

Classification of Cells Based on Scale-space Measures and Semi-supervised Machine Learning



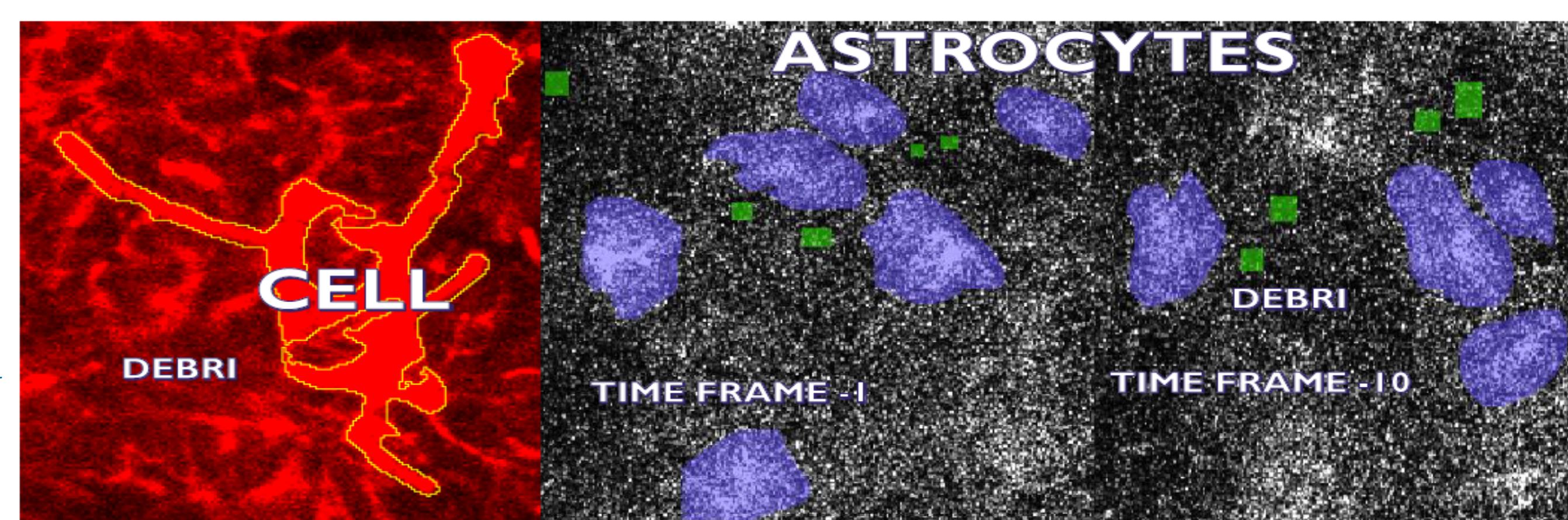
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Problem Outline

