Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

1475 N. Scottsdale Road, Suite 200
Scottsdale, AZ 85287-3538
Phone: 480 884 1996 Fax: 480 884 1984

Case ID:M21-199L^
Published: 4/19/2023

Inventors

Zongwei Zhou

Jae Shin

Jianming Liang

Contact

Jovan Heusser
jovan.heusser@skysonginnovations.com

Jianming Liang Portfolio

M11-093L: Development of a Highly Efficient and User-Friendly Software System for Carotid Intima-Media Thickness- Researchers at Arizona State University have developed a highly user-friendly system for semiautomatic CIMT image interpretation. Their contribution is the application of active contour models (snake models) with hard constraints, leading to an accurate, adaptive and user-friendly border detection algorithm. Please see Zhu – SPIE 2011 for additional information.

M11-103L: Automatic diagnosis of pulmonary embolism by machine learning-based detection of pulmonary trunk- Researchers at Arizona State University have developed a machine learning-based approach for automatically detecting the pulmonary trunk. By using a cascaded Adaptive Boosting machine learning algorithm with a large number of digital image object recognition features, this method automatically identifies the pulmonary trunk by sequentially scanning the CTPA images and classifying each encountered sub-image with the trained classifier.

M12-031L: Automated Detection of Major Thoracic Structures with a Novel Online Learning Method- Researchers at Arizona State University have developed a novel online learning method for automatically detecting anatomic structures in medical images, which continually updates a linear classifier. Given a set of training samples, it dynamically updates a pool containing M features and returns a subset of N best features along with their corresponding voting weights.

M12-112L: Self-Adaptive Asymmetric On-line Boosting for Detecting Anatomical structures- Researchers at Arizona State University have developed a novel self-adaptive, asymmetric on-line boosting (SAAOB) method for detecting anatomical structures in CT pulmonary angiography. This method utilizes a new asymmetric loss criterion with self adaptability according to the ratio of exposed positive and negative samples. Moreover, the method applies advanced formulates to situations and updates a sample's importance weight based on those different situations i.e. true positive, false positive, true negative, false negative.

M12-113L: Shape-based analysis of right ventricular dysfunction associated with acute pulmonary embolism- Researchers at Arizona State University have developed a method of detecting early stage APE using measured biomechanical

changes to the cardiac right ventricle. It was found that RV dysfunction due to APE exhibits several characteristic signs including (1) waving paradoxical motion of the RV inner boundary, (2) decrease in local curvature of the septum, (3) lower positive correlation between the movement of inner boundaries of the septal and free walls of the RV, (4) slower blood ejection by the RV, and (5) discontinuous movement observed particularly in the middle of the RV septal wall.

M13-026L: Computer-Aided Detection & Visualization of Pulmonary Embolism- Researchers at Arizona State University have developed novel approaches for automated computer-aided detection of emboli in CTPA. One technique automatically registers the vessel orientation in a display, providing compelling demonstration of arterial filling defects, if present, and allowing the radiologist to thoroughly inspect the vessel lumen from multiple perspectives and report any filling defects with high confidence. Another uses deep neural networks and vessel-aligned multi-planar representations to eliminate false positives. A third technique automatically and robustly detects and marks central emboli at CTPA using a rule-based approach for simplicity and low computational cost. Yet another technique creates and presents vessel-oriented images that provide consistent, compact and discriminative representation to enable a radiologist to distinguish PE from PE mimics. It also supports multi-view visualization to maximally reveal and fill defects. Please see Liang - MICCAI 2015 for additional information.

M13-122LC: Polyp Detection in Optical Colonoscopy- Researchers at Arizona State University in collaboration with Dr. Gurudu of the Mayo Clinic have developed two novel systems for computer-aided detection of polyps in optical colonoscopy images. The first system detects polyps by using boundary classifiers and a voting scheme to automatically identify the boundary or edge of polyps. This method was evaluated on 300 images containing 300 colorectal polyps with different shapes and scales and it detected 260 out of 300 polyps with 40 false detections. The second system uses a shape-based method and voting scheme to detect polyp boundaries in optical colonoscopy images. It is based on image appearance variation between polyps and their surrounding tissue. The second system was also evaluated on 300 images containing 300 colorectal polyps and detected 267 out of 300 polyps.

M13-234L: Diagnosing Pulmonary Embolism by Integrating Patient-level Diagnosis and Embolus-level Detection- Prof. Jianming Liang from Arizona State University has developed an innovative computer aided diagnosis system for PE detection. By using advanced algorithms and classifiers for patient-level diagnosis with embolus-level detection, non-PE patients can be excluded without overlooking PE patients. This positively impacts the system performance because the rate of true positive CTPA is only 5-10% and the treatment for PE is usually systemic, therefore false positives (FPs) impose extra burdens on the radiologist to evaluate and reject FPs in nearly all negative patients.