Zhiyuan Liu

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EDUCATION

University of North Carolina, *Chapel Hill, NC*
3rd year PhD candidate in Computer Science *Aug. 2017 – May. 2022*
Advised by Dr. Stephen M. Pizer

Sun Yat-sen University, *Guangzhou, China*
Master's of Biomedical Engineering *Sept. 2010 – Jun. 2013*
Awarded Full-Tuition Scholarship

Sun Yat-sen University, *Guangzhou, China*
Bachelor's of Biomedical Engineering *Sept. 2006 – Jun. 2010*
Awarded Excellent Students Scholarship in 2007-2008 and 2008-2009

WORK EXPERIENCE

University of North Carolina, *Chapel Hill, NC*
Research Assistant in Shape Analysis *Aug. 2017 – Present.*

- Updated the existing shape analysis framework Pablo; provided direct technical support for international collaborators.
- Proposed a novel two-stage framework for representing shapes consistently under noise; extended the skeletal shape models onto more complex shapes, e.g., mandibles.
- Proposed machine learning based approach to obtain shape models; designed and conducted the experiments on multi-object shape analysis.

United Imaging Healthcare Co., *Shanghai, China*
Software engineer in dept. of Radiotherapy & Software *Jul. 2013 – Jul. 2017*

- Led the project of evaluating radiotherapy treatment plans, including the visualization, evaluation and simulation modules; won the Outstanding Contribution Award for employees in the dept. of Radiotherapy in 2013-2014.
- Designed and developed diagnostic applications for blood vessel disease (e.g., stent); streamlined the deployment in three hospitals in Shanghai; the team won the Excellent Team Award in 2015-2016.
- Proposed and contributed to a novel workflow in radiotherapy treatment, integrating the patient reception using bar code, treatment plan retrieval and conversion, treatment delivery and quality control.

Department of Radiation Oncology in University of North Carolina, *Chapel Hill, NC*
Short-term research scholar *Apr. 2015 – Sept. 2015*

- Gathered clinical requirements to define the workflow in radiation therapy; formulated the development plans and streamlined the iterative development involving developers and clinical experts.
- Optimized the mesh generating algorithm in PLUNC; reduced the running time by half.
- Proposed and implemented a novel simplified solution (i.e., EZPlan) for creating a radiotherapy plan with 2D images.

RESEARCH PROJECTS

Multi-object shape analysis
Guide: Dr. Stephen M. Pizer, J. S. Marron, James N. Damon *Dec. 2018 – Present.*

- Built shape models to represent the geometry of multi-object shapes.
- Tailored the existing statistical method JIVE to multi-object shape analysis.
- Visualized both the geometric model (using OpenGL) and the statistic results (in Matlab).

SlicerSALT S-rep extension
Guide: Dr. Stephen M. Pizer *Dec. 2017 – Present.*

- Used Mean Curvature Flow for constructing diffeomophisms on the target surface boundary.
- Estimated the backward deformation, resulting in the shape model of the target object.
- Used the derivative-free optimization algorithm to refine the zeroth, first, and second order geometry of shape models; produced histograms to evaluate the shape models.

Cascaded Automatic Detection for Schistosoma Japonicum eggs
Guide: Yan Liu *Sept. 2010 – Jun. 2013*

- Extended the connected component analysis algorithm to support the multi-target segmentation.
- Modeled 5-dimensional shape features for automatically differentiating result contours from previous segmentation.
- Established a classifier using SVM for auto-recognition resulting in 92.3% accuracy; wrote a paper that won the Youth Outstanding Award in Guangdong Institute of Biomedical Engineering, 2011-2012 annual.
- Implemented a website tool for this auto-detection; obtained the copyright of pathogen remote monitoring system.

SKILLS

Programming: C++, Java, Python, Matlab, Lisp, SQL. (Program in Linux and Windows.)
Machine Learning: Generalized Linear Models, Dimensionality Reduction, Markov Chain Monte Carlo, Deep Learning, Support Vector Machine, Bayesian Theorem. Familiar with Pytorch and Tensorflow.
Software Engineering: Unified Modeling Language, Agile Software Development, Git, SVN.
Web Development: JSP, JavaScript, CSS, HTML.