SUPERVISED LEARNING

- MultiClass Problem



INSTANCE

- Pixel Characterized By Feature Vector

OBJECTIVE

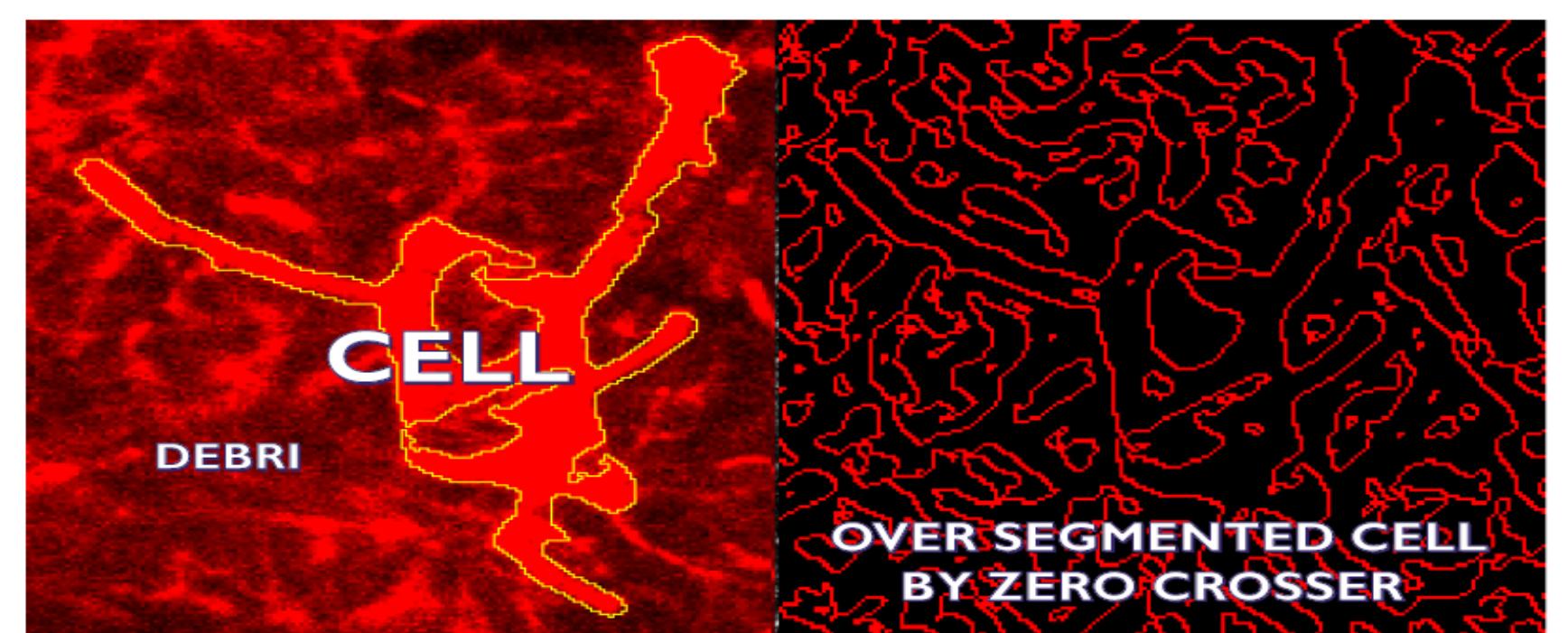
ANATOMIC IMAGE

TIME LAPSED IMAGES

- Build an interactive framework that adapts every learning task without initial knowledge like removing debris around cell, segment cytoplasm etc.
- Segment images in an objective manner.

