Yifan Zhou

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SUMMARY

I am a 3rd year PhD student at Arizona State University, advised by <u>Dr. Heni Ben Amor</u>. My research focuses on Language-Conditioned Robot Manipulation and Imitation Learning. I also have experience in Computer Vision, Language Models and Modality Fusion. I have publications in CoRL, IROS, Auton-Robots and TMM. I'm now open for Summer 2024 Research / Applied Scientist Intern positions.

EDUCATION

Arizona State University   **Aug 2021 – Present**
    Ph.D. Computer Science, GPA: 4.0   Tempe, AZ
    Advisor: Dr. Heni Ben Amor

Carnegie Mellon University   **Aug 2019 – May 2021**
    M.S. Artificial Intelligence and Innovation, GPA: 3.92   Pittsburgh, PA

Southwest Jiaotong University   **Sep 2015 – Jun 2019**
    B.E. Computer Science and Technology, GPA: 3.65   Chengdu, China

PEER-REVIEWED PUBLICATIONS

[1] **Y. Zhou**, S. Sonawani, M. Phielipp, et al. "Learning Modular Language-Conditioned Robot Policies through Attention." ***Autonomous Robots (2023): 1-21.*** In Collection: Large Language Models in Robotics.

[2] X. Liu, **Y. Zhou**, S. Ikemoto, et al. "α-MDF: An Attention-based Multimodal Differentiable Filter for Robot State Estimation" *7th Conference on Robot Learning (**CoRL 2023**).*

[3] S. Sonawani, **Y. Zhou**, H. Ben Amor. "Projecting Robot Intentions Through Visual Cues: Static vs. Dynamic Signaling." *International Conference on Intelligent Robots and Systems (**IROS 2023**).*

[4] X. Liu, G. Clark, J. Campbell, **Y. Zhou** and H. Ben Amor. "Enhancing State Estimation in Robots: A Data-Driven Approach with Differentiable Ensemble Kalman Filters." *International Conference on Intelligent Robots and Systems (**IROS 2023**).*

[5] S. Sonawani, **Y. Zhou**, H. Ben Amor. "Imitation Learning based Auto-Correction of Extrinsic Parameters for A Mixed-Reality Setup." *IROS Horizons of an Extended Robotics Reality (**IROS-XR2 Workshop 2022**).*

[6] **Y. Zhou**, S. Sonawani, M. Phielipp, et al. "Modularity through Attention: Efficient Training and Transfer of Language-Conditioned Policies for Robot Manipulation." *6th Conference on Robot Learning (**CoRL 2022**).*

[7] **Y. Zhou**, R. Jiang, X. Wu, et al. "BranchGAN: Unsupervised Mutual Image-to-Image Transfer with a Single Encoder and Dual Decoders." *IEEE Transactions on Multimedia (**TMM 2019**) 21, no. 12: 3136-3149.*

RESEARCH EXPERIENCE

Arizona State University, Interactive Robotics Lab   **Aug 2021 – Present**
Research Assistant | Advisor: Dr. Heni Ben Amor   Tempe, AZ

Language Conditioned Imitation Learning for Robot Manipulation [1, 6]   *Aug 2021 – Present*
- Proposed a novel method, namely Hierarchical Modularity, for training **language-conditioned manipulation policies**, which allows for efficient training and rapid transfer across different types of robots.

- Expanded the module hierarchies to include more complex manipulation tasks, showcasing the flexibility of the proposed method.
- Created an automated pipeline for **synthesis of 3D models** of novel objects using **diffusion models** and **DPT models**, which helps efficient data collection in simulation.

Multi-Modal Robot State Estimation using Attention Mechanism [2]   *Feb 2023 – Aug 2023*
- Proposed an attention-based **Multimodal Differentiable Filter** (α-MDF) for **robot state estimation**, which utilizes **attention mechanisms** to learn multimodal latent representations and generate learnable gains that combine multiple input modalities.

Projecting Robot Intention for Human Robot Interaction [3]   *Sep 2022 – Feb 2023*
- Studied the effect of projecting different visual signals to a human partner in a **mixed-reality human-robot collaboration** setup, finding that the mixture of multiple visual signals result in significant advantages, i.e., increased task efficiency and reduced cognitive load.
- Introduced an information theoretic analysis, **Transfer Entropy**, to numerically quantify the degree of information transfer between visual signals and human behavior.

Mixed-Reality Extrinsic Parameter Auto-Correction Using Imitation Learning [5]   *Aug 2022 – Sep 2022*
- Adopted image-based **imitation learning** for **extrinsic parameter correction** in a projector-camera stereo setup, by training a policy to iteratively correct the offset between a QR code and a projected pattern.

Carnegie Mellon University, RoboTouch Lab   Nov 2019 – May 2020
Research Student | Advisor: Dr. Wenzhen Yuan   Pittsburgh, PA
- Predicted hardness of objects touched by a **GelSight tactile sensor**, where the sensor signal is a time sequence of images, by training a combination of **CNN**s and **RNN**s.
- Improved R^2 by 0.097 (achieved 0.884) on novel shape dataset by adopting pretrained models, weight freezing and curriculum learning.

Southwest Jiaotong University, Virtual Reality and Multimedia Lab [7]   Sep 2017 – Jun 2019
Undergraduate Research Student | Advisor: Dr. Xiao Wu   Chengdu, China
- Proposed BranchGAN, an unsupervised end-to-end **generative adversarial network** for mutual **image-to-image transfer** between two domains.
- Introduced a novel backbone architecture with one single encoder and dual decoders to capture the cross-domain distributions and generate images in both domains. Together with a set of 3 comprehensive training objects, the method is able to outperform baselines with great margin on different benchmarks.

WORK EXPERIENCE

LinkedIn Corporation   Jun 2020 – Aug 2020
Machine Learning – Artificial Intelligence Engineer Intern   Sunnyvale, CA
- Predicted missing fields of LinkedIn member profiles by adapting **BERT**'s ability of Masked Language Modeling as Masked Profile Modeling.
- Increased top 1 acc. of retrieving the missing fields by over 10% compared to baselines.
- Trained the model on several tens of millions datapoints using **TensorFlow2**, **Hadoop File System**, **Kubernetes** clusters and **Docker** containers.

SKILLS

Tools & Libraries
   PyTorch, TensorFlow, Jax, MuJoCo, OpenCV, MATLAB, Git, Docker, Kubernetes, Django

Languages
   Python, Java, HTML, JavaScript, SQL, C/C++