

-SW

Software: ILASTIC

Link: <https://www.ilastik.org/index.html>

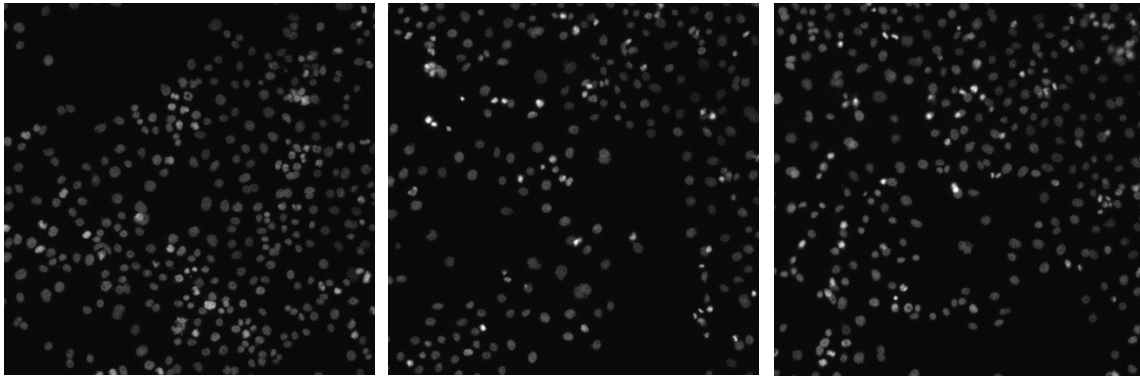
Image processing function: Pixel classification

Based on pixel attributes and human comments, the Pixel Classification procedure provides labels to individual pixels. It classifies the pixels based on several properties like edge filters, smoothed pixel intensity, and texture descriptors, colors, intensities etc. Here each pixel belongs a particular class. Once the features are chosen, user annotations are used to train a Random Forest classifier. The Random Forest is known for its good ability to generalize, and the overall workflow can be used to solve a wide range of segmentation problems. Note that this workflow does semantic segmentation, not instance segmentation, and returns a probability map of each class, not individual objects. There are several ways to turn the probability map into individual objects. The ilastik Object Classification Workflow includes thresholding and connected component analysis, which may be the easiest. Other options include thresholding, watershed, and agglomeration algorithms in Fiji and other popular image analysis tools that are more complex.

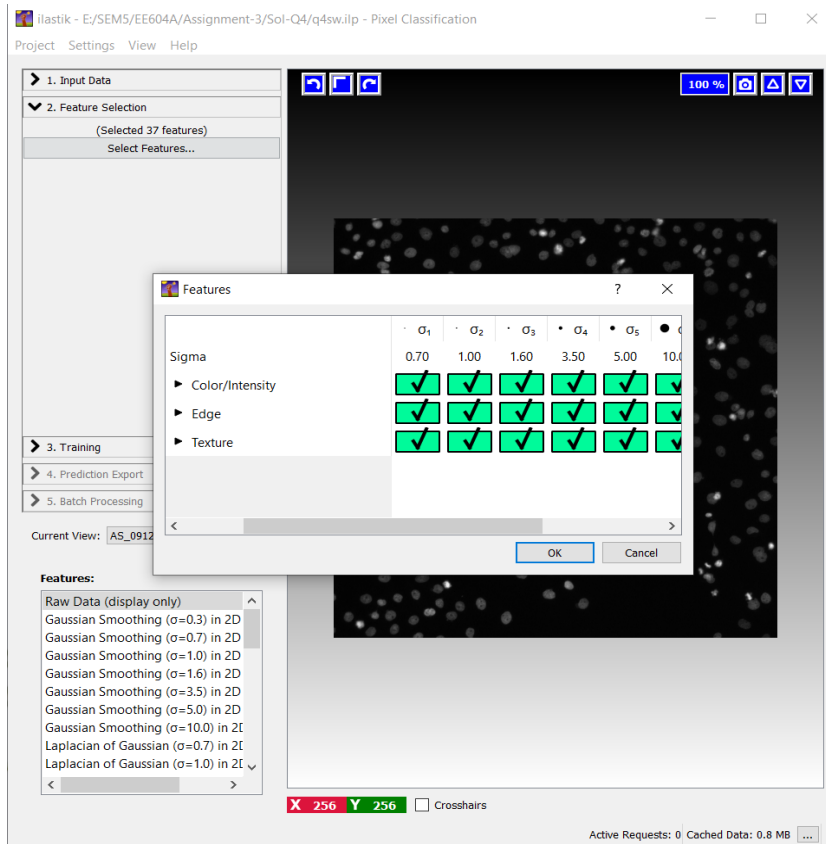
Here I am trying to classify human cancer cells and background of input image. The process is following-