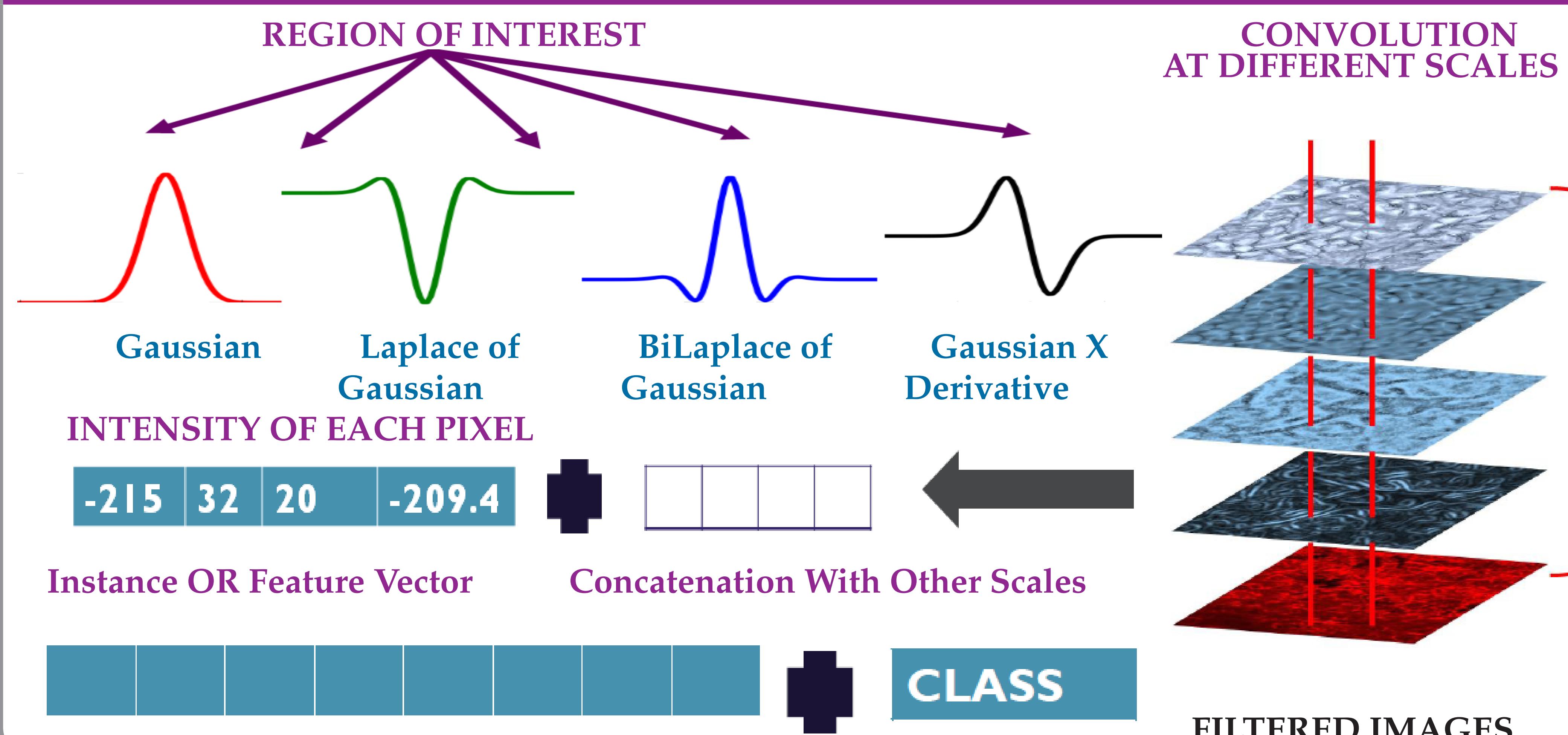
Motivation

- Expert segment Anatomic & Time Lapsed Images manually.
- Tools are very domain specific.
- Most of the tools are based on original intensity which vary a lot among images.

