Tiantian Wang

Curriculum Vitae

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EDUCATION

2018 - Present: Ph. D.	University of California, Merced, CA, USA.
	Research Focus: Free-Viewpoint Human Video Generation with Diffusion Model; Novel View Synthesis & Animated Human with Neural Radiance Fields (NeRFs) & Gaussian Splatting, Video Matting.
	Advisor: Ming-Hsuan Yang in Electrical Engineering and Computer Science.
2015 - 2018: M. S.	Dalian University of Technology, Dalian, China.
	Research Focus: Salient Object Detection.
2011 - 2015: B. S.	Dalian University of Technology, Dalian, China.

RESEARCH EXPERIENCE

Research Intern	**Stability AI**, *San Francisco, California, CA, USA*, Mar 2024 - Present.
	Research Focus: **Photo-Realistic Free-Viewpoint Human Video Generation with Diffusion Model**. Our work aims to generate high-quality, 360-degree spatio-temporally coherent human videos from a single image. We propose a multi-view multi-frame model by integrating stable video diffusion to capture global correlations across viewpoints and time, and CNNs to inject critical conditions, including camera parameters, pose maps, and single RGB image. At its core, our method factorizes self-attention across spatial dimensions, views, and time steps, enabling robust modeling of 4D space.
	Mentor: Chun-Han Yao, Mallikarjun Byrasandra, Varun Jampani.
Research Intern	**Snap Research**, *Los Angeles, CA, USA*, Aug 2021 - Mar 2022.
	Research Focus: **Human Performer Stylization**. We present a first step towards 4D (3D space and time) human video stylization, which addresses style transfer, novel view synthesis, and human animation within a unified framework. The existing video stylization methods are restricted to rendering images in specific viewpoints of the input video, lacking the capability to generalize to novel views and novel poses in dynamic scenes. To overcome these limitations, we utilize a single framework to represent and stylize videos by simultaneously modeling the human subject and the surrounding scene using two NeRFs, facilitating the animation of human subjects across various poses and novel viewpoints.
	Mentor: Xinxin Zuo, Fangzhou Mu, Jian Wang.
Research Intern	**Meta Reality Lab**, *Sausalito, CA, USA*, Jan 2021 - July 2021.
	Research Focus: **Neural Representation Learning of Human Body**. Learning a user-controlled model for unseen poses remains challenging for existing approaches. To address this problem, we introduce an effective method to i) integrate observations across multiple frames and ii) encode the appearance at each frame. This is achieved by utilizing the human pose that models the body shape and point clouds that partially cover the human as input.

The human pose-based code models the shape of a performer, whereas the point cloud-based code predicts details and infers missing structures at the unseen poses. To recover non-visible regions in query frames, we use a temporal transformer to integrate features of points in query frames and track body points from automatically-selected key frames.

Mentor: Nikolaos Sarafianos, Tony Tung.

Research Intern   **Adobe Research**, *San Jose, CA, USA, May 2019 - Aug 2019*.

Research Focus: **Deep Video Matting**. Existing video matting approaches, often based on optical flow or simple combinations of multiple frames, struggle to maintain temporal coherence across frames. To address this issue, we propose enhancing temporal coherence using Consistency-Regularized Graph Neural Networks (CRGNN), supported by a synthesized video matting dataset. CRGNN employs Graph Neural Networks to relate adjacent frames, enabling the correction of incorrectly predicted pixels in one frame by leveraging information from neighboring frames. To generalize our model from synthesized to real-world videos, we introduce a consistency regularization technique that enforces coherence in alpha and foreground predictions when blending with different backgrounds.

Mentor: Brian Price, Joon-Young Lee, Ning Xu, Scott Cohen.

PUBLICATION

[Ongoing Work] Tiantian Wang, Chun-Han Yao, Mallikarjun Byrasandra, Ming-Hsuan, Yang, Varun Jampani. Photo-Realistic Free-Viewpoint Human Video Generation with Diffusion Model. Target **CVPR2025**.

[Under Review] Tiantian Wang, Xinxin Zuo, Fangzhou Mu, Jian Wang, Ming-Hsuan Yang. Towards 4D Human Video Stylization. In **TCSVT**.

[Under Review] Tiantian Wang, Nikolaos Sarafianos, Ming-Hsuan Yang, Tony Tung. Neural Rendering of Humans in Novel View and Pose from Monocular Video. In **TCSVT**.

[1] Tiantian Wang, Sifei Liu, Yapeng Tian, Kai Li, Ming-Hsuan Yang. Video Matting via Consistency-Regularized Graph Neural Networks. In **ICCV** 2021.

