

Patrick Langechuan Liu, PhD

3371 Agate Dr, Santa Clara, California, 95051, USA

(+1) 734-277-1381

liulangechuan@gmail.com

<http://langechuan.com>

WORK EXPERIENCE

Detector Physicist

Santa Clara, CA

PerkinElmer Medical Imaging

2015-Present

- Led engineer teams to design and test various amorphous silicon and CMOS detectors for X-ray imaging
- Optimized detector test procedures and cut testing time by 60% through analysis of 5 years of test data (60 TB+ image and text files stored on in-house server) in Python
- Reduced time for defect analysis from 5 minutes to 3 seconds (100x speedup) by developing new algorithms
- Developed a GUI to analyze test images and identify detectors of passing grade using logistic regression
- Increased X-ray detector spatial resolution by 80%+ by adopting a barrier rib structure in the scintillator layer

Data Science Fellow

San Francisco, CA

The Data Incubator

Summer 2015

- Selected as one of 30 fellows from 1800 applicants to participate in an intensive data science fellowship program
- Performed sentiment analysis through construction of bag-of-words and bigram models based on more than 1 million Yelp reviews using Scikit-learn library in Python
- Predicted business star-rating through linear regression of the features extracted from 30,000+ Yelp records
- Identified the most common restaurant violations in different cuisine types based on analysis of more than 500,000 restaurant inspection records in New York City using SQL
- Constructed and analyzed a social network of celebrities in NYC using data scraped from 1200+ webpages
- Revealed relationships among Wikipedia pages by analyzing the network of links on all English Wikipedia pages (10 GB+ of HTML files stored on Amazon Web Service) using MapReduce algorithms in mrjob framework

Research Assistant

Ann Arbor, MI

Department of Radiation Oncology, University of Michigan

2009-2014

- Pioneered design optimization of megavoltage X-ray detectors for radiotherapy portal imaging and MV CBCT
- Designed and conducted numerical modeling through parallel Monte Carlo simulation on 800+ CPU cores
- Invented a hybrid modeling framework to reduce simulation time from 100 million down to only 30 CPU hours
- Designed and implemented CT reconstruction algorithm and imaging performance analysis in MATLAB

Management Consulting Trainee

Chicago, IL

McKinsey & Company

Summer 2011

- Collaborated with fellow trainees on the case study of a cosmetics company with declining sales
- Created a multivariate regression model to predict sales from various types of investments in Microsoft Excel
- Proposed and pitched a solution to increase sales by ~20% based on the analysis to an executive panel

EDUCATION

University of Michigan, Ann Arbor

MI, USA

PhD (with distinction) in *Physics* | GPA: **4.0/4.0**

2008-2014

- GRE score: Physics 990/990, Quantitative 800/800

Peking University

Beijing, China

Bachelor of Science in *Physics* | GPA: **3.7/4.0**

2004-2008

SKILLS & INTERESTS

- Computer Skills: Unix Shell Scripting, Python, Matlab, C/C++, SQL, FORTRAN, Parallel Computing
- Languages: Chinese (Native), Japanese (Fluent), Spanish (Intermediate), Arabic (Beginner)
 - Translated the first two seasons of the Big Bang Theory into Chinese and promoted the show in China
 - **1st Place** in Michigan Japanese Language Speech Contest (awarded round-trip tickets from US to Tokyo)
- Interests: Badminton, Table Tennis, Golf, Translation, Calligraphy, Typography, Linguistics, Manga

ACADEMIC HIGHLIGHTS

Peer-review Experience:

- Invited as judge to peer review 80+ manuscripts from 10+ journals in Image Processing and Medical Imaging

Peer-reviewed Publication:

