Tianxin Huang

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Experience

- **National University of Singapore** *NUS School of Computing* 2023 -- Now Research Fellow
- **Tencent** *Youtu AI Lab* 2022 -- 2023 Research Intern
- **Zhejiang University** *Control Science and Engineering* 2020 -- 2023 Doctor's Degree
- **Zhejiang University** *Mechanical Engineering* 2017 -- 2020 Master's Degree
- **Xi'an Jiaotong University** *Mechanical Engineering* 2013 -- 2017 Bachelor's Degree

Interested Areas

- **3D Point Cloud Geometry Analysis**
- **3D Human Face Modeling**
- **3D Scene Understanding and Reconstruction**

Research

- **ComPC: Completing a 3D Point Cloud with 2D Diffusion Priors (ICLR'25)**
  - A new framework to synthesize 3D shapes from incomplete points by integrating priors from a pose-conditioned 2D diffusion model using Gaussian Splatting. This approach resembles an optimization-based point-to-point 3D generation process.
- **Learning to Decouple the Lights for 3D Face Texture Modeling (NeurIPS'24)**
  - Learning to imitate the illumination affected by external occlusions with multiple local illumination conditions combined with optimizable neural networks. In this way, this method can avoid the influences of external shadows on modeled 3D face textures.
- **FreeSplat: Generalizable 3D Gaussian Splatting Towards Free-View Synthesis of Indoor Scenes (NeurIPS'24)(co-author)**
  - A method enhancing 3D Gaussian Splatting with a novel framework for free-view synthesis, using low-cost cross-view aggregation, pixel-wise triplet fusion, and an effective free-view training strategy, resulting in state-of-the-art novel view synthesis performance, efficient inference, and reduced redundancy in large scene reconstruction.
- **VCR-GauS: View Consistent Depth-Normal Regularizer for Gaussian Surface Reconstruction (NeurIPS'24)(co-author)**
  - A method enhancing 3D Gaussian Splatting for high-quality surface extraction by introducing a Depth-Normal regularizer, mitigating normal prediction inconsistencies, and implementing a densification and splitting strategy, resulting in improved reconstruction quality, competitive appearance, faster training, and 100+ FPS rendering.
- **3D Point Cloud Geometry Compression On Deep Learning (ACM MM'19 Oral)**
  - A simple and early framework to compress small and sparse point cloud objects with PointNet++ feature extraction and sparse coding, whose robustness is limited and cannot process different spatial distributions from training data.
- **3QNet: 3D Point Cloud Geometry Quantization Compression Network(Siggraph Asia'22)**

  - An universal purely point-based point clouds compression framework applicable to point clouds with multiple spatial distributions including dense objects, indoor and outdoor scenes.

- **RFNet: Recurrent Forward Network for Dense Point Cloud Completion (ICCV'21)**
  - A efficient dense point cloud completion network achieved by completing the point clouds recurrently and merging the completed results with partial input to preserve original shape details.

- **Learning to measure the point cloud reconstruction loss in a representation space (CVPR'23)**
  - Learning to extract a global representation which can be used to evaluate the point cloud shape differences with contrastive learning to learn similar shape characteristic and adversarial strategy to find out the shape differences.
- **Learning to Train a Point Cloud Reconstruction Network without Matching (ECCV'22)**
  - A learning-based loss function dynamically updated with point cloud reconstruction-related networks including reconstruction/completion/unsupervised classification to avoid the possible biases in existing matching-based losses.

- **Resolution-free Point Cloud Sampling Network with Data Distillation (ECCV'22)**
  - Improving the performances of driving-based sampling network by using FPS sampled points and promoting the network structures, while distillation losses are introduced for extra supervision.

- **Adaptive Recurrent Forward Network for Dense Point Cloud Completion (TMM)**
  - Based on RFNet, ARFNet is proposed by replacing the merging operation controlled by a few learnable parameters with more flexible networks.
- **Fast Point Cloud Sampling Network (Pattern Recognition Letters)**
  - A simple and highly efficient point cloud sampling network by driving initial randomly sampled points to better positions to optimize the performances on downstream tasks including reconstruction and classification.

- **Learnable Chamfer Distance for point cloud reconstruction (Pattern Recognition Letters)**
  - A method making the Chamfer Distance learnable by predicting weights for different point-to-point distances between point clouds, which can achieve faster convergence to better results.

- **Deep Residual Surrogate Model (Information Sciences)**
  - A hybrid surrogate model achieved by adaptively selecting and assembling multiple simple surrogate models, which can model complex functions with a small amount of sampled points.

- **UDNet: Fusing Multi-Scale Context for 3D Semantic Scene Completion (IROS'21)(co-author)**
  - Building a multilevel semantic scene completion network to predict the volumetric occupancy and semantic labels of outdoor scenes by fusing multi-scale features based on 3D sparse convolutions.

- **Semantic Segmentation-assisted Scene Completion for LiDAR Point Clouds (IROS'21)(co-author)**
  - Combining the 2D and 3D scene semantic completion frameworks, where the 3D geometrical features are injected into 2D BEV to improve performances. During inference, the 3D prediction branch is dropped to guarantee the efficiency.