

Kamal Pangen, Ph.D.

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Professional Profile

Trained as a theoretical high energy physicist, I enjoy solving complex problems with innovative ideas. My background in physics provides a solid foundation for quantitative problem solving skills. I have extensive experience in data manipulation, data analysis, building machine learning models, and deploying the product to end users at a large organization.

Areas of Expertise

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| • Supervised and Unsupervised Machine Learning | • Deep Learning |
| • Natural Language Processing | • Statistical analysis |
| • Mathematical modeling | • Algorithm development and implementation |
| • Monte Carlo modeling and simulations | • Problem solving |
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Skills

Computer Languages: Python, Mathematica, SQL, MATLAB, C++, java, \LaTeX

Data analysis and visualization: Numpy, Pandas, Matplotlib, Seaborn, QlikView, QlikSense

Machine Learning: Scikit-Learn, Keras, XGboost, LightGBM, Tensorflow, Pytorch

AutoML: H2O.ai, DataRobot

Languages: English, Nepali, Hindi, Urdu

Experience

Data Scientist - Machine Learning @Mercy Hospital, St. Louis

Feb 2018-Present

I develop machine learning models to drive operational efficiency and create profitability.

- Built and deployed machine learning models to predict the Diagnosis Related Group (DRG) for inpatient admissions. Within a year of its deployment, it has already saved more than 7 million dollars in hospital revenue. This project was selected as a finalist (in cost and efficiency category) at Mercy wide innovation conference.
- Developed Qlik Sense app to share the predictions from the model with medical coders who are currently using it to audit and review medical coding at Mercy.
- Built a Natural Language Processing model based on deep learning to predict the diagnosis for inpatient admission from physician notes.
- Estimated the financial impact of elective surgery cancellations due to COVID-19.
- Used Natural Language Processing techniques to automate the cancer registry case findings.

Graduate Research Assistant @Washington University, St. Louis

Aug 2013-Aug 2017

I worked on several aspects of quantum chromodynamics (QCD) at nonzero temperature and density. My principle achievements included:

- Development and implementation of algorithms to find the saddle point of a multi-dimensional function, and perform multi-dimensional integration numerically, as required to study the phase structure of QCD and liquid-gas system.
- Computation of the mass spectrum and correlation functions in lattice models of QCD by numerically diagonalizing matrices of large dimensions.
- Perform multi-dimensional integral numerically using Monte Carlo techniques to calculate the rate of neutrino emission from neutron stars.

Undergraduate Research Assistant @Brigham Young University

May 2008-Aug 2011

- I successfully constructed and tested a time-of-flight ion spectrometer that was later used in single photon radiation experiment. As part of the testing of the apparatus, I collected a large set of data from experiments and performed data analysis (primarily Mathematica).
- In making a brief transition to algebraic topology, I quickly learned new ideas and applied it to my research. My main focus was to identify different triangulations and circle packing on the surface of a sphere and use it to investigate the properties of knots with less than nine twist regions.

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Education

Washington University	ST. LOUIS MO
Doctor of Philosophy in Physics 3.89/4	AUG 2017
Dissertation: <i>Topics in QCD at nonzero temperature and density</i>	
Masters of Science in Physics 3.79/4	MAY 2013
Brigham Young University	PROVO, UT
Bachelors of Science in Physics and Mathematics 3.7/4	JAN 2007-AUG 2011

Machine Learning Courses on Coursera

Reinforcement Learning Specialization (4 courses)	March 2020
Introduction to TensorFlow for AI, ML and DL	June 2019
Deep Learning Specialization (5 Courses)	May 2019
How to Win a Data Science Competition	June 2018
Machine Learning	Nov 2017

Honors and Awards

• Finalist in Mercy wide innovation conference	Oct 2019
• Winner of 1st Mercy Hackathon [link]	Sept 2019
• Arthur L. Hughes Fellow , Washington University [link]	Summer 2012
• University Fellow , Washington University [link]	2011 & 2013
• Harvery Fletcher Scholarship , Brigham Young University	2010/2011
• Academic Scholarship , Brigham Young University	2007-2010
• Physics Department Scholarship , Brigham Young University	2007-2010

Publications

(Note: In high energy physics, name of authors are listed in alphabetical order)

- M. Alford, **K. Pangeni** and A. Windisch “Color Superconductivity and Charge Neutrality in Yukawa Theory”, Physics Review Letters 120, 082701 (2018)
- H. Nishimura, M. Ogilvie and **K. Pangeni**, “Liquid-Gas Phase Transition and CK Symmetry in Quantum Field Theories”, Physical Review D 95, 076003(2017).
- Mark Alford and **Kamal Pangeni** “Gap bridging enhancement of modified Urca process in nuclear matter.”, Physical Review C 95, 015802 (2017).
- H. Nishimura, M. Ogilvie and **K. Pangeni**, “Complex mass spectrum in lattice QCD with static quarks at strong coupling”, Physical Review D 93, 094501 (2016).
- H. Nishimura, M. Ogilvie and **K. Pangeni**, “Complex saddle points and disorder lines in QCD at finite temperature and density”, Physical Review D 91,054004 (2015).
- H. Nishimura, M. Ogilvie and **K. Pangeni**, “Complex saddle points in QCD at finite temperature and density”, Physical Review D 90,045039 (2014).