Zhiwen Fan

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RESEARCH INTERESTS

Neural Radiance Fields, 3D Reconstruction, Panoptic Symbol Spotting & Segmentation.

SELECTED PROJECTS

Neural Radiance Field   Sep. 2021 - Now

NeRF Augmentations: In our *Aug-NeRF* paper, we effectively boosts NeRF accuracy in both novel view synthesis (up to 1.5dB PSNR gain) and underlying geometry reconstruction.

Single view NeRF: In our *SinNeRF* paper, We push the setting of sparse views to the extreme, by training a neural radiance field on only one view with depth information. Utilizing the generated pseudo labels according to the available single view, the learned radiance field generate more satisfying synthesized results on novel views.

INR stylization: In our *INS* paper, we conduct a pilot study for training stylized implicit representations (e.g., SIREN, NeRF, SDF). We propose to decouples the ordinary implicit function into a style implicit module and a content implicit module, in order to separately encode the representations from the style image and input scene. An amalgamation module is then applied to aggregate these information and synthesize the stylized output. Consequently, we can synthesize faithful stylization and can interpolate between different styles to generate new mixed style.

CAD Drawing Perception using Transformer and GCN   Oct. 2020 - Now

Project Page & Product Page

We release the first large-scale real-world dataset of over 10,000 CAD drawings with line-grained annotations, covering various types of builds. This dataset can be used in architecture, engineering and construction (AEC) industries to accelerate the efficiency of 3D modeling. We introduce the task of **panoptic symbol spotting**, which is a relaxation of the traditional symbol spotting problem. Moreover, we propose the Panoptic Quality (PQ) as the evaluation criteria of panotic symbol spotting results. We first propose a CNN-GCN method in [ICCV 2021] which unified a GCN head and a detection head for semantic and instance symbol spotting respectively. Recently, we present a novel framework named **CADTransformer** by painlessly modifying existing vision transformer (ViT) backbones to tackle the panoptic symbol spotting task. The PQ is boosted from 0.595 in the GCN-CNN based methods to a new state-of-the-art **0.685**.

Efficient Stereo Matching and Multi-view Stereo   Jul. 2019 - Dec. 2019

We propose a memory and run time efficient cost volume formulation which is built upon a standard feature pyramid encoding geometry and context at gradually finer scales. We further narrow the depth (or disparity) range of each stage by the depth (or disparity) map from the previous stage to recover the output in a coarser to fine manner.

We apply the cascade cost volume to the representative MVS-Net, and obtain a 23.1% improvement on [DTU benchmark] **(1st place)** , with **50.6% and 74.2%** reduction in GPU memory and run-time. In addition, we adapt GwcNet with our proposed cost volume design, and the accuracy ranking rises from 29th to 17th with 37.0% memory reduction on [KITTI 2015 test set]. It is also rank 1st within all learning-based methods on [Tanks and Temples benchmark] . See [CVPR2020] for more details.

SELECTED PUBLICATIONS

Arxiv [link]: Zhiwen Fan∗, Yifan Jiang∗, Peihao Wang∗, Xinyu Gong, Dejia Xu, Zhangyang Wang, "`Unified Implicit Neural Stylization`"

Arxiv [link]: Dejia Xu∗, Yifan Jiang∗, Peihao Wang, **Zhiwen Fan**, Humphrey Shi, Zhangyang Wang, "`SinNeRF: Training Neural Radiance Fields on Complex Scenes from a Single Image`"

ICML 2022 [link]: Peihao Wang, **Zhiwen Fan**, Tianlong Chen, Zhangyang Wang, "`Neural Implicit Dictionary Learning via Mixture-of-Expert Training`", The International Conference on Machine Learning.

CVPR 2022(Oral) [link]: **Zhiwen Fan**, Tianlong Chen, Peihao Wang, Zhangyang Wang, "`CADTransformer: Panoptic Symbol Spotting Transformer for CAD Drawings`", Conference on Computer Vision and Pattern Recognition.

CVPR 2022 [link]: Tianlong Chen, Peihao Wang, **Zhiwen Fan**, Zhangyang Wang, "`Aug-NeRF: Training Stronger Neural Radiance Fields with Triple-Level Physically-Grounded Augmentations`", Conference on Computer Vision and Pattern Recognition.

