# Dilxat Muhtar (Dilixiati Muhataer)

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## Education

**Nanjing University** 2022/09 - 2025/06 (Expected)
M.Sc. in Geographic Information Science (GIS), School of Geography and Ocean Science Nanjing, Jiangsu, China

- Under the supervision of Dr. Xueliang Zhang and Prof. Pengfeng Xiao
- GPA: 89/100 (Top 10%)

**Nanjing University** 2018/09 - 2022/06
B.Eng. in Geographic Information Science (GIS), School of Geography and Ocean Science Nanjing, Jiangsu, China

- GPA: 4.4/5.0 (Top 10%)
  - Math: Calculus; Linear Algebra; Probability Theory and Mathematical Statistics; General Physics; Fluid Dynamics
  - Coumpter Science: Foundations of Coumpter Networks; Pattern Recognition and Computer Vision; Object-Oriented Programming; Digital Photogrammetry; Spatial Data Structure; Geo-Database; Geospatial Big Data and Cloud Computing

## Research Interests

My long-term research interest lies in understanding how machines can learn about the world in ways similar to humans. My work primarily focuses on three interconnected areas: efficient representation learning from raw signals, development of efficient architectures and learning algorithms, and intelligent reasoning and cooperation.

## Publications

- **D. Muhtar**, Y. Shen, Y. Yang, et al.. "StreamAdapter: Test Time Adaptation for Streamlined Inference". **Under Review**. [Paper]
- **D. Muhtar**, Y. Yang, Y. Shen, et al.. "MTL-LoRA: Low-Rank Adaptation for Multi-Task Learning". **AAAI 2025**. [Paper]
- **D. Muhtar**, Z. Li, F. Gu, et al.. "LHRS-Bot: Empowering Remote Sensing with VGI-Enhanced Large Multimodal Language Model". **European Conference on Computer Vision (ECCV), 2024**. [Paper], Github
- **D. Muhtar**, X. Zhang, P. Xiao, et al.. "CMID: A Unified Self-Supervised Learning Framework for Remote Sensing Image Understanding". **IEEE Transactions on Geoscience and Remote Sensing**, vol. 61, pp. 1-17, 2023. [Paper], Github
- **D. Muhtar**, X. Zhang, and P. Xiao. "Index your position: A novel self-supervised learning method for remote sensing images semantic segmentation,". **IEEE Transactions on Geoscience and Remote Sensing**, vol. 60, pp. 1-11, 2022. [Paper], Github

## PATENTS

- A Hierarchical Feature Autonomous Learning Method for Remote Sensing Image Feature Extraction, Xueliang Zhang, **Dilxat Muhtar**, and Pengfeng Xiao. Invention Patent, ID: 202310782744.
- A Position Encoding Based Self supervised Semantic Segmentation Method for Remote Sensing Images, Xueliang Zhang, Pengfeng Xiao, and **Dilxat Muhtar**. Invention Patent, ID: 202210393747.

## Research Experience

**Test Time Customozed Adaptation of LLM | MSFT Research | Research Intern** 2024/02 - 2024/10
Advisor: Dr. Yaming Yang, Dr. Yelong Shen, Dr. Xiaodong Liu, and Yuefeng Zhan Beijing, China

- Inspired by the in-context learning capabilities of LLMs, we develop test-time adaptation strategies that directly map context into parameter updates, enabling models to dynamically adapt to the current context.

**Low-Rank Adaptation for Multi-Task Learning | MSFT Research | Research Intern** 2023/12 - 2024/08
Advisor: Dr. Yaming Yang, Dr. Yelong Shen, and Yuefeng Zhan Beijing, China

- We developed a representation distinction and aggregation strategy within the low-rank space, addressing the feature collapse problem during multi-task fine-tuning.

**Multimodal LLM for Earth Observation| NJU | Research Assistant** 2023/05 - 2024/02
Advisor: Dr. Xueliang Zhang and Prof. Pengfeng Xiao Nanjing, JiangSu, China

- Proposed a framework leveraging LLMs for enhanced conditional image understanding through natural language supervision and human-agent interaction, advancing urban monitoring and decision-making capabilities.

**Vision Foundation Model for Remote Sensing| NJU | Research Assistant** 2022/09 - 2023/5
Advisor: Dr. Xueliang Zhang and Prof. Pengfeng Xiao Nanjing, JiangSu, China
- Scaled up domain-specific foundation models by designing unified self-supervised learning signals through an online distillation framework. Demonstrated the models' effectiveness across multiple urban sensing tasks, including object detection, urban pattern perception, and land use change analysis.

**Fine-grained Self-supervised Representation Learning | NJU | Research Assistant** 2021/11 - 2022/05
Advisor: Dr. Xueliang Zhang and Prof. Pengfeng Xiao Nanjing, JiangSu, China
- Designed domain-friendly self-supervised learning signals to learn object-level fine-grained representations directly from raw data without human supervision.

## Work Experience

**Microsoft Research** 2023/12 - Present
Algorithm Intern, supervised by Dr. Yelong Shen, Dr. Xiaodong Liu, Dr. Yaming Yang, and Yuefeng Zhan Beijing, China
- Efficient Adaptation Strategy of LLMs
- Multimodal Agent System

## Technical Skills

- **Languages**: English (TOEFL: 102 (Listening: 30, Speaking: 24); CET-6: 608), Mandarin, Uyghur (Native)
- **Programming Languages:** Python, C/C++, Shell, SQL, LaTex, MATLAB
- **Frameworks and Tools:** Pytorch, Triton, Megatron-LM, Deepspeed, HuggingFace, Docker, Sklearn, Numpy
- **Research:** Profound paper reading skills, along with good coding skills and the ability to reproduce the papers.
- **AI:** Large Language Model (Pre-training, SFT, Linear Attention, PEFT) | Multi-Modal Large Language Model (Alignment, SFT) | Self Supervied Learning (Contrastive Learning, Masked Modeling, Language Modeling)

## Selected Awards

- National Scholarship (Top 1%)
- Academic Scholarship Major Award (Top 10%)
- Excellent Graduate Student of Nanjing University (Top 5%)
- Ruli Scholarships at Nanjing University (Top 1%)
- Rank 17th in 2022 "Hangtianhongtu Cup" Remote Sensing Image Intelligent Processing Algorithm Contest—International Track: Semantic Segmentation of Remote Sensing Image (Top 5%)
- Top Prize for Outstanding Undergraduate Thesis at Nanjing University (Top 1%)
- Dongliang Scholarships at Nanjing University (Top10%)
- Excellent Completion in the Undergraduate Training Programs for Innovation and Entrepreneurship (Top 10%)

## Personal Interest

In addition to my research life, I engage in a variety of personal interests including boxing and playing the guitar. Music holds a special place in my leisure activities, particularly the works of JJ Lin, who ranks as my favorite singer. Moreover, I am currently learning to ski.

Last Updated on December 10, 2024