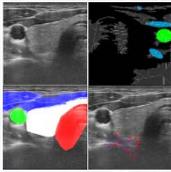# IMI RESEARCH SEMINAR

DATE: 25 March 2014, Tuesday
TIME: 11:00 am – 12:30 pm
VENUE: IMI Seminar Room, Research Techno Plaza, XFrontiers, Level 03-01
50 Nanyang Drive, Singapore 637553
*Lunch will be served

Sabbarao Nikhil NARAYAN
PhD student,
IMI/EEE

Multi Organ Segmentation in 2D Ultrasound Images of Thyroid Gland Using Speckle Related Pixels

In this research work, the use of speckle related pixels to perform multi-organ segmentation of the Thyroid gland is studied. Speckle related pixels are used to segment an ultrasound image of the thyroid gland into the trachea, carotid, muscles and thyroid based on tissue echogenicity. New methods to accurately estimate the anterior boundary of the thyroid gland are introduced. A new energy functional is defined to segment the carotid artery which is then used as a landmark to segment other significant structures visible in the ultrasound image. Experimental results on a dataset of 32 images comprising of a mix of transverse and longitudinal scans of the ultrasound image of the thyroid gland show an average accuracy of 83% for thyroid, 84 % for carotid, 79% for muscles and 77% for trachea when compared with ground truth markings obtained from two medical experts using Dice coefficient as the overlap measure to validate the algorithm.
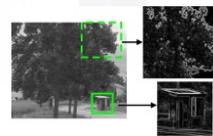
Dr XIAO Yang
Research Fellow,
IMI

#### *mCENTRIST: A Multi-channel Feature Generation Mechanism for Scene Categorization*

mCENTRIST, a new multi-channel feature generation mechanism for recognizing scene categories, is proposed in this research. mCENTRIST explicitly captures the image properties that are encoded jointly by two image channels, which is different from popular multi-channel descriptors. In order to avoid the curse of dimensionality, tradeoffs at both feature and channel levels have been executed to make mCENTRIST computationally practical. As a result, mCENTRIST is both efficient and easy to implement. In addition, a hyper opponent color space is proposed by embedding Sobel information into the opponent color space for further performance improvements. Experiments show that mCENTRIST outperforms established multi-channel descriptors on four RGB and RGB-NIR datasets, including aerial orthoimagery, indoor and outdoor scene category recognition tasks. Experiments also verify that the hyper opponent color space enhances descriptors' performance effectively.

Jaroslaw Slawomir KOCHANOWICZ
PhD Student
IMI/SCE

Psychological and Sociological Inspirations in Development of Believable Social Agents

This research aims to develop elements of a cognitive-affective architecture for believable agents capable of generating complex social behavior for various applications. Existing models will be improved and expanded by certain significant concepts from psychology and sociology, enabling implementation of agents with more believable personality, values, morality, goals, styles, social identities, culture, world model, individual social maps and other characteristics. Afterwards this flexible and reusable model will be embedded in various environments as a basis of simulation of an emergent, dynamic and interactive social structure of believable society.
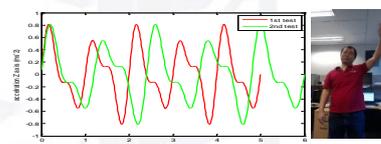
LI Bingbing
PhD Student
IMI/MAE

Dimensionless Analysis of Human Motions and Similarity Evaluation

Motion, as well as speech, is an important channel in communication. A motion is the movement of a specific person to finish a certain task or to express a certain meaning. It is critical for an animatronic avatar to do same motions as its operator. However, the size differences between different make it difficult to quantitatively evaluate how similar two motions are. In this work, a method to do dimensionless analysis of human motions is proposed. Kinematic data (such as velocity and acceleration) of body joints is captured using inertia measurement units. The data is then analyzed and relative joint length and joint angles are used to describe each posture. An evaluation criteria for the similarity between different motions is also proposed.

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