- [Langechuan Liu](#), Larry Antonuk, Youcef El-Mohri, Hao Jiang, Qihua Zhao, "Theoretical investigation of the design and performance of a dual energy (kV and MV) radiotherapy imager", Medical Physics 42, 2072 (2015) (Featured as [Cover Article](#) and [Editor's Pick](#))
- [Langechuan Liu](#), Larry Antonuk, Youcef El-Mohri, Hao Jiang, Qihua Zhao, "Optimization of the design of thick, segmented scintillators for megavoltage cone-beam CT using a novel, hybrid modeling technique", Medical Physics 41, 061916 (2014)
- Youcef El-Mohri, Larry Antonuk, Richard Choroszucha, Qihua Zhao, Hao Jiang, [Langechuan Liu](#), "Optimization of the performance of segmented scintillators for radiotherapy imaging through novel binning technique", Physics in Medicine and Biology, 59 (2014) 797-818 (Featured article in [PMB](#) and [Medical Physics Web](#))
- [Langechuan Liu](#), Larry Antonuk, Qihua Zhao, Youcef El-Mohri, Hao Jiang, "Countering Beam Divergence Effects with Focused Segmented Scintillators for High DQE Megavoltage Active Matrix Imagers", Physics in Medicine and Biology, 57 (2012) 5343-58
- Youcef El-Mohri, Larry Antonuk, Qihua Zhao, Richard Choroszucha, Hao Jiang, [Langechuan Liu](#), "Low-dose megavoltage cone-beam CT imaging using thick, segmented scintillators", Physics in Medicine and Biology, 56 (2011) 1509-1527 (Featured in [Medical Physics Web](#))

Conferences presentations:

- [Langechuan Liu](#), Minghui Lu, Wanqing Cao, Luke Peng, Arthur Chen, "Improving detector spatial resolution using pixelated scintillators with a barrier rib structure", SPIE Medical Imaging 2016: Physics of Medical Imaging, 978315 (Opening speaker of session)
- Larry Antonuk, [Langechuan Liu](#), Albert Liang, Youcef El-Mohri, Qihua Zhao, Martin Konieczek, Hao Jiang, "Multi-Energy Imagers for a Radiotherapy Treatment Environment", SPIE Medical Imaging 2015, 9412-14
- Larry Antonuk, [Langechuan Liu](#), Youcef El-Mohri, Hao Jiang, Qihua Zhao, "Theoretical Investigation of the Design and Performance of Dual Energy X-ray Detectors for kV and MV CBCT Imaging in a Radiotherapy Treatment Room", RSNA 2014, SSJ21-06
- [Langechuan Liu](#), Larry Antonuk, Youcef El-Mohri, Qihua Zhao, Hao Jiang, "Design Optimization of Segmented Scintillators for Megavoltage Cone-Beam CT", AAPM 2014, TH-A-18C-1
- [Langechuan Liu](#), Larry Antonuk, Hao Jiang, Youcef El-Mohri, Qihua Zhao, "Optimization of the design of portal imaging systems incorporating thick, segmented scintillating detectors employed for megavoltage cone-beam CT through a novel hybrid modeling technique", RSNA 2013, SST15-06
- Larry Antonuk, Youcef El-Mohri, Qihua Zhao, [Langechuan Liu](#), Hao Jiang, "Implications of Orders-of-Magnitude Improvement in DQE Performance of Conventional Electronic Portal Imagers", RSNA 2012, LL-PHS-TH2B
- Larry Antonuk, [Langechuan Liu](#), Qihua Zhao, Youcef El-Mohri, Hao Jiang, Robert Street, "Investigation of Novel, Focused, Segmented Scintillator Geometries for High DQE Megavoltage Active Matrix Imagers", AAPM 2011, Radiography/Projection Imaging Section, SU-C-220-6
- Qihua Zhao, [Langechuan Liu](#), Youcef El-Mohri, Larry Antonuk, Hao Jiang, Martin Konieczek, "Theoretical Limits to System Performance of High Efficiency, Direct Detection, Megavoltage Active Matrix Flat-Panel Imagers Based On Polycrystalline Mercuric Iodide", AAPM 2010, Imaging General Section, SU-GG-I-136