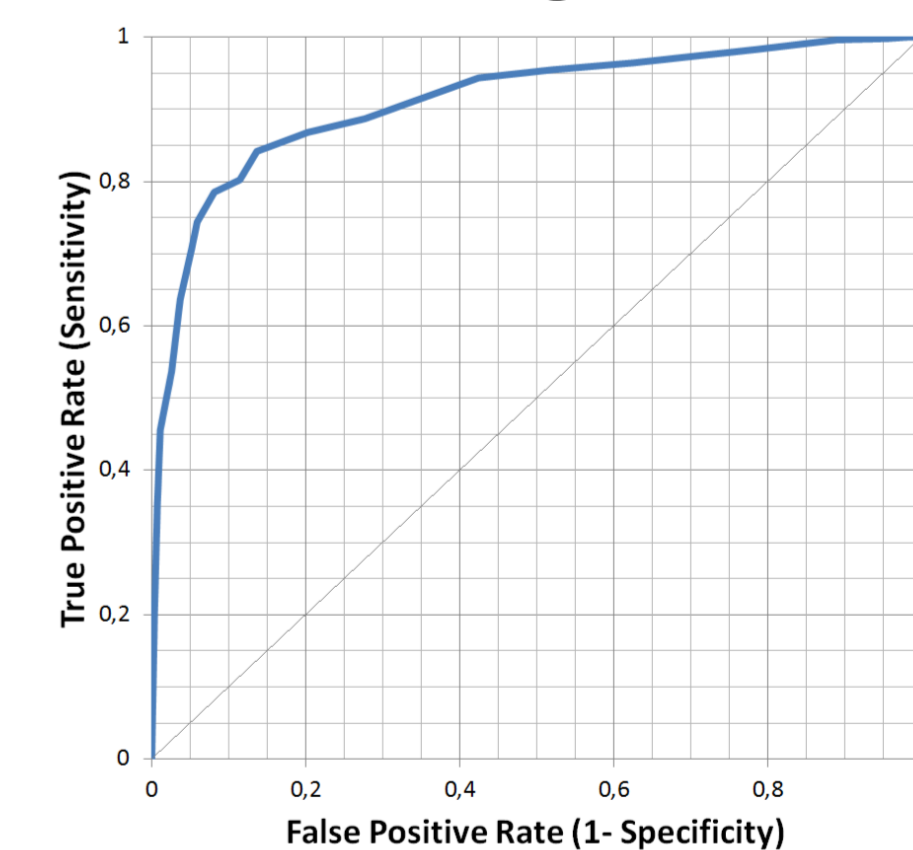

Positive and negative examples

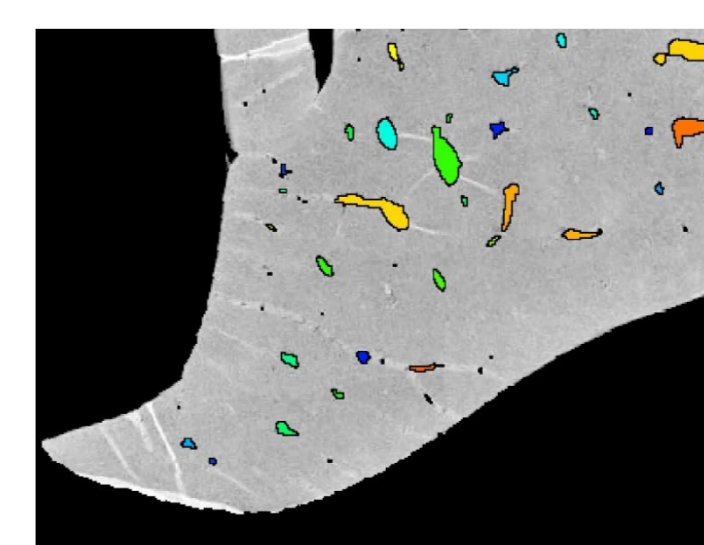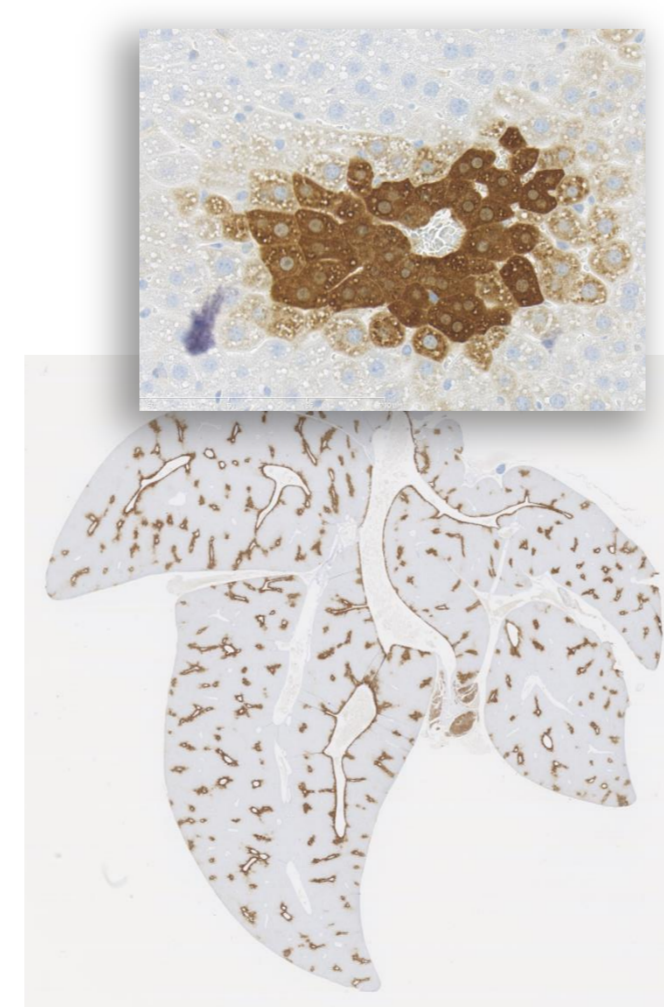*Creating object hierarchy and extracting features*

