

# Learning Neural Orientation Field for Volumetric Hair Reconstruction

Computer Vision Project Proposal

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## 1 Introduction

Reconstructing human hair is one of the most challenging yet critical process in rendering photorealistic digital human. Unlike other parts of the human body, human hair is highly detailed and often intertwined together. Therefore, it's difficult to use traditional photogrammetry method to reconstruct its structure.

Before machine learning is used in this field, artists often hand crafted splines on skulls to represent hair strands. Each strand is then textured and rendered to mimic the hair volume. This workflow requires a lot of experience as it's non-trivial for artists to infer the final render result from hair stand splines. To reduce the workload and improve the accuracy of hair reconstruction, machine learning models are used to generate hair strand from captured photos.

## 2 Related Work

Previous attempt to achieve this goal mainly focus on learning based hair strand generation. This includes some studies about single view hair synthesis [2, 4, 3, 1].

## 3 Method

## 4 Experiment

## References

- [1] Chongyang Ma. "Single-View Hair Modeling Using A Hairstyle Database". In: ().

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- [3] Keyu Wu et al. “NeuralHdHair: Automatic High-fidelity Hair Modeling from a Single Image Using Implicit Neural Representations”. In: *2022 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*. 2022 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR). New Orleans, LA, USA: IEEE, June 2022, pp. 1516–1525. ISBN: 978-1-66546-946-3. DOI: 10.1109/CVPR52688.2022.00158. URL: <https://ieeexplore.ieee.org/document/9878513/> (visited on 10/06/2024).
- [4] Yujian Zheng et al. *HairStep: Transfer Synthetic to Real Using Strand and Depth Maps for Single-View 3D Hair Modeling*. Mar. 23, 2023. DOI: 10.48550/arXiv.2303.02700. arXiv: 2303.02700[cs]. URL: <http://arxiv.org/abs/2303.02700> (visited on 10/06/2024).