

Anran Xu

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EDUCATION

University of Toronto

Toronto, Canada

Honours Bachelor of Science

2018.09-2022.06

Physics Specialist; Mathematics & Its Applications Specialist (Physical Science)

- GPA: **3.91/4.0**
- Dean's List Scholar (Fall/Winter 2019-2020 & 2020-2021)
- The Don Salt Memorial Scholarship (Canadian Exploration Geophysical Society (KEGS))
- New College Council In-Course Scholarship
- The 3T0 M.&P. and Associates Scholarship

The University of British Columbia

Vancouver, Canada

Master of Science in Geophysics

2022.09-present

RESEARCH EXPERIENCE

Visual Sentiment Analysis Using Deep Learning Models

Toronto, Canada

AI4Good Lab

2022.05-2022.07

- Reviewed the existing research literature on image sentiment analysis
- Collaborated with team members to write a project proposal
- Pre-processed the collected data to create a labeled dataset
- Built and optimized a convolutional neural network (CNN) model using transfer learning from ResNet50v2, achieving accuracy of 72% for the training set and 75% for the validation set

Development of ML Methods for Neural Cosmological power spectrum emulators

Toronto, Canada

Advisor: Keir Rogers, University of Toronto

2022.05-2022.08

- Reviewed literature about Cosmopower and axion dark matter cosmology
- Studied background material on cosmology including cosmic microwave background, LSS matter density, simons observatory, etc.
- Used axionCAMB package to collect datasets with different LCDM parameters' space
- Grasped python packages Cosmopower to train DNN that maps input cosmological parameters to CMB and matter power spectra in an axion dark matter cosmology, achieving error less than 0.06σ for 99% of the CMB spectra

Development of AI Methods for Finding Hidden Dimensions

Toronto, Canada

Advisor: Prof. R. J. Dwayne Miller, Hazem Daoud, University of Toronto

2021.05-2021.08

- Reviewed literature about diffraction pattern analysis using machine learning methods, and explored how A.I. can aid in matching changes in diffraction pattern to structural changes of bismuth
- Gained essential knowledge and skills by taking two courses: *Deep Learning Specialization* and *TensorFlow Developer Professional Certificate* on Coursera
- Exported the synthetic profiles of the electron diffraction patterns and converted them into ring-like electron diffraction images using Python
- Built and optimized a convolutional neural network (CNN) model, achieving accuracy of 93.2% for the training set and 91.15% for the validation set
- Used the CNN model to predict the U_{iso} values of real diffraction patterns, and the prediction has the right trends

Moment Tensor Inversion for the Mw=6.5 Earthquake in Nevada

Toronto, Canada

Advisor: Prof. Qinya Liu, University of Toronto

2021.05-2021.07

- Studied background material on seismic wave equation, seismic wave propagation, and earthquake source representations (focal ball, moment tensor)
- Grasped software packages (gCAP & FK package) on seismic data processing and source mechanism inversions
- Used FK package to calculate the required Green's functions in multi-layered media
- Performed moment-tensor inversion about the Mw=6.5 earthquake in Nevada in 2020 using gCAP package, the result shows that most of segments have correlation coefficients greater than 90 (100 is the maximum)
- Analyzed the result by comparing it to other results from Ruhl (2021) and NSL (Nevada Seismological Laboratory)