MARK KAMUDA

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SUMMARY

Machine learning research engineer with 4 years of experience leveraging simulated data and deep learning algorithms to solve real-world signal classification and regression problems. Looking to transfer my deep learning and research skills to develop reliable solutions to complex problems.

SKILLS

Python, TensorFlow, Keras, scikit-learn, Pandas, Numpy, Jupyter Notebooks, MATLAB, Amazon Web Service, Git/GitHub, Monte Carlo simulation, statistical modeling, sampling techniques, digital signal processing, Linux, Bash

RESEARCH EXPERIENCE

Artificial Neural Network for Spectral Analysis (link)

- Developed and prototyped an open source Python package for deep learning with noisy spectroscopic data
- Researched and evaluated dense, convolution, and autoencoder neural networks for problems in nuclear security
- Performed feature engineering using autoencoders
- Applied software development best practices such as unit testing, version control, and automated documentation
- Designed, built, and simulated custom datasets for training and experiments

A Comparison of Machine Learning Methods for Automated Gamma-Ray Spectroscopy

- Compared convolution and dense neural networks for multiclass spectroscopic signal classification
- Studied both algorithms' generalization performance on simulated data
- Published results in Nuclear Instruments and Methods in Physics Research Section A

Automated Isotope Identification Algorithm Using Artificial Neural Networks

- Employed a logarithmic regression neural network for multiclass multilabel signal regression
- Published results in IEEE Transactions on Nuclear Science

EDUCATION

University of Illinois at Urbana-Champaign, Illinois

Doctorate, Nuclear Engineering — **Aug 2017 - Oct 2019 (expected)**
Masters, Nuclear Engineering — **May 2014 - August 2017**
Bachelors, Nuclear Engineering — **August 2010 - May 2014**

WORK EXPERIENCE

Guest Scientist, Los Alamos National Laboratory — **June 2015 - Aug 2015**

- Performed data mining and statistical analysis on legacy data to improve nuclear forensics capabilities
- Presented results in a Los Alamos National Laboratory internal report

Guest Scientist, Brookhaven National Laboratory — **May 2013 - Aug 2013**

- Participated in the Department of Energys Science Undergraduate Laboratory Internship
- Simulated and evaluated a novel collimator design for a compact medical scanner
- Applied a maximum likelihood expectation maximization algorithm to reconstruct and localize tumors
- Presented results in a poster and published paper

LEADERSHIP

The Hacker Within-Illinois, President — **Aug 2018 - May 2019**

- Effectively managed a software skill-sharing club of over 25 members
- Leveraged communication skills to sustain membership by encouraging participation and planning creative topics
- Developed and delivered multiple technical presentations and tutorials

Engineering Outreach Society, President — **Aug 2013 - May 2014**

- Headed an outreach organization of over 50 students with an executive board of five people
- Coordinated weekly science projects with a team of ten elementary school teachers

PUBLICATIONS

E. J. Hague, **M. Kamuda**, W. P. Ford, E. T. Moore, and J. Turk. "A comparison of adaptive and template matching techniques for radio-isotope identification." *SPIE Proceedings.* **2019**

M. Kamuda and C.J. Sullivan. "An Automated Isotope Identification and Quantification Algorithm for Isotope Mixtures in Low-Resolution Gamma-ray Spectra." *Radiation Physics and Chemistry.* **2019**

M. Kamuda, J. Zhao, K. Huff. "A Comparison of Machine Learning Methods for Automated Gamma-Ray Spectroscopy." *Nuclear Instruments and Methods in Physics Research Section A.* **2018**

M. Kamuda, J. Stinnett, and C.J. Sullivan. "Automated Isotope Identification Algorithm Using Artificial Neural Networks." *IEEE Transactions on Nuclear Science.* **2017**

J. Mattingly, J. Hutchinson, C. Sullivan, J. Stinnett , **M. Kamuda**, M. Alamaniotis, B. Simms, J. Mueller, J. Newby, J. Linkous, S. Pozzi, K. Polack, M. Hamel, Z. He, D. Goodman, and M. Streicher. "CNEC and CVT Subcritical Experiments with Category I Special Nuclear Material at the Nevada National Security Site Device Assembly Facility." *Institute of Nuclear Materials Management Conference Record.* **2016**

M. Kamuda et al. "Modeling Of A Slanted-hole Collimator In A Compact Endo-cavity Gamma Camera." *SPIE Proceedings.* **2013**

SELECTED PRESENTATIONS

M. Kamuda and K. Huff. "Preventing Disaster: Identifying Nuclear Weapons with Neural Networks." Poster presented at SciPy, Autin, Texas. **2019**

M. Kamuda and K. Huff. "A Machine Learning Approach To Identifying Shielded Radioisotopes In Gamma-ray Spectra." Poster presented at the Consortium For Verification Technology Workshop, Ann Arbor, Michigan. **2018**

M. Kamuda and K. Huff. "Uranium Enrichment Measurements Using an Artificial Neural Network." Podium presentation given at the Consortium for Verification Technology Workshop, Ann Arbor, Michigan. **2017**

M. Kamuda and C.J. Sullivan. "An Automated Isotope Identification and Quantification Algorithm for Isotope Mixtures in Low-Resolution Gamma-ray Spectra." Podium presentation given at the 10th International Topical Meeting on Industrial Radiation and Radioisotope Measurement Applications, Chicago, Illinois. **2017**

M. Kamuda, J. Stinnett, C.J. Sullivan. "Peak Quantification with Neural Networks for Low-Resolution NaI Spectra." Poster presented at the IEEE Nuclear Science Symposium, Medical Imaging Conference and Room-Temperature Semiconductor Detector Workshop (NSS/MIC/RTSD), Strasbourg, France. **2016**

M. Kamuda and C.J. Sullivan. "An Automated Isotope Identification and Quantification Algorithm for Isotope Mixtures in Low-Resolution Gamma-ray Spectra." Poster presented at the Symposium on Radiation Measurements and Applications, Berkeley, California. **2016**

M. Kamuda, M.M. Watson, and C.J. Sullivan. "Information Barriers based on Enhanced Automated Isotope Identification." Poster presented at the University and Industry Technical Interchange Program and Technical Review Meeting, Ann Arbor, Michigan. **2015**

GUIDED DISCUSSIONS

M. Kamuda. "Posting to GitHub and Reviewing Legacy Code." The Hacker Within, University of Illinois at Urbana-Champaign **2019**

M. Kamuda. "Data Visualization." The Hacker Within, University of Illinois at Urbana-Champaign **2018**

M. Kamuda and J. Drobny. "Intro to Python & Python Tips." The Hacker Within, University of Illinois at Urbana-Champaign **2018**

M. Kamuda and J. Wilson. "Data Mining and Machine Learning." The Hacker Within, University of Illinois at Urbana-Champaign **2018**

M. Kamuda. "Natural Language Processing." The Hacker Within, University of Illinois at Urbana-Champaign **2017**

M. Kamuda. "Introduction to TensorFlow." The Hacker Within, University of Illinois at Urbana-Champaign **2017**