

先端 ICT メディカル・ヘルスケア研究センター講演会

日時 : 2016.7.14 (木) 16:20-17:20

場所 : CC202

Title: Computational Anatomy Modeling and its Applications to Surgical Planning

Presented by: Dr. Amir Hossein Foruzan (Shahed University, Iran)

Amir Hossein Foruzan received B.S. degree in Electrical Engineering from Sharif University of Technology, Tehran, Iran and the M.S. and Ph.D. degree in Biomedical Engineering from Tehran University, Iran in October 2010. From November 2008 to March 2010, he was a researcher in Intelligent Image Processing Lab (IIPL), College of Information Science, Ritsumeikan University. In 2011, he joined as a faculty member to Shahed University, Tehran, Iran. From 2011 up to now, he has continued his collaboration with IIPL. His current research fields include Medical Image Analysis, Computer-Aided Diagnosis Systems and Surgical Simulators.

Abstract: In this talk, we introduce achievements of medical image analysis group of Shahed University. The talk consists of two parts: (1) Computational Anatomy and (2) Surgical Simulators. In this first part, the talk will include topics such as “Liver segmentation”, “Vessel extraction”, “Tumor segmentation” and “Statistical Shape Modeling”. Our Liver segmentation method employs a generalized appearance model to segment liver in low-contrast images. Regarding tumor segmentation, we developed an algorithm to segment a diverse set of liver tumors: small/large sizes, hyper/hypo-intense and homogenous/heterogeneous tumors. Our proposed statistical shape model incorporated the “Modified-Coherent Point Drift” technique to find corresponding points and a generalized appearance model to accurately find the hepatic tissue boundary. In the second part, we will focus on applications of image modeling on developing a surgical simulator. Surgical Simulations have applications such as treatment planning and training. We also developed a volume preserving model to represent liver. Some references are given below:

- 1- **Foruzan, Amir Hossein**, and Yen-Wei Chen. "Improved segmentation of low-contrast lesions using sigmoid edge model." International journal of computer assisted radiology and surgery (2015): 1-17.
- 2- Dong, Chunhua, Yen-wei Chen, **Amir Hossein Foruzan**, Lanfen Lin, Xian-hua Han, Tomoko Tateyama, Xing Wu, Gang Xu, and Huiyan Jiang. "Segmentation of liver and spleen based on computational anatomy models." Computers in biology and medicine 67 (2015): 146-160.

- 3- **Foruzan AH**, Motlagh HR, Multimodality liver registration of Open-MR and CT scans, Int J Comput Assist Radiol Surg. **2015** Aug;10(8):1253-67.
- 4- **Foruzan, A. H.**, Chen, Y. W., Hori, M., Sato, Y., & Tomiyama, N. (2014). Capturing large shape variations of liver using population-based statistical shape models. International journal of computer assisted radiology and surgery, 1-11, **2014**.
- 5- Tomoko TATEYAMA, Masaki KAIBORI, Tsukasa SHINDO, **Amir Hossein FORUZAN**, Chen-Lun LIN, Kosuke MIYAWAKI, Takumi TSUDA, Kosuke MATSUI, Masanori KON, Xianhua HAN, Huiyan JIANG, Yen-Wei CHEN , Patient-Specific 3D Visualization of the Liver and Vascular Structures and Interactive Surgical Planning System,” Medical Imaging Technology, ISSN:0288-450X; VOL.31; NO.3; PAGE.176-188; **2013**.
- 6- Delavari, Mahdi, **Amir Hossein Foruzan**, and Yen-Wei Chen. "Improvement of Statistical Shape Models for Soft Tissues Using Modified-Coherent Point Drift." IFAC-PapersOnLine 48, no. 20 (**2015**): 36-41.
- 7- **Amir H. Foruzan**, Yen-Wei Chen, Reza A. Zoroofi, Akira Furukawa, Yoshonobu Sato, Masatoshi Hori, Noriyuki Tomiyama, “Segmentation of Liver in Low-Contrast Images Using K-Means Clustering and Geodesic Active Contour Algorithms,” IEICE TRANSACTIONS on Information and Systems Vol.E96-D No.4 pp.798-807, **2013**.