

055:191

Electrical & Computer Engineering Graduate Seminar

Speaker: Visiting Assoc. Prof. Bram van Ginneken
Image Sciences Institute

University Medical Center Utrecht, the Netherlands

“Smoking and Image Processing”

Thursday, December 13, 2007

3:30–4:20 p.m. 3321 SC

Abstract:

Smoking is strongly related to several devastating diseases: heart disease, chronic obstructive pulmonary disease (COPD) and lung cancer. These diseases are expected to be the #1, #3 and #5 most common cause of death in 2020. Much is still unknown about how smoking affects the risk for these diseases, and what the relation is between these risks and the genetics of an individual smoker: many heavy smokers die old, with perfectly healthy lungs and heart.

A technological revolution in computed tomography (multi-detector row CT) has made it possible to obtain high quality images of the thorax, containing the heart and lungs, with sub-millimeter resolution in all directions, requiring only a few seconds and a low dose of radiation. As a result, many studies have started in which heavy smokers receive low-dose chest CT scans, typically with the aim to detect early stage lung cancer. These studies generate huge amounts of data (tens of thousands of scans, terabytes of image data).

We are developing automated image processing techniques to extract quantitative information from chest CT scans. I will discuss automatic segmentation techniques to find the heart, the aorta, the lungs, the lung lobes and lung segments and the airway tree. Tools for detection, segmentation and characterization of lung nodules will be described. Image processing challenges in deriving accurate measurements of the extent of COPD will be presented: noise reduction and correction for breathing differences. Finally, I will show systems for computer-aided detection and quantification of coronary and aortic calcifications and epicardial fat, major indicators of elevated risk of heart disease.

The challenge for the future is to develop robust, automatic and accurate image processing techniques that can quantify the extent of damage of smoking in large databases and link these findings to genetics and other factors.

Bio:

Bram van Ginneken is Associate Professor at the Image Sciences Institute, University Medical Center Utrecht. He studied Physics at the Eindhoven University of Technology and at Utrecht University, the Netherlands. In 2001 he obtained his Ph.D. on Computer-Aided Diagnosis in Chest Radiography. Ever since he has been leading the Computer-Aided Diagnosis group at the Image Sciences Institute. He has (co-)authored over 30 journal publications. He is Associate Editor of IEEE Transactions on Medical Imaging and member of the program committee of the Image Processing and the Computer-Aided Diagnosis conferences of SPIE Medical Imaging. From March 2007 until March 2008 he is a Visiting Professor at the University of Iowa.

All ECE graduate students are required to attend.

For more information contact:

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