Sheng Zhang

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Experience

Research Assistant June 2023 – Present
Mohamed Bin Zayed University of Artificial Intelligence, UAE
Supervisor: Prof. Kun Zhang

Master of Science(Graduate Research Assistant) August 2021 – May 2023
Mohamed Bin Zayed University of Artificial Intelligence, UAE *GPA: 3.9/4.0*
Supervisor: Prof. Salman Khan; Co-supervisor: Dr. Zhiqiang Shen

Bachelor of Software Engineering September 2016 – June 2021
Tongji University, Shanghai, China *GPA: 86/100*

Research Interests

* Visual Concept learning: Novel Category Discovery, Self-Supervised Learning, Representation Learning.
* Vision-Language Learning under Open World assumption in various downstream vision tasks.

Publications

1. PromptCAL: Contrastive Affinity Learning via Auxiliary Prompts for Generalized Novel Category Discovery.
   ***Sheng Zhang**, Salman Khan, Zhiqiang Shen, Muzammal Naseer, Guangyi Chen, Fahad Khan.* CVPR 2023. Paper Code.
2. Towards Realistic Zero-Shot Classification via Self Structural Semantic Alignment.
   ***Sheng Zhang**, Muzammal Naseer, Guangyi Chen, Zhiqiang Shen, Salman Khan, Kun Zhang, Fahad Khan.* Preprint. Paper Code.
3. L-SNet: From Region Localization to Scale Invariant Medical Image Segmentation.
   *Jiahao Xie, **Sheng Zhang**, Jianwei Lu, Ye Luo.* ICIP 2021. Paper.
4. A Channel Attention Based Deep Neural Network for Automatic Metallic Corrosion Detection.
   ***Sheng Zhang**, Xinling Deng, Yumin Lu, Shaozheng Hong.* Journal of Building Engineering, 2021. Paper.

Research Experience

Realistic Zero-Shot Classification with Vision-Language Learning Jan. 2023 – June. 2023
My individual research supervised by Prof. Salman Khan. *MBZUAI, UAE*

- ★ Proposed a novel framework to address the challenging Realistic Zero-Shot Classification based on semantic structural alignment augmented by Large Language Models.
- ✓ Benchmarked our method with SOTA performance on six generic, fine-grained and out-of-vocabulary datasets.
- ✓ Adapted multiple previous SOTAs to our setting as baselines for performance comparisons.

Generalized Novel Category Discovery June 2022 – Dec. 2022
My individual research supervised by Prof. Salman Khan. *MBZUAI, UAE*

- ★ Proposed a novel contrastive affinity learning framework to address the problem of generalized category discovery.
- ✓ Proposed a novel visual prompt regularization technique to enhance backbone semantic discriminativeness.
- ✓ Achieved SOTA performance on seven challenging benchmarks including fine-grained Herbarium19 and CUB.

Weakly-Supervised Semantic Segmentation on Medical Images Jan. 2021 – June 2021
My bachelor thesis supervised by Dr. Ye Luo. *Tongji University, China*

- ★ Proposed a two-stage framework to address semi-supervised domain adaptation in medical image segmentation.
- ✓ Proposed a novel patch rotation prediction pretext to enhance the representation transferability on downstream dense-prediction tasks.
- ✓ Outperformed previous segmentation SOTA models on both few-annotation and domain-shit scenarios.

Solution to Mask-Scale Variations in Medical Image Segmentation July 2020 – Jan. 2021
My extended research for the MICCAI2020 TN-SCUI challenge advised by Dr. Ye Luo. *Tongji University, China*

- ★ Proposed an entirely differentiable two-stage network to solve the large-scale variations problem in medical image segmentation.

✓ Adapting UNet architecture with various techniques, including channel/gate attention and D-LinkNet.

Metallic Corrosion Detection System Mar. 2020 – Jan. 2021
Advisor: Dr. Ye Luo *Tongji University, China*

★ Proposed an automatic framework to detect multi-level metallic corrosion based on channel attention mechanism.
✓ Adapted squeeze-and-excitation network for metallic corrosion detection with channel-wise explainability.

A Study on ncRNA-Protein Interactions Mar. 2019 – Nov. 2019
My cooperative project with a Bioinformatics PhD. *Tongji University, China*

★ Designed ML models to predict ncRNA-Protein interactions in the development of cardiovascular diseases.
✓ Conducted bioinformatics feature engineering and modeled with explainable learning-based models.

Project Experience

Class-agnostic Open-Set Object Detection Sep. 2021 – June. 2022
Advised by Prof. Salman Khan *MBZUAI, UAE*

- To detect unannotated out-of-vocabulary objects with a class-agnostic detector.
- Enhanced the openness of detectors by implementing a neat copy-paste data augmentation strategy.
- Designed and implemented an uncertainty-based box-jittering method to refine detector localization prediction.

Partially-Supervised Medical Image Segmentation Mar. 2021 – June 2021
Advisor by Dr. Mohammad Yaqub *MBZUAI, UAE*

- To conduct semantic segmentation on 3D MRI-scan datasets with only partial-class voxel-wise annotations.
- Benchmarked existing SOTA on a novel public datasets and conducted ablation experiments.
- Proposed CutMix with Spatial Priori and partially-supervised contrastive loss to improve SOTA performance.

A Study on Visual Relationship Detection with Large-Scale Pre-trained Models Mar. 2022 – May. 2022
Course project *MBZUAI, UAE*

- To leverage large-scale pre-trained models, e.g., CLIP, BERT, to address the visual relationship detection task.
- Adapted pretrained CLIP to the visual relationship detection task.
- Proposed a novel and effective semi-supervised framework for visual relationship plausibility detection.

Semi-Supervised Speech Sentiment Analysis with Pre-trained Models Mar. 2022 – May. 2022
Advised by Shady Shehata *MBZUAI, UAE*

- To explore the application of pre-trained LLM for Semi-Supervised Speech Sentiment Analysis.
- Recreated a SOTA semi-supervised speech-to-text sentiment analysis technique on well-known benchmarks.
- Enhanced the approach using the pre-trained Wav2Vec model.

Technical Skills

Language: English (fluent), Chinese (native)
Programming: Python, JAVA, Oracle
Libraries: Pytorch, Scikit-learn, Matplotlib, Pandas, NumPy

Academic Services

International Conference on Computer Vision (ICCV-Workshop) | *Reviewer* 2023

Conference on Empirical Methods in Natural Language Processing (EMNLP) | *Volunteer* 2023