Process

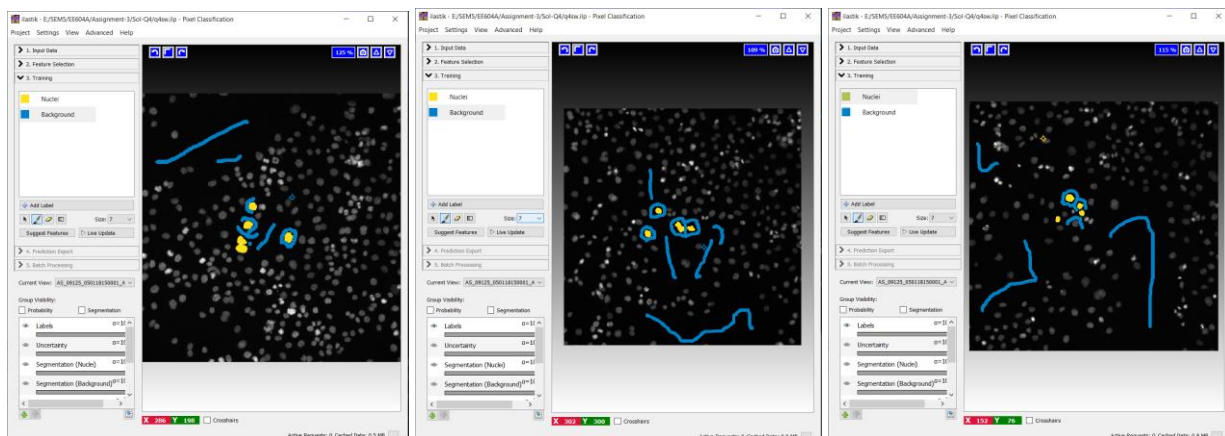
1. Input images



2. Feature selection



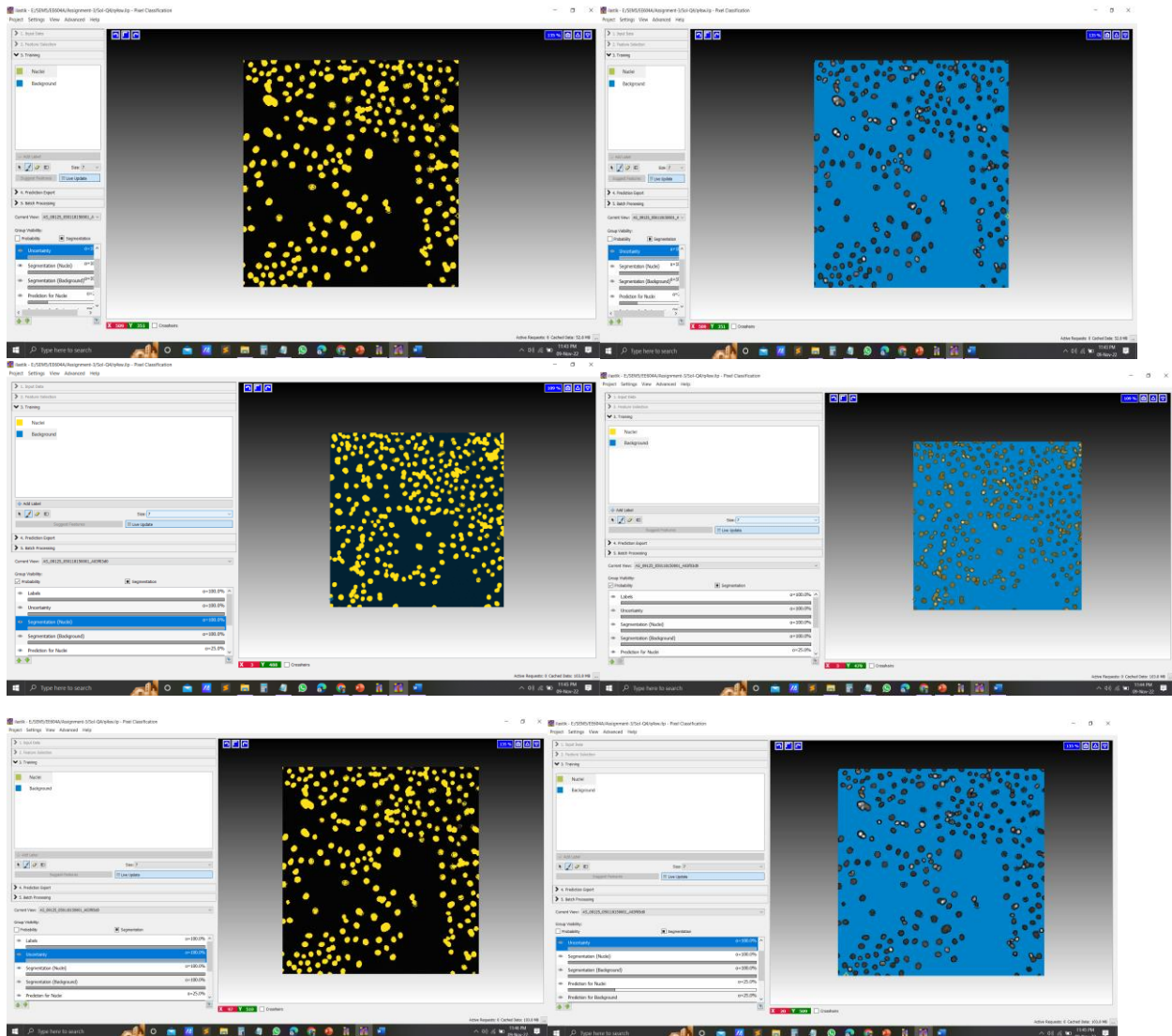
3. Training



4. Prediction

Nuclei (yellow)

Background(Blue)

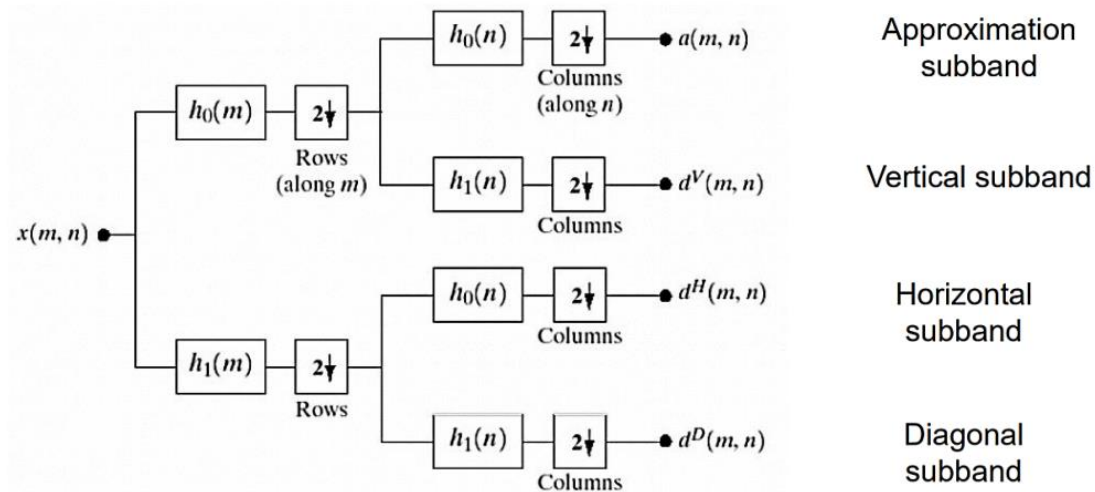


-q4q

Question 1 (Analytical)

You are given low band pass and high band pass filters, how can you use them to decompose the image in four different sub bands. Describe the answer and state the name of sub bands.

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The low band pass and high band pass filters are applied along row and column recursively two times. Which gives Approximation subband (low band pass filter along row and column), Vertical subband (low band pass filter along row then high band pass filter along column), Horizontal subband (high band pass filter along row then low band pass filter along column) and Diagonal subband (high band pass filter along row and column). Note that the signal is downsampled each time after applying a band pass filter.

Question 2(Objective)

Which of the following statements are true regarding mean-shift and watershed segmentation methods?

- a. Mean shift clustering automatically finds all possible segments of the image.
- b. Mean shift clustering is vulnerable to outliers.
- c. Time Complexity of mean shift clustering is $O(n^3T)$.
- d. Watershed is a good segmentation method for overlapping similar objects.
- e. Pixel chromaticity is represented as height in watershed segmentation.
- f. Watershed segmentation treats images treated as topological surfaces.
- g. None of the above

Answers = a, d, f.

Question 3(Objective)

Your friend shows you a video of a helicopter flying, but the blades appear not rotating, what could be the possible reasons behind this?

- a. The video shown is fake or edited.
- b. The framerate of the camera (in which the video was captured) was extremely low.
- c. The framerate of the camera (in which the video was captured) was extremely high.
- d. This is happening because blades of helicopter are rotating at very high speed.
- e. The frame rate of the camera is equal to the rounds per second of the helicopter's blades.
- f. The camera was malfunctioning.
- g. None of the above.

Answers = e.