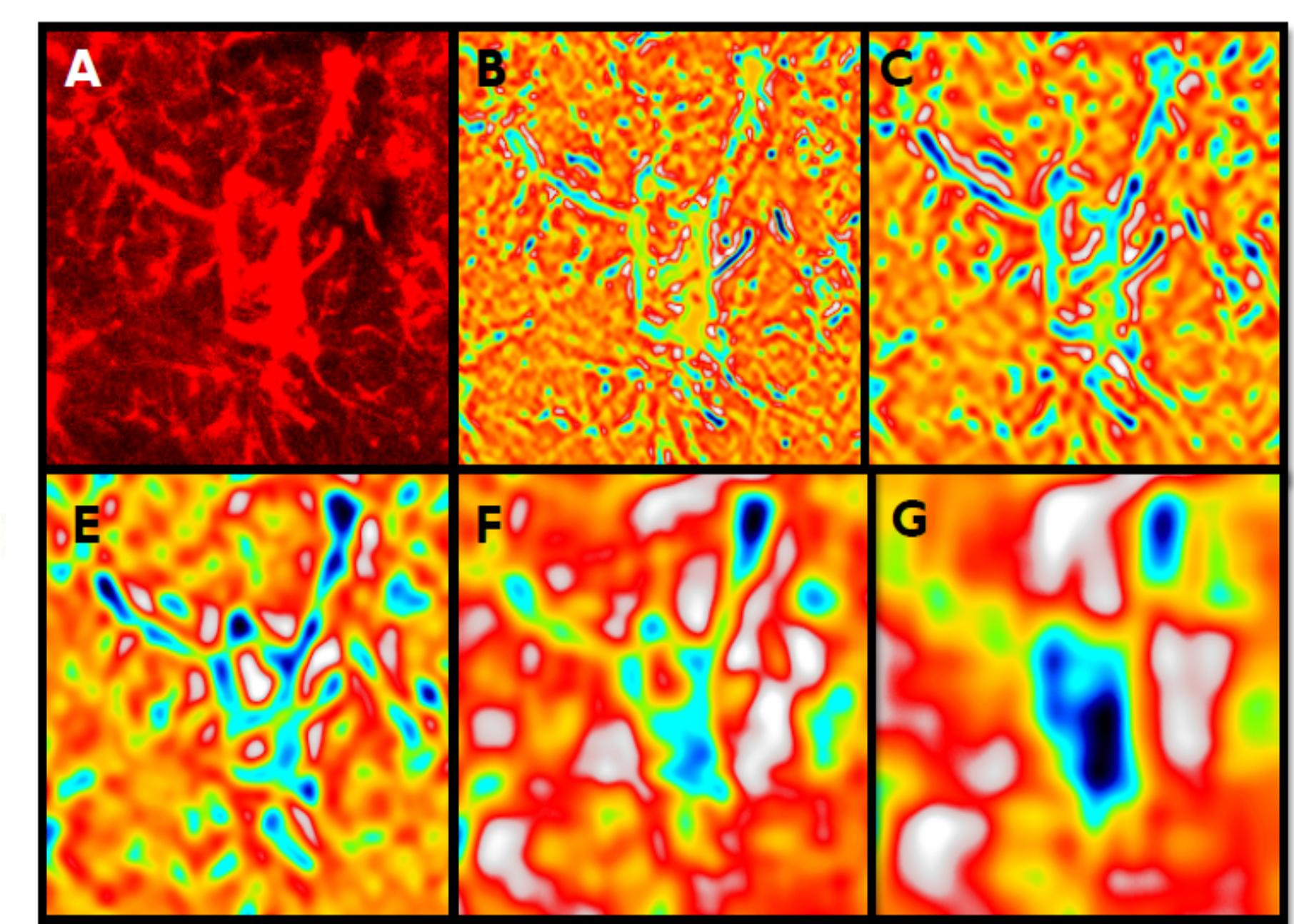


Example of ZeroCrosser for Segmentation

Features Extraction



MULTISCALE METHOD



A: Astrocytes stained for GFAP.
B-F: Laplace of Gaussian, i.e. Mexican hat
SCALE: 2,4,8,16,32.