[2] Tiantian Wang, Yongri Piao, Xiao Li, Lihe Zhang, Huchuan Lu. Deep Learning for Light Field Saliency Detection. In **ICCV** 2019.

[3] Yi-Wen Chen, Yi-Hsuan Tsai, Tiantian Wang, Yen-Yu Lin, Ming-Hsuan Yang. Referring Expression Object Segmentation with Caption-Aware Consistency. In **BMVC** 2019.

[4] Tiantian Wang, Lihe Zhang, Shuo Wang, Huchuan Lu, Gang Yang, Xiang Ruan, Ali Borji. Detect Globally, Refine Locally: A Novel Approach to Saliency Detection. In **CVPR** 2018.

[5] Xiaoning Zhang*, Tiantian Wang*, Jinqing Qi, Huchuan Lu, Gang Wang. Progressive Attention Guided Recurrent Network for Salient Object Detection. In **CVPR** 2018. (* denotes equal contributions).

[6] Tiantian Wang, Ali Borji, Lihe Zhang, Pingping Zhang, Huchuan Lu. A Stagewise Refinement Model for Detecting Salient Objects in Images. In **ICCV** 2017.

[7] Tiantian Wang, Lihe Zhang, Huchuan Lu, Chong Sun, Jinqing Qi. Kernelized Subspace Ranking for Saliency Detection. In **ECCV** 2016.

[8] Lihe Zhang, Jie Wu, Tiantian Wang, Pingping Zhang, Ali Borji, Huchuan Lu. A Multi-Stage Refinement Network for Salient Object Detection. **IEEE Transactions on Image Processing**, vol. 29, pp. 3534-3545, 2020.

[9] Lihe Zhang, Jiayu Sun, Tiantian Wang, Yifan Min, Huchuan Lu. Visual Saliency Detection via Kernelized Subspace Ranking with Active Learning. **IEEE Transactions on Image Processing**, vol. 29, pp. 2258-2270, 2020.

[10] Wenlong Guan, Tiantian Wang, Jinqing Qi, Lihe Zhang, Huchuan Lu. Edge-Aware Convolution Neural Network Based Salient Object Detection. **IEEE Signal Processing Letters**, vol. 26, no. 1, pp. 114-118, 2019.

[11] Lihe Zhang, Xiang Fang, Hongguang Bo, Tiantian Wang, Huchuan Lu. Deep Multi-Level Networks with

Multi-Task Learning for Saliency Detection. **Neurocomputing**, vol. 312, pp. 229-238, 2018.

[12] Dakhia Abdelhafid, <u>Tiantian Wang</u>, Huchuan Lu. A Hybrid-Backward Refinement Model for Salient Object Detection. **Neurocomputing**, vol.358, pp. 72-80, 2019.

[13] Dakhia Abdelhafid, <u>Tiantian Wang</u>, Huchuan Lu. Multi-scale Pyramid Pooling Network for Salient Object Detection. **Neurocomputing**, vol. 333, pp. 211-220, 2019.

TEACHING EXPERIENCE

Teaching Assistant: Electrical Engineering and Computer Science, University of California, Merced, CA, USA.

Fall 2018	CSE165: Introduction to Object Orient Program.
Spring 2019	CSE021: Introduction to Computing II.
Fall 2019	CSE175: Introduction to Artificial Intelligence.

PROFESSIONAL SERVICE

Conference Reviewer: International Conference on Learning Representations (ICLR).

Neural Information Processing Systems (NeurIPS).

Conference on Computer Vision and Pattern Recognition (CVPR).

Association for the Advancement of Artificial Intelligence (AAAI).

Winter Conference on Applications of Computer Vision (WACV).

European Conference on Computer Vision (ECCV).

International Conference on Computer Vision (ICCV).

Journal Reviewer: IEEE Transactions on Visualization and Computer Graphics (TVCG).

International Journal of Computer Vision (IJCV).

IEEE Transactions on Neural Networks and Learning Systems (TNNLS).

IEEE Transactions on Multimedia (TMM).

AWARD

Graduate Dean's Dissertation Fellowship, *2024.*

Third Place (3rd), *1st International Workshop and Challenge on People Analysis: From Face, Body and Fashion to 3D Virtual Avatars (ECCV 2022).*

Outstanding Reviewer of CVPR 2021.

Excellent Postgraduate of Dalian City, 2018.

Excellent Postgraduate of Dalian University of Technology, 2017.

Excellent Graduate of Dalian University of Technology, 2015.

TECHNICAL SKILL

Language:	Python, MATLAB, C/C++, LATEX.
Framework:	Pytorch, Caffe, Tensorflow.
Other Tools:	Vim, Git.

REFERENCE

Ph.D. Advisor: Ming-Hsuan Yang ⬀, Professor, University of California, Merced.

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