Yuxing FEI

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EDUCATION

University of California, Berkeley Berkeley, CA, USA   Aug. 2021 – May 2026 (expected)
Ph.D. in Material Science, Department of Material Science and Engineering

Wuhan University Wuhan, Hubei, China   Sept. 2017 – June 2021
B.S. in Chemistry, College of Chemistry and Molecular Sciences & **Honor Science Program** of Hongyi Honor School
GPA: **3.96**/4.00; Averaged Grade: **93.0**/100; Rank:**1/17**

University of California, Berkeley Berkeley, CA, USA   Jan. 2020 – May 2020
Visiting Undergraduate Student
Programming For Mathematical Applications (A); Introduction to Artificial Intelligence (Pass)

RESEARCH EXPERIENCE

Research Assistant to Prof. Gerbrand Ceder   Feb. 2020 – Aug. 2020
UNIVERSITY OF CALIFORNIA, BERKELEY

1. Self-surpervised Language Model for Abbreviation Sense Disambiguation in Material Science Documents
Overview:
This research focuses on developing a novel learning-based toolkit to detect, expand and disambiguate abbreviations appeared in material science documents more accurately, which is an important part of automatic knowledge extraction from material science literature.

- Modified the abbreviation detection algorithm by Schwartz to get better performance in material science documents.
- Designed a self-surpervised task to teach deep learning model (*Bert*) to catch latent knowledge in the scientific documents and used this model to disambiguate material abbreviations in texts.
- Built a search engine to link the long forms to PubChem entries based on Elasticsearch.

Keywords: material informatics; deep learning (DL); natural language processing (NLP); word sense disambiguation; abbreviation expansion

2. COVIDScholar: COVID-19 literature search powered by advanced NLP algorithms
Overview:
This work is aimed at facilitating researchers to retrieve COVID-19 related publications more efficiently using state-of-the-art natural language processing technique. Related work is reported by *Nature*.

- Trained a multi-label text classification model for categorizing COVID-19 related articles (e.g. `prevention`, `diagnosis`, `treatment`) based on *Bert*
- Built a super-fast autocomplete system for search queries
- Trained a *FastText* model for search query re-ranking to improve search accuracy

- Created word embedding visualization to show latent relationship between terminologies
- Wrote scrapers and parsers to collect up-to-date papers from various sources

Keywords: bioinformatics; natural language processing (NLP); deep learning (DL); COVID-19; academic search engine

Research Assistant to Prof. Zhiping Song   Oct. 2018 – Jan. 2020
College of Chemistry and Molecular Sciences
Wuhan University
Overview:
This research focuses on designing a novel organic polymer for next-generation lithium battery cathode material.

- Designed a benzoquinone polymer based on phenolic-aldehyde condensation reaction
- Synthesised the material in a scalable way and tested its electrochemistry properties in coin cells

Keywords: lithium battery; organic cathode material; benzoquinone polymer

Research Assistant to Prof. Lin Zhuang   June 2019 – Oct. 2019
College of Chemistry and Molecular Sciences
Wuhan University

- Developed a FORTRAN package to calculate Fermi softness for a given surface of a crystal structure
- Visualized the final results and interpreted the results to predict the chemical reactivity of solid catalysts

Keywords: DFT calculation; Fermi-Dirac distribution; chemical reactivity; Fermi softness

WORK EXPERIENCE

Research Intern @ Microsoft Research Asia   Nov. 2020 – Apr. 2021
Mentor: Wenlei Shi (Machine Learning Group)
Overview:
In this project, we tried to design a reinforcement learning (RL) agent to generate novel and stable crystals that is not included in the experiment database like ICSD.

- Built a RL model based on Crystal GCNN (crystal graph convolutional neural network) and RLlib in Ray package
- Proposed a ionic substitution environment for RL-based novel crystal generation
- Designed various rewards (step rewards & final rewards) to guide the RL agent to make good decisions and tried to find a way to aggregate them into single reward value

Keywords: deep reinforcement learning (DRL); novel material design; crystal structure generation

HONORS

National Scholarship (0.2%)   Nov. 2018
Ministry of Education, P.R. China

Merit-Based First Class Scholarship   Nov. 2018
Wuhan University

Wang Laoji Scholarship   Oct. 2019
Wuhan University

First Class Hongyi Academic Scholarship   Nov. 2019
Hongyi Honor School, Wuhan University

Merit Student   Dec. 2018 & Dec. 2019
Wuhan University

Skills and Languages

Programming Languages: Python, Javascript, Rust and LaTeX
Softwares & Frameworks: Quantum Espresso, PyMatGen, Docker, MongoDB, PyTorch, Ray, NumPy
Operating Systems: Linux/Windows
Languages: Mandarin (native), English (professional)
Experiment Skills: Organic synthesis experience, Electrochemistry test skills, X-ray diffraction