Title: Segmentation of acini in breast terminal duct lobular units

Short description: Terminal duct lobular units (TDLUs; see figure) are the structures within the breast that produce milk and are the primary source of most breast cancer precursors and cancers. With completion of childbearing and physiological aging, TDLUs involute, resulting in a reduction in acini (substructures; see figure) per TDLU and total TDLU counts. Analysis of women who have undergone a breast biopsy that showed benign breast disease (BBD), suggests that those who have less TDLU involution are more likely to develop breast cancer than those with greater degrees of involution.

The goal of this project is to develop an image analysis method for automatic detection and/or segmentation of acini in histology images of TDLUs. Such a method can be used for automatic assessment of TDLU involution in BBD patients and in turn estimation of the risk of developing breast cancer. Towards this goal, the students will apply state-of-the-art deep learning algorithms.

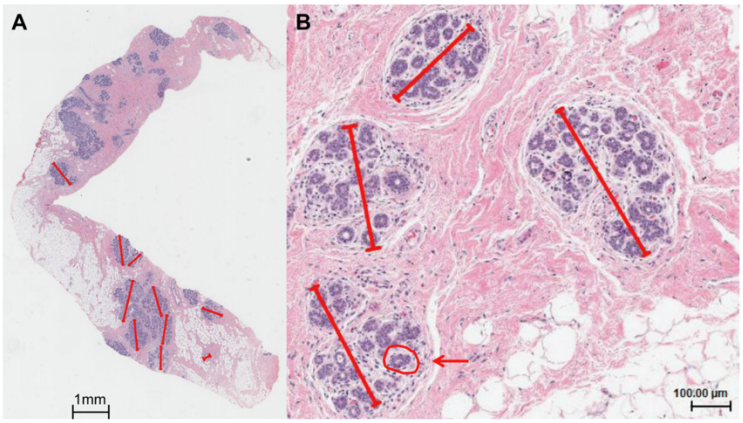

Figure *(from Figueroa et al. JNCI 2014): A) Digital slide of breast tissue stained with hematoxylin and eosin (H&E). Multiple TDLUs are visible in the slide. B) Magnified region of a similar slide. The red lines indicate TDLU cross sections and the arrow indicates a representative acinus.*