3DV 2021 [link]: Rakesh Shrestha, **Zhiwen Fan**, Qingkun Su, Zuozhuo Dai, Siyu Zhu, Ping Tan, "`MeshMVS: Multi-View Stereo Guided Mesh Reconstruction`", International Conference on 3D Vision.

ICCV 2021 [link]: **Zhiwen Fan***[1], Lingjie Zhu*, Honghua Li, Xiaohao Chen, Siyu Zhu, Ping Tan, "`FloorPlanCAD: A Large-Scale CAD Drawing Dataset for Panoptic Symbol Spotting`", The International Conference on Computer Vision.

CVPR 2020 (Oral) [link]: Xiaodong Gu*, **Zhiwen Fan***, Siyu Zhu, Zuozhuo Dai, Feitong Tan, Ping Tan "`Cascade Cost Volume for High-Resolution Multi-View Stereo and Stereo Matching`", Conference on Computer Vision and Pattern Recognition.

IPMI 2019 [link]: Liyan Sun*, **Zhiwen Fan***, Xinghao Ding, Yue Huang, John Paisley "`Joint CS-MRI reconstruction and segmentation with a unified deep network`", Information Processing in Medical Imaging.

ACM MM 2019 [link]: **Zhiwen Fan***, Huafeng Wu*, Xueyang Fu, Yue Huang, Xinghao Ding "`Residual-guide network for single image deraining`", ACM Multimedia.

ECCV 2018 [link]: **Zhiwen Fan***, Liyan Sun*, Xinghao Ding, Yue Huang, Congbo Cai, John Paisley, "`A Segmentation-aware Deep Fusion Network for Compressed Sensing MRI`", European Conference on Computer Vision.

AAAI 2018 [link]: Liyan Sun*, **Zhiwen Fan***, Yue Huang, Xinghao Ding, John Paisley "`Compressed Sensing MRI Using a Recursive Dilated Network`", Association for the Advancement of Artificial Intelligence.

TIP 2019 [link]: Liyan Sun*, **Zhiwen Fan***, Xueyang Fu, Yue Huang, Xinghao Ding, John Paisley, "`A deep information sharing network for multi-contrast compressed sensing MRI reconstruction`", Transactions on Image Processing.

MRI 2019 [link]: Liyan Sun, **Zhiwen Fan***, Xinghao Ding, Yue Huang, John Paisley, "`Region-of-interest undersampled MRI reconstruction: A deep convolutional neural network approach`", Magnetic resonance imaging.

MRI 2019 [link]: Liyan Sun, **Zhiwen Fan**, Xinghao Ding, Congbo Cai, Yue Huang, John Paisley "`A divide-and-conquer approach to compressed sensing MRI`", Magnetic resonance imaging.

PROFESSIONAL EXPERIENCE

Google	May. 2022 - TBD
Research Intern, Supervisor: Alexander Koumis and Sergio Orts Escolano	
The University of Texas at Austin	Aug. 2021 - Present
Research Assistant, Supervisor: Prof. Zhangyang (Atlas) Wang	
Alibaba Cloud	Jul. 2019 - Aug. 2021
Senior Algorithm Engineer, Supervisor: Prof. Ping Tan, Dr. Siyu Zhu	
Microsoft Research Asia	Jun. 2018 - Aug. 2018
Research Intern, Supervisor: Dr. Xun Guo	
Xiamen University	Aug. 2016 - Jun. 2019
Research Assistant, Supervisor: Prof. Xinghao Ding	

EDUCATION

The University of Texas at Austin (UT Austin)	Aug. 2021 - Present
Ph.D. Student, Electrical and Computer Engineering	Advisor: Prof. Zhangyang (Atlas) Wang
Xiamen University (XMU)	Sep. 2016 - Jun. 2019
Master, Electronic and Communication Engineering	Advisor: Prof. Xinghao Ding

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[1]A marker * denotes equal-contribution first authorship.

Shandong Agriculture University (SDAU)   Sep. 2012 - Jun. 2016
Bachelor, Electronic Information Science and Technology

HONORS

Scholarship & Travel Awards

- Outstanding Graduates of Xiamen University   Jun. 2019
- The First Prize Scholarship of Xiamen University   2016-2018
- AAAI 2018 Travel Award   Jan. 2018
- Outstanding Graduates of Shandong Province   Jun. 2016

SERVICES

Journal Reviewer: IJCV, Neurocomputing

Conference Reviewer: CVPR'22, ICCV'21, AAAI'21, ICME'19