Junjie Fei

Research Assistant

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Work Experiences

Southern University of Science and Technology *Shenzhen, China*

Research Assistant *Jun. 2023 - Current*

- Engaged in research on multimodality and AIGC at the Vision-Language Group and AIGC Group, Visual Intelligence & Perception Lab, SUSTech.
- Focused on multimodal instruction tuning, multimodal large language models, and controllable, personalized image generation and editing.

Southern University of Science and Technology *Shenzhen, China*

Visiting Student *Oct. 2022 - Mar. 2023*

- Engaged in research on multimodality at the Vision-Language Group, Visual Intelligence & Perception Lab, SUSTech.
- Focused on the prompt tuning of large-scale pre-trained models for zero-shot transfer learning.
- The paper on zero-shot image captioning has been accepted by ICCV 2023.

Education

Xiamen University *Xiamen, China*

Master of Engineering in Electromagnetic Field and Microwave Technology *Sept. 2020 - Jun. 2023*

- **Overall GPA:** 3.59 / 4.00
- **Courses:** Numerical Analysis, The Design and Analysis of Algorithms, Deep Learning, Modern Electronics Technique
- **Final Year Research Project:** Fast Electromagnetic Imaging Based on Deep Learning

Chongqing University *Chongqing, China*

Bachelor of Engineering in Telecommunication Engineering *Sept. 2016 - Jun. 2020*

- **Overall GPA:** 3.17 / 4.00
- **Courses:** Advanced Mathematics, Linear Algebra, Complex Function and Integral Transformation, C/C++ Programming, Java Programming, Computer Composition Principle, Computer Communication Network, Signals and Systems, Digital Signal Processing
- **Final Year Research Project:** Filter Design Based on Genetic Algorithm and Gradient Descent Algorithm

Publications

(* equal contribution)

[1] **Junjie Fei***, Teng Wang*, Jinrui Zhang, et al, *Transferable Decoding with Visual Entities for Zero-Shot Image Captioning*, International Conference on Computer Vision (ICCV) 2023, accepted 2023.

[2] Teng Wang*, Jinrui Zhang*, **Junjie Fei***, et al, *Caption Anything: Interactive Image Description with Diverse Multimodal Controls*, arXiv 2023, technical report.

[3] Feng Han, Miao Zhong, and **Junjie Fei**, *Hybrid Microwave Imaging of 3-D Objects Using LSM And BIM Aided by a CNN U-Net*, IEEE Transactions on Geoscience and Remote Sensing (2 Year IF: 8.125, ranking: 42/708), accepted 2022.

[4] **Junjie Fei**, Yanjin Chen, Miao Zhong, et al, *Fast 3-D Electromagnetic Full-Wave Inversion of Dielectric Anisotropic Objects Based on ResU-Net Enhanced by Variational Born Iterative Method*, IEEE Transactions on Antennas and Propagation (2 Year IF: 4.824, ranking: 71/708), accepted 2022.

Research Projects

Caption Anything *Shenzhen, China*

Southern University of Science and Technology *Apr. 2023 - Apr. 2023*

- The objective is to develop an interactive image-to-text generative tool that can generate descriptions for any user-specified object within an image, providing a variety of language styles and visual controls to cater to diverse user preferences.
- Implemented and evaluated the captioning module and chat module around the selected object.
- Proposed visual chain-of-thought to bootstrap the generated description focusing on the user-selected region through step-by-step generation.
- Earned **1.3k GitHub stars** for this project and released the **technical report** on arXiv.

Transferable Decoding for Zero-Shot Image Captioning *Shenzhen, China*

Southern University of Science and Technology *Oct. 2022 - Mar. 2023*

- The objective is to achieve zero-shot image captioning, enabling the generation of descriptions for images in open-world scenarios.
- Demonstrated the challenges of modality bias and object hallucination that arise during the adaptation of pre-trained vision-language models and large language models for downstream tasks.
- Proposed an entity-aware decoding paradigm that leverages the CLIP-based classifier and vocabulary to construct the training-agnostic entitiy-aware hard prompt so that the model can compensate for the degradation of the transferability when adapting large-scale pre-trained models.
- The paper “Transferable Decoding with Visual Entities for Zero-Shot Image Captioning” has been **accepted by ICCV 2023**.

3D Objects Reconstruction Based on Artificial Neural Networks *Xiamen, China*

Xiamen University *Oct. 2020 - Dec. 2021*

- The objective is to leverage dense prediction networks to locate and reconstruct 3D unknown objects through received electromagnetic wave.
- Collected and curated the training, validation, and testing set (each sample consists of an object and the corresponding electromagnetic wave).
- Proposed the fusion of an inflated 3D U-Net with shortcut connections to implement a deeper dense reconstruction network, which is capable of mapping the received electromagnetic wave to the unknown object.
- Incorporated attention mechanisms to highlight varying degrees of importance in the electromagnetic wave to different properties of the object.
- Two papers have been accepted by IEEE Transactions on Geoscience and Remote Sensing (**2 Year IF: 8.125, ranking 42/708**), and IEEE Transactions on Antennas and Propagation (**2 Year IF: 4.824, ranking 71/708**), respectively (ranking in the field of electrical and electronic engineering).

Skills

Programming Python, C++

Toolkit Pytorch, Tensorflow, SSH, Git, Matlab, LaTex

Language CET-6, IELTS: 6.5

Achievements

2023.04 **Cai Wenzhong Second Class Scholarship**, School of Electronic Science and Engineering, Xiamen University *China*

2022.11 **Graduate Academic Scholarship**, Xiamen University *China*

2021.11 **Graduate Academic Scholarship**, Xiamen University *China*

2020.11 **Graduate Academic Scholarship**, Xiamen University *China*

2019.12 **Outstanding Student Cadres**, Outstanding Students of Chongqing University 2018-2019 Academic Year *China*

2019.10 **Outstanding Graduate Cadres**, Outstanding Graduate Students of Chongqing University Class of 2020 *China*

2019.06 **Good**, The 10th Student Research Training Program (SRTP) *China*

2018.11 **Second Prize**, The 10th Chinese Mathematics Competitions (Non-Mathematics) *China*

Other Activities

Teaching Assistant in Electronic Circuit *Xiamen, China*

Xiamen University *Feb. 2022 - Jun. 2022*

- Assisted the professor in completing teaching tasks in the area of artificial circuits and digital circuits.
- Engaged in addressing student-submitted questions, reviewing homework assignments, and evaluating examination papers.