

Ziyao Zeng (Adonis)

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Summary

- Research towards **Multimodal Perception** inspired by human perception, especially **3D Perception** and **Vision-Language Models**

Educations

Yale University

Aug. 2023 - (Expected) Aug. 2028

-Ph.D. in Computer Science | Supervised by **Prof. Alex Wong**

ShanghaiTech University

Sept. 2019 - June 2023

-B.Eng. in Computer Science, Major | Innovation and Entrepreneurship, Minor

- Entrepreneurial Mindshift Program, Babson College, March 2021 | International Summer Program, Osaka University, June 2022

Publications (*: equal contribution)

Can Language Understand Depth?

Renrui Zhang*, Ziyao Zeng*, Ziyu Guo, Yafeng Li

ACM Multimedia 2022 (Brave New Idea), acceptance rate $\leq 12.5\%$ | Link: <https://arxiv.org/abs/2207.01077>

-We are **the first** to conduct **zero-shot training-free adaptation** from semantic language to quantified vision tasks (**monocular depth estimation**).

-Our **DepthCLIP** surpasses existing unsupervised methods and even **approaches the early fully-supervised networks**.

DSPoint: Dual-scale Point Cloud Recognition with High-frequency Fusion

Renrui Zhang*, Ziyao Zeng*, Ziyu Guo*, Xinben Gao, Kexue Fu, Jianbo Shi

arXiv technical report, 2021 | Link: <https://arxiv.org/abs/2111.10332>

-We proposed DSPoint to **conduct dual-scale processing** with local point convolution and global voxel attention for efficient point cloud processing.

-For better feature blending, we conduct inter-scale cross-modality interaction by **communicating high-frequency coordinates information**.

PointCLIP V2: Adapting CLIP for Powerful 3D Open-world Learning

Xiangyang Zhu*, Renrui Zhang*, Bowei He, Ziyao Zeng, Shanghang Zhang, Peng Gao

arXiv technical report, 2022, submitted to a top-tier conference | Link: <https://arxiv.org/abs/2211.11682>

-We introduce a **realistic shape projection** module, and leverage large-scale language models to **automatically design 3D-semantic prompt**.

-Our approach significantly surpasses PointCLIP by **+42.90%, +40.44%, and +28.75% accuracy** on three datasets for zero-shot 3D classification.

iQuery: Instruments as Queries for Audio-Visual Sound Separation

Jiabao Chen, Renrui Zhang, Dongze Lian, Jiaqi Yang, Ziyao Zeng, Jianbo Shi

CVPR 2023 | Link: <https://arxiv.org/abs/2212.03814>

-We re-formulate visual-sound separation task and **propose Instrument as Query (iQuery) with a flexible query expansion mechanism**.

-We demonstrate state-of-the-art performance, with **up to 44.2% improvement** of SDR on MUSIC benchmark.

VT-CLIP: Enhancing Vision-Language Models with Visual-guided Texts

Longtian Qiu, Renrui Zhang, Ziyu Guo, Ziyao Zeng, Yafeng Li, Guangnan Zhang

arXiv technical report, 2021 | Link: <https://arxiv.org/abs/2112.02399>

-To adapt CLIP to few-shot classification, we enhance vision-language modeling **via visual-guided texts**.

-Specifically, we **guide text feature to adaptively explore informative regions on the image** and aggregate the visual feature by cross-attention.

Course Project

Twitter Emotion Classification (CS181 Artificial Intelligence)

Mentor: Prof. Kewei Tu, ShanghaiTech University | Link: https://adonis-galaxy.github.io/homepage/research/AI_CS181_project.pdf

Generalized DUQ: Generalized Deterministic Uncertainty Quantification (CS282 Machine Learning)

Mentor: Prof. Xuming He, PLUS Lab, ShanghaiTech University | Link: https://adonis-galaxy.github.io/homepage/research/ML_CS282_project.pdf

Seek Common while Shelving Differences: A New Way for dealing with Noisy Labels (CS280 Deep Learning)

Mentor: Prof. Xuming He, PLUS Lab, ShanghaiTech University | Link: https://adonis-galaxy.github.io/homepage/research/DL_CS280_project.pdf

Research / Working Experience

GRASP Lab, University of Pennsylvania

April 2021 - Present

-Mentor: **Prof. Jianbo Shi** | Project: DSPoint, iQuery, Reconstruction-based Image Segmentation

Shanghai AI Laboratory

Oct. 2022 - March 2023

-Intern Researcher | Project: Visual Grounding, Prototype-based Segmentation

Research with Renrui Zhang, Ph.D. student at MMLab, CUHK

Nov. 2021 - July 2022

-Mentor: **Renrui Zhang** | Project: DepthCLIP, VT-CLIP, PointCLIP V2

UISEE AI Lab, UISEE Technology

July 2021 - April 2022

-Intern Algorithm Engineer | Develop point cloud recognition & monocular 3D object detection algorithm for self-driving cars

PLUS Lab, ShanghaiTech University

July 2020 - June 2021

-Mentor: **Prof. Xuming He** | Project: Mix-data Anomaly Segmentation, Noisy Labels Classification, Uncertainty Estimation

Shanghai Advanced Research Institute, CAS

Aug. 2020 - June 2021

-Intern Lecturer | Teaching advanced scientific topic to public, including deep learning and computer vision

Service / Tutoring Experience

Reviewer: CVPR 2022, ICCV 2023; Volunteer of WWF China & Greenpeace; ShanghaiTech Freshman Mentor; ACM SIGMM member;

Awards / Competitions

Merit Student of ShanghaiTech University

2021, 2022

State Grid AI Innovation Competition in Power Dispatch and Control (Top 10%, 24/242)

2021

Skills

Python/PyTorch, C/C++, Unity/C#, Bilingual (Chinese/English: CET6-607, GRE-327+4, TOEFL-103)