Research Statement

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As a graduate student in Computer Science at Northwestern University, I am postively seeking a research opportunity to further delve into the fields of computer vision, machine learning, and 3D graphics. My research interests primarily lie in unsupervised learning, 3D computer vision, and the application of deep learning in image and video processing.

Research Experience and Contributions

During undergraduate studies at CUHKSZ, I served as an Undergraduate Researcher in the Generation and Analysis of Pixels, Points, and Polygons (GAP) Lab. Contributions were made to projects on 3D cartoon face reconstruction and multi-style 3D face reconstruction, employing advanced 3D techniques such as 3D Morphable Models (3DMM), UV maps, generative adversarial networks, and differentiable renderers to achieve state-of-the-art results in 2D landmark and color difference metrics. Efforts culminated in a paper submitted to the IEEE Transactions on Visualization and Computer Graphics (TVCG), where I served as the secondary author. Significant contributions were made to the algorithm and experiments design for 3D reconstruction, with independent implementation of the majority of the reconstruction algorithm, demonstrating practical abilities in the field.

Currently, as a Graduate Researcher in the Image & Video Processing Lab (IVPL) at Northwestern University, I am leading a project focused on the unsupervised clustering of gravitational wave glitches captured by The Laser Interferometer Gravitational-Wave Observatory (LIGO). The project involves developing a novel four-branch autoencoder that integrates Convolutional Neural Networks (CNN) and Vision Transformers (ViT) to extract both global and local features from glitches across different time window durations. The aim is to advance the understanding of gravitational waves and contribute to the field of astrophysics. The role as the first author on a paper accepted by the IEEE/CVF Computer Society Conference on Computer Vision and Pattern Recognition Workshops (CVPRW) underscores the capacity to manage and execute the entire project successfully.

Future Research Goals

Looking ahead, I am eager to continue my exploration of unsupervised learning techniques for image and video analysis, with a focus on developing algorithms that can effectively leverage the vast amounts of unlabeled data available in these domains. I am also interested in furthering my work in 3D computer vision, particularly in the areas of 3D reconstruction and 3D object recognition.

Conclusion

My research journey so far has been a blend of exploration, learning, and innovation. With a strong foundation in computer science, a passion for computer vision and machine learning, and a commitment to excellence, I am eager to continue contributing to the field through research and collaborations.