

## DEEP LEARNING FOR COMPUTER-AIDED EARLY DIAGNOSIS OF BREAST CANCER

Breast cancer has the highest incidence amongst women. Regular screening allows to reduce the mortality rate, but creates a heavy workload for clinicians. To reduce it, the computer-aided diagnosis tools are designed, but a high level of performances is expected. Deep learning techniques have a potential to overcome the limitations of the traditional image processing algorithms. Although several challenges come with the deep learning applied to breast imaging, including heterogeneous and unbalanced data, limited amount of annotations, and high resolution. Facing these challenges, we approach the problem from multiple angles and propose several methods integrated in complete solution. Hence, we propose two methods for the assessment of the breast density as one of the cancer development risk factors, a method for abnormality detection, a method for uncertainty estimation of a classifier, and a method of transfer knowledge from mammography to tomosynthesis. Our methods contribute to the state of the art of weakly supervised learning and open new paths for further research.

Keywords: Deep learning, Breast Imaging, Classification, Segmentation, Weak supervision