Training on
- Samples from 74 image series
- 220 positive samples
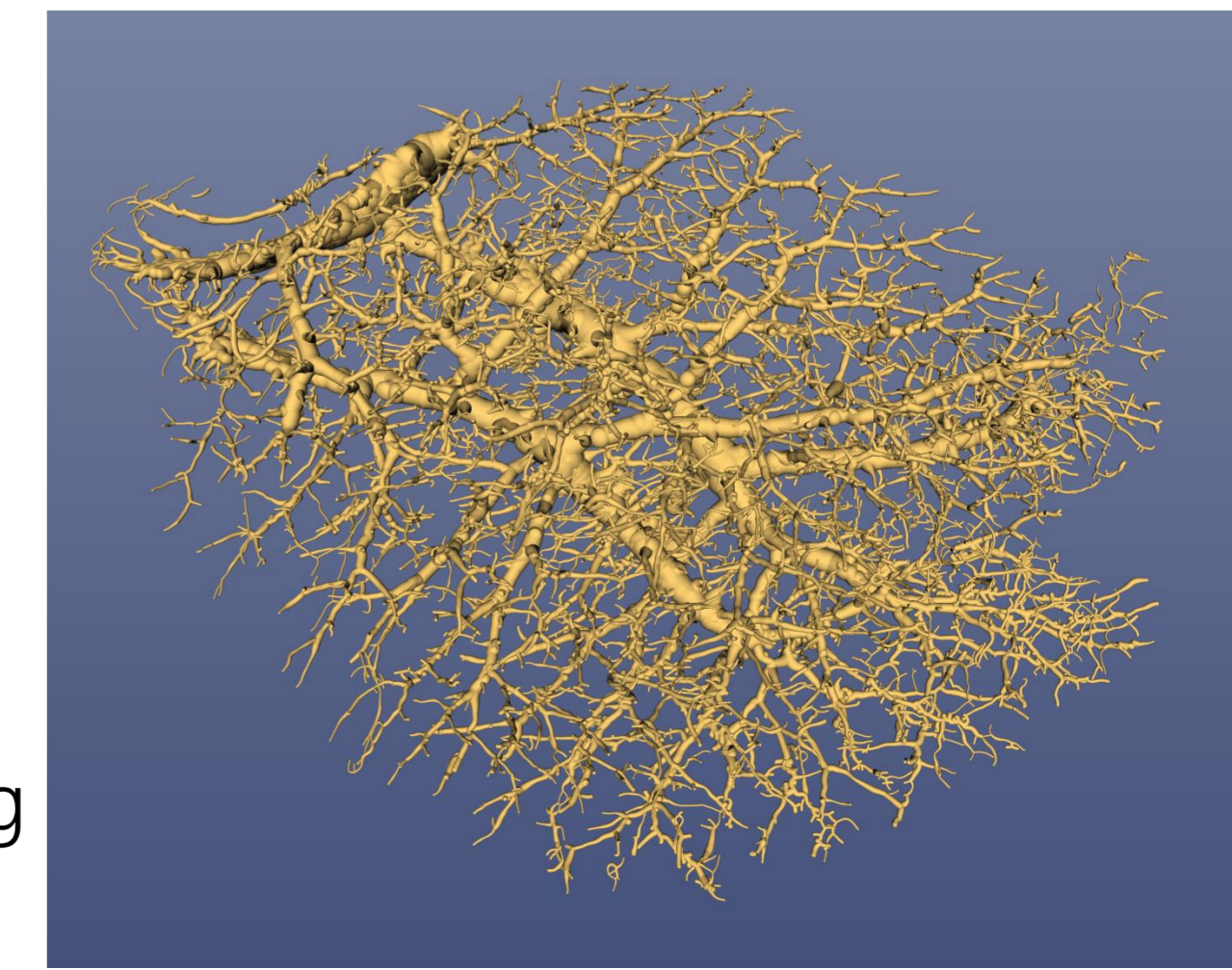- 484 negative samples

Random Forest Classifier
- Probability for each object
- Standard features
- Custom border feature

VESSEL RECONSTRUCTION FROM HISTOLOGICAL WHOLE SLIDE IMAGES

Object-based vessel tracking

Whole Slide Image

Reconstructed Vessels (until 30µm)