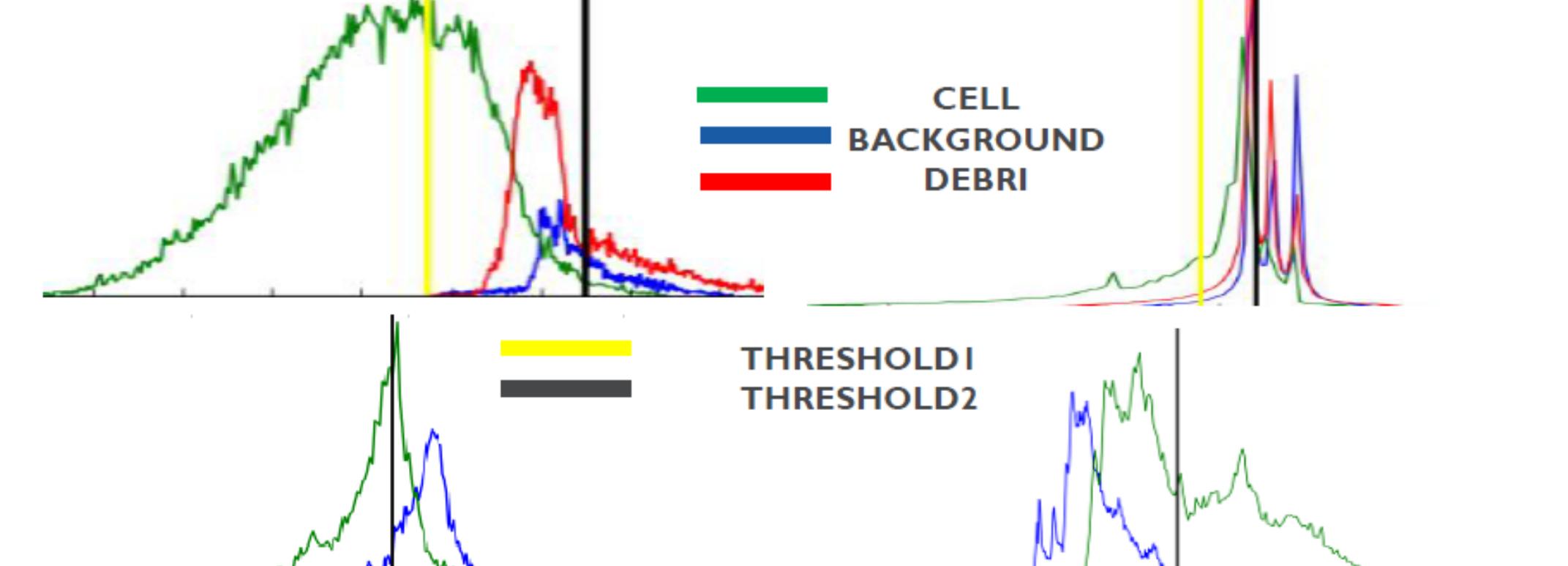
Method

THRESHOLDING

Objects can be separated from each other by selecting the Threshold value

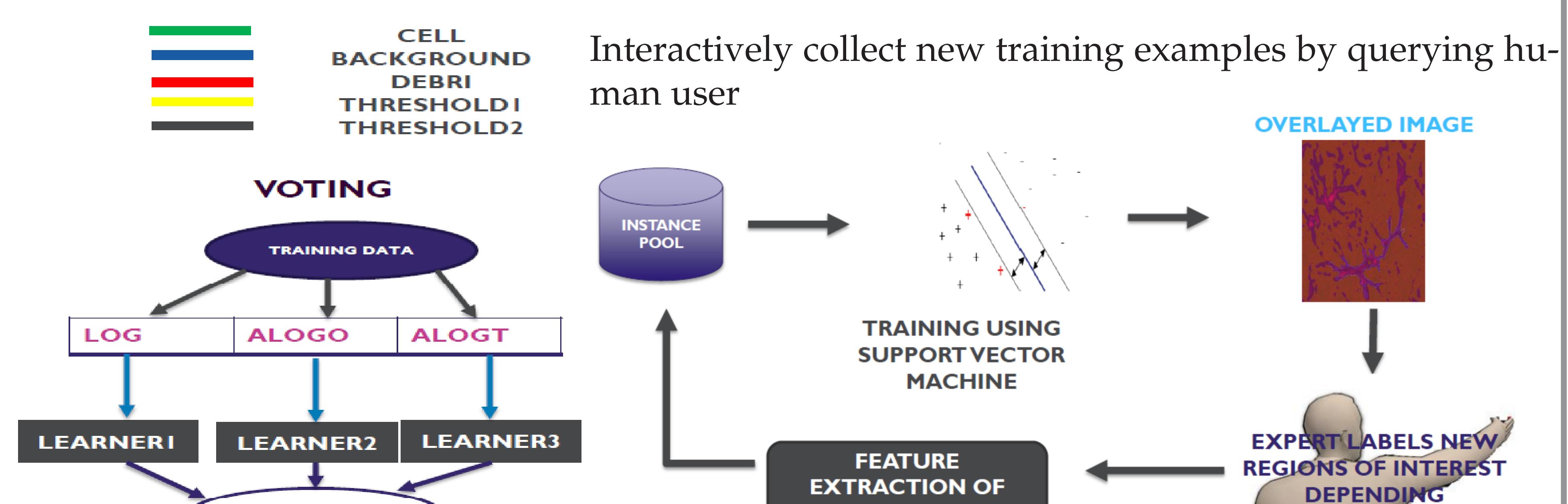
LOCAL

Different threshold value for each Scale & Filter



GLOBAL

One threshold value for each Scale



ACTIVE LEARNING

Interactively collect new training examples by querying human user

Evaluation

EXTERNAL VALIDATION(PREDICTION ON UNSEEN IMAGES)

Country List		
Country Name or Area Name	ISO ALPHA 2	ISO ALPHA 3
Afghanistan	AF	AFG
Aland Islands	AX	ALA
Albania		ALB

ROC & PR CURVES SVM APPROACH

3green!80!yellow!50green!70!yellow!40

KU LEUVEN

ANATOMIC IMAGE
Background
Cell
Debri
Weighted Avg
TIME LAPSED

