Junbo Wang

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Education

China University of Geosciences   **Sep. 2021 – present**
B.E in Computer Science and technology GPA: 3.53/4.0   *Beijing, China*

selected Coursed

- Higher Mathematics A
- Linear Algebra
- Algorithm Design and Analysis
- C++ Programming
- Discrete Mathematics
- Numerical Analysis
- College Physics
- Data Structures
- Probability and Statistics

Ongoing Papers

[1] **Wang J.** and Ye S.*, "Vision-based study on highway safety under extreme weather conditions," in preparation.

[2] Ye S.*, Hartman S., Carrano M., Peters S.E., and **Wang J.**, "Sedimentary rock quantity and the dinosaur fossil record in the Cretaceous of North America," in preparation.

[3] Lyu Y., Zhangzhou J.*, **Wang J.**, et al., "FAIR principles on geochemistry dataset: High Temperature Geochemistry Benchmark Database," in preparation.

Research Experience

Generative AI: New Pipeline and Place Perceptions   **Jul. 2024 – Present**
Supervisor: Dr. Yuhao Kang and Dr. Shan Ye   *Austin, Texas(Remote)*

- Collected seven audio-image datasets, including three widely-used, general-purpose pairs and four human-centered geographic datasets, enhancing support for both general and human-centered geographic multimodal research.
- Utilized metadata from Sounding Earth to re-collect data, transitioning from pairing remote sensing images with spectrograms to a new modality that pairs street view imagery with audio, significantly enhancing the perceptual alignment of the datasets.
- Conceptualized a cutting-edge image generative model that synergistically combines diffusion techniques, GPT, and CycleGAN, utilizing perceptual loss to achieve superior generative results.
- Independently completed code development, script writing, and baseline experiments, demonstrating strong technical proficiency and problem-solving skills, while also contributing to the original drafts of research papers, ensuring thorough documentation and effective dissemination of findings.
- Exploring the use of Diffusion Transformers (DiT) for generating images from audio with content localization, further advancing the capabilities of generative AI in interpreting and visualizing geographic and emotional human-centered contexts.

Highway Safety: Integrating Aerosol Data and Street View Imagery   **Mar. 2024 – Present**
Supervisor: Dr. Shan Ye   *Beijing, China*

- Collecting aerosol data from M2T1NXAER, a NASA satellite product, and processing netCDF data for a specific research area to enhance analysis capabilities for environmental studies.
- Developing scripts to collect street view imagery from specific research areas in the Midwestern United States using the Google Maps API, facilitating detailed geographical analysis.
- Employing CNN and CNN-LSTM architectures to recognize road safety features such as rumble strips, concrete barriers, and metal barriers within street view imagery, contributing to advanced road safety assessments.
- Compiling precise statistics on highway accidents with a localization accuracy of 20 meters and conducted comprehensive correlation analyses between car accidents, extreme weather, and safety measures, identifying critical factors affecting traffic safety.
- Conducting correlation analysis on car accidents, extreme weather conditions, and road safety measures to identify key factors influencing traffic safety in the research area.

Spatiotemporal Compilation of Cretaceous Fossil Occurrence Data   **Oct. 2023 – Present**
Supervisor: Dr. Shan Ye   *Beijing, China*

- Validating age models of North American Cretaceous dinosaurs by intersecting PBDB and Macrostrat database.

- Investigating the macroevolutionary pattern of dinosaurs in the Late Cretaceous by tabulating dinosaur data at different taxonomic levels for time series analyse.
- Visualizing trends in the quantity of dinosaur species data from 145 to 65 million years ago (MA), before and after chronological corrections, to provide insights into evolutionary patterns over this geological time period.

Research on Network Analysis and LLM Agent for Geochemistry Pi   Jan. 2024 – Present
Supervisor: Dr. ZhangZhou J   *Hangzhou, China(Remote)*
- Investigated the application of various machine learning algorithms in rock geochemistry to enhance predictive modeling and data analysis.
- Converted mineral and rock tabular data into a graph-based data structure, enabling the application of sophisticated analytical techniques and network analysis.
- Applied community detection algorithms to identify co-occurrence relationships among three types of minerals: clinopyroxene (CPX), orthopyroxene (OPX), and olivine (OL), advancing understanding of mineralogical associations.
- Leading the development of a Large Language Model (LLM) Agent designed as a comprehensive, user-friendly machine learning tool for geochemists, particularly benefiting those with limited coding skills.

High-Temperature Geochemistry Benchmark Database   Oct. 2023 – Present
Supervisor: Dr. ZhangZhou J   *Hangzhou, China(Remote)*
- Contributed to website design and enhanced user interaction mechanisms, improving overall user experience and engagement.
- Successfully implemented an efficient database retrieval system, significantly enhancing overall system performance.
- Conducted comprehensive interface testing across multiple functionalities, identifying and resolving critical bugs to ensure system reliability and user satisfaction.
- Implemented a user bug submission feature, significantly enhancing the efficiency of bug tracking and resolution processes.
- Investigated the FAIR principles and implemented a novel tool to quantify the FAIRness of our database, enhancing data accessibility and interoperability.

Volunteer

Computer Association of CUGB   Oct. 2021 – Oct. 2022
Hardware Engineer Intern   *Beijing, China*
- Diagnosed and repaired hardware issues, significantly enhancing the reliability and performance of computing systems for students and faculty.
- Contributed to maintaining and upgrading computer hardware, ensuring optimal performance and minimizing system downtime, thereby supporting the academic environment.

Award

Academic Scholarships   Dec. 2022
2021 – 2022 academic year second-class scholarship   *China University of Geosciences (Beijing)*

Third Prize Winner   Mar. 2023 – Jul. 2023
North China Division   *C4-Network Technology Challenge*

Technical Skills

Languages: Python, Java, C/C++, HTML, SQL, R, swift
Developer Tools: VS Code, Idea, PyCharm, Eclipse, DDE Cloud Platform, Navicat
Technologies/Frameworks: Linux, GitHub, SpringBoot, Pytorch, Tensorflow
Data processing: netCDF, HDF