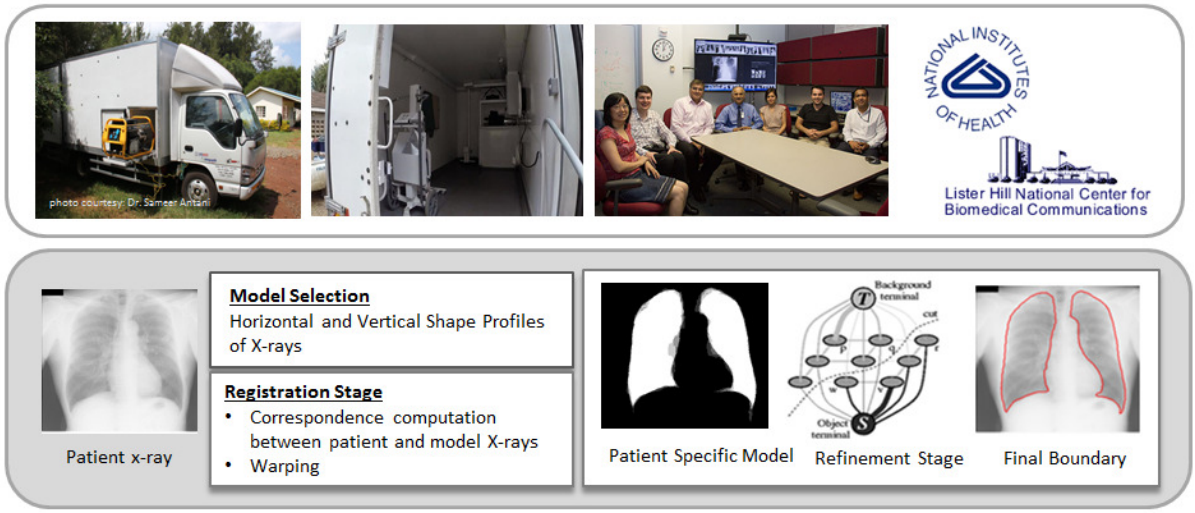
Atlas-Based Segmentation of Lung in Chest X-rays

Lister Hill Center researchers have developed a chest X-ray (CXR) screening system for deployment in resource constrained communities and developing countries worldwide with a focus on early detection of pulmonary abnormalities. When the system is presented with a digital CXR image from a PACS or an imaging source, it extracts image features and classifies the image as normal or abnormal using trained machine-learning algorithms. One of the first stages of the system is to detect anatomical boundaries from X-ray images. The aim of this stage is selecting the region of interest from lung and non-rib regions, providing data without noise, and improving the classifier performance. We propose a technique to automatically detect the lung regions. It is a model-based non-rigid registration driven method, and consist of three main stages: 1) selecting the model images (x-rays and expert labeled anatomical boundaries), 2) creating the model patient-specific anatomical model using non-rigid registration algorithm, and 3) extracting the lung boundaries using a graph cuts approach with a customized energy function. The boundary detection system is reported in one of the well-known journals in medical image processing area, and incorporated in the CXR screening system in use. The presentation will describe the boundary detection part of the CXR screening system.



Researcher will also shortly mention her other research efforts during her postdoctoral appointment, including automatic rib boundary detection and cardiomegaly detection on CXR, target tracking in wide areal imagery and rotation, scale invariant, line based color aware descriptor.

Dr. Sema Candemir is a postdoctoral fellow at the Communications Engineering Branch, the U.S. National Library of Medicine, and National Institutes of Health. She received her doctorate degree in 2011, in computer engineering from Gebze Institute of Technology, Turkey. She worked as a postdoctoral researcher at University of Missouri-Columbia, where she collaborated with Air Force Research Laboratory and Kitware Company towards robust target tracking in wide area imagery. Currently, she is a member of the chest X-ray screening project team and malaria screening/analyzing team. She also partially works with researchers in face matching team for post-disaster family reunification project. She is a regular reviewer for Computer Methods and Programs in Biomedicine-Elsevier, Turkish Journal of Electrical Engineering and Computer Sciences, Journal of Biomedical and Health Informatics and Journal of IEEE Transaction on Biomedical Engineering. Her research interests are computer vision and image processing.