

Rohan Agarwal

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Education

Carnegie Mellon University, School of Computer Science

Pittsburgh, PA

Master of Science in Computer Vision (Robotics Institute), GPA: 4.06/4.00

Dec 2022

- **Learning for 3D vision** - 3D Representations, Neural Radiance Fields, Neural Surface Rendering, PointNet
- **Visual Learning and Recognition** - GANs & VAEs, Visual Question and Answering, Object Localization

Indian Institute of Technology (BHU)

Varanasi, India

Bachelor of Technology in Electronics Engineering, GPA: 9.30/10.00

May 2018

Experience

Amazon

Seattle, WA

Applied Scientist Intern, Amazon Studios (Prime Video)

May 2022 - Aug 2022

Dynamic NeRFs for Talking Head Generation

- Formulated deformable field-based Neural Radiance Fields to model non-rigid facial deformations conditioned on audio.
- Introduced an audio-visual contrastive loss to boost sync between target audio and rendered mouth shape.
- Corroborated method's ability to disentangle effects of pose & audio, and produce high quality output in low-data regime.

Generative Intelligence Lab, Robotics Institute, CMU

Pittsburgh, PA

Research Collaborator, Advisor: [Prof. Jun-Yan Zhu](#)

May 2022 - Present

Content-based Search for Deep Generative Models [\[paper\]](#)[\[website\]](#)

- Introduced novel problem of model retrieval to find the best-match model given a query and large database of generative models.
- Formulated a probabilistic retrieval model using 1st and 2nd order moment approximation of model distributions.
- Demonstrated model search retrieved good models for image reconstruction, transfer learning & latent space interpolation.
- **Submitted paper to SIGGRAPH Asia 2022.**

Qualcomm

Bangalore, India

Engineer, Multimedia Display Lab

July 2018 - Aug 2021

Summer Intern, Multimedia and Graphics Team

May 2017 - July 2017

Memory-Efficient GAN for Superresolution

- Leveraged GAN compression using knowledge distillation and channel pruning to reduce ESRGAN memory footprint by 7.3x.
- Achieved ~14x speedup in throughput on Qualcomm Snapdragon 865 chipset and 89% of Inception Score of full network.

Lightweight DNN for Real-Time HDR Tone Mapping

- Adapted HDRnet to develop a hardware-friendly tone-mapping operator; the method operates on downsampled input and learns a bilateral grid of local affine transformations to meet latency and quality constraints respectively.
- Corroborated support for 90Hz frame rate and 1080p resolution display.

Single Frame Super Scaler for Mobile Display

- Developed a novel hardware-realizable and content-adaptive image upscaling model.
- Leveraged Fuzzy Logic Pattern Matching and Gradient Profile Prior-guided Feature Detection for high image fidelity.
- Demonstrated higher image fidelity than NVIDIA, Mediatek and Qualcomm AI scalars for several usecases.
- **Filed US Patent US17/648,414**; Authored two papers at Qualcomm's Annual Technical Conferences.

Low-Cost Chromatic Aberration Correction in VR Headsets

- Developed an inverse image warp model to offset chromatic aberration in Oculus headsets via differential channel rescaling.
- Optimized latency by 33% and overall power consumption by 16% by employing a separable parabolic warping formulation.

Academic Projects

3D Face Reconstruction from a 2D image [\[report\]](#)

Jan 2022 - April 2022 | CMU

- Introduced coordinate-based network to predict 3D displacement maps for capturing dynamic details in face mesh.
- Enforced patch-level regularization for improved photo-realism of the reconstructed mesh projection.

Latent Space Robustness of GANs [\[code\]](#) [\[website\]](#)

Jan 2022 - April 2022 | CMU

- Proposed a method to examine latent space robustness in GANs by identifying poorly sampled regions in latent space.
- Performed adversarial attacks with in-distribution constraints to arrive at latent vectors which result in noisy reconstructions.

Skills

Programming Languages: Python (*proficient*), C/C++ (*familiar*)

Software & Tools: Pytorch, Pytorch3D, OpenCV, Linux, Perforce, Git, AWS