Tejan Karmali

: tejank10@gmail.com
: +91-7020063047 / +91-9623307457
: tejank10.github.io | : Google Scholar

Research Interests: Generative Models, Representation Learning

Education

Indian Institute of Science, Bengaluru **GPA: 8.70/10**
Master of Technology (Research) in Computational and Data Sciences *2019 - 2022*

National Institute of Techonlogy, Goa **GPA: 9.12/10**
Bachelor of Technology in Computer Science and Engineering *2015 - 2019*

Work Experience

Research Engineer II - Avataar Bengaluru, IN
*Mentor: **Dr. Sohil Shah*** *October 2023 - Present*

- 3D Reconstruction from sparse-view images using large diffusion models and LRMs.

Pre-Doctoral Researcher - Google Research Bengaluru, IN
*Mentors: **Dr. Varun Gulshan** , **Alex Wilson*** *April 2022 - May 2023*

- Addressed the problem of producing high-resolution segmentation maps of agricultural fields from their low-resolution satellite imagery.
- Implemented Multi-frame super-resolution models, PIUNet and SPINet, for various use-cases: a) Image super-resolution b) Super-resolved Semantic segmentation c) Super-resolved Instance segmentation.
- Demonstrated the effectiveness of using multi-temporal low-resolution imagery over single low-resolution image for super-resolved instance segmentation, by improving the InstanceIoU from 0.26 to 0.47 (80% improvement).

*Mentor: **Dr. Varun Jampani***

- Addressed the problem of swapping objects in a given scene image by a user-specified subject image.
- Prototyped a method based on Stable Diffusion that can store the pose information of the object in the scene image, without the need to retrain the model. The method only modifies the inference stage of the diffusion model to transfer the pose into the identity of the object as defined in the subject image.

Thesis

Landmark Estimation and Image Synthesis Guidance using Self-Supervised Networks
Advisor: Prof. R. Venkatesh Babu

- Proposed techniques to leverage pretrained networks trained using Self-Supervised Learning (SSL) on large data to improve performance on discriminative (landmark estimation) and generative (image synthesis) tasks.
- Discovered the emergence of correspondence tracking property in SSL networks and used it to solve few-shot landmark estimation. [WACV 2022]
- Identified the correlation between problem of unnatural image generation in StyleGAN and their PPL scores. Proposed distilling intermediate features from SSL networks into the generator to improve the naturalness. This led to 16% improvement on PPL score across datasets. [ECCV 2022]

Publications

Conference Papers

- *Hierarchical Semantic Regularization of Latent Spaces in StyleGANs*
  Karmali T. , Parihar R., Agrawal S., Rangwani H., Jampani V., Singh M., Babu R.V.
  Published at the 17th European Conference on Computer Vision (**ECCV 2022**)

- *LEAD: Self-Supervised Landmark Estimation by Aligning Distributions of Feature Similarity*
  Karmali T.* , Atrishi A.*, Harsha S.S., Agrawal S., Jampani V., Babu R.V.
  Published at the 2022 IEEE/CVF Winter Conference on Applications of Computer Vision (**WACV 2022**)

- *NoisyTwins: Class-Consistent and Diverse Image Generation Through StyleGANs*
  Rangwani H.*, Bansal L.*, Sharma K., **Karmali T.** , Jampani V., Babu R.V.
  Published at the IEEE/CVF Conference on Computer Vision and Pattern Recognition, 2023 (**CVPR 2023**)

- *Improving GANs for Long-Tailed Data Through Group Spectral Regularization*
  Rangwani H., Jaswani N., **Karmali T.** , Jampani V., Babu R.V.
  Published at the 17th European Conference on Computer Vision (**ECCV 2022**)

- *Everything is There in Latent Space: Attribute Editing and Attribute Style Manipulation by StyleGAN Latent Space Exploration*
  Parihar R., Dhiman A., **Karmali T.** , Babu R.V.
  Published at the 30th ACM International Conference on Multimedia (**ACM MM 2022**)

- *Deep Implicit Surface Point Prediction Networks*
  Venkatesh R., **Karmali T.** , Sharma S., Ghosh A., Babu R.V., Jeni L., Singh M.
  Published at the 2021 IEEE/CVF International Conference on Computer Vision (**ICCV 2021**)

Workshop Papers

- *Fashionable Modelling with Flux*
  Innes M., Saba E., Fischer K., Gandhi D., Rudilosso M.C., Joy N.M., **Karmali T.** , Pal A., Shah V.; **SysML at NeurIPS 2018**

Awards, Grants, & Honours

Facebook AI Research International Scholarship for **DPhil** at **Oxford University** (declined) 2023
Selected for **International Computer Vision Summer School (ICVSS)** at Milan, Italy 2023
Outstanding Reviewer at **CVPR** 2022
Travel grant for presenting poster at **JuliaCon** in London, UK 2018
2x **Google Summer of Code** recipient 2018-2019

Select Projects

Duckietown.jl (as part of JuliaLang in **Google Summer of Code**) *May 2019 - Aug 2019*

- Developed a differentiable self-driving car simulator to train driving agent via differentiable programming.

AlphaGo.jl (as part of NumFOCUS in **Google Summer of Code**) *May 2018 - Aug 2018*

- Developed a Julia package to train and play zero-sum board games using Alpha(Go)Zero algorithm.

Academic Service & Volunteering

Reviewer	CVPR 2024, ICLR 2024, NeurIPS 2023, CVPR 2023, CVPR 2022, WACV 2022, SPCOM 2022
Volunteer	ICML 2020, NeurIPS 2020, IISc EECS Symposium 2021
Teaching	Tutorials on Computer Vision in IISc-TalentSprint Executive M.Tech. programs in Deep Learning
Mentorship	Undergraduate Interns at Video Analytics Lab, IISc

Skills

Languages and Tools	C++, Python, Julia, LaTeX, Git, Docker, Linux
Libraries and Softwares	Tensorflow, PyTorch, OpenCV, Diffusers