Research Statement

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The paramount step in creating Artificial Intelligence is to teach computers to understand our world as intuitively as humans do. This dream is rapidly transforming into reality with the advancements in Computer Vision (CV), Machine Learning (ML), Natural Language Processing (NLP) and Computer Graphics, and in some cases outperforming human capabilities. It is my dream to be an integral part of this change.

I am passionate about building intelligent machines that can reason and understand the natural world and create products that work, are built on novel techniques (for some people this may be indistinguishable from magic) and aids artists and novice users in their creative endeavors.. I want to develop products that make the world a better place and bring joy to the users.

My interests lie in the intersection of **Computer Vision, Computer Graphics and Deep Learning**.

• I wish to tackle problems on the theoretical realm specifically generative models (primarily GANs), unsupervised learning (specifically disentangled representation learning), geometric deep learning, learning shape and texture representation of 3d data, discrete differential geometry

• and in the applied realm specifically building parametric models for shape estimation, 3D reconstruction, differentiable rendering, neural rendering, PBR, image-based modelling and rendering, style transfer, vision as inverse graphics and AI for creative content.

In the past I worked on problems in 3D reconstruction of geometry and appearance from image(s), ranging from using interactive methods backed up by classical constrained optimization techniques to using differentiable path tracing to estimate shape and SVBRDF.

Currently I am working on two broad problems:

1) single view portrait re-lighting, where the challenge is to use neural nets to estimate the lighting parameters in the scene, 3D face morphable model coefficients and explicitly decompose the portrait into the deferred shading components in order to enable unconstrained image editing.

2) learning texture representations: learn high quality textures for conditional texture reconstruction of 3D objects and enable learning of probabilistic generative models for texturing unseen 3D models.

Given the alignment of my research and engineering intestersts with the problems being solved and products being built at Snap, I believe Snap is the right place for me to pursue my dreams. I am also excited to be part of a collaborative environment where researchers, engineers, designers and artists from various backgrounds work together to solve challenging problems.

It would be an honour for me to be able to work with a team at Snap for the Summer of 2021. My experience and skill set developed over the years (*detailed in my resume*) makes me confident to take up this challenge.