
3D Vision Summer School

IIIT Hyderabad

Link to Presentation

<https://tinyurl.com/5d78ry78>

Learning Implicit Functions

— (PIFu & PIFu-HD) —

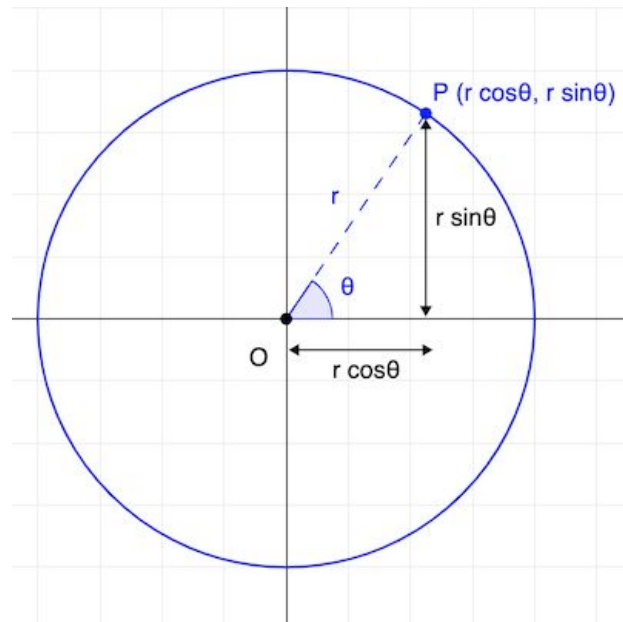
Implicit Function : Overview

Parametric Equation of a circle:

$$x = r \cos \theta$$

$$y = r \sin \theta$$

Ideal for sampling points or generating the curve (circle).

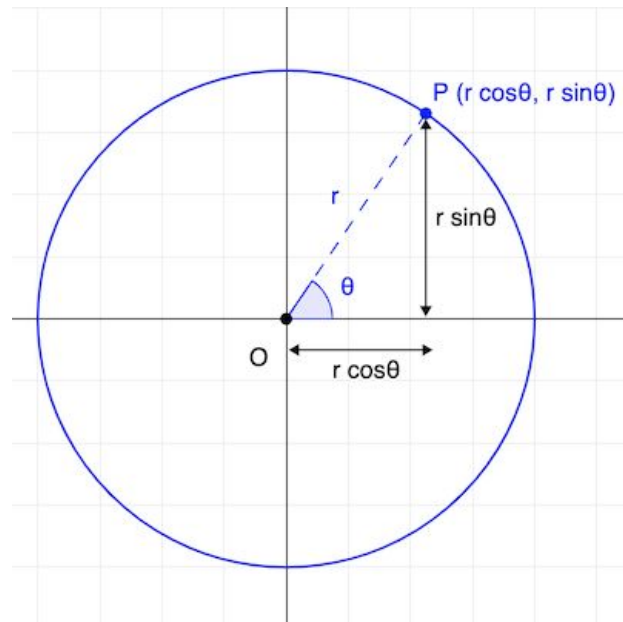


Implicit Function : Overview

Non-Parametric/ Implicit Equation of a circle :

$$x^2 + y^2 - r^2 = 0$$

Ideal for querying whether a given point (x,y) belongs to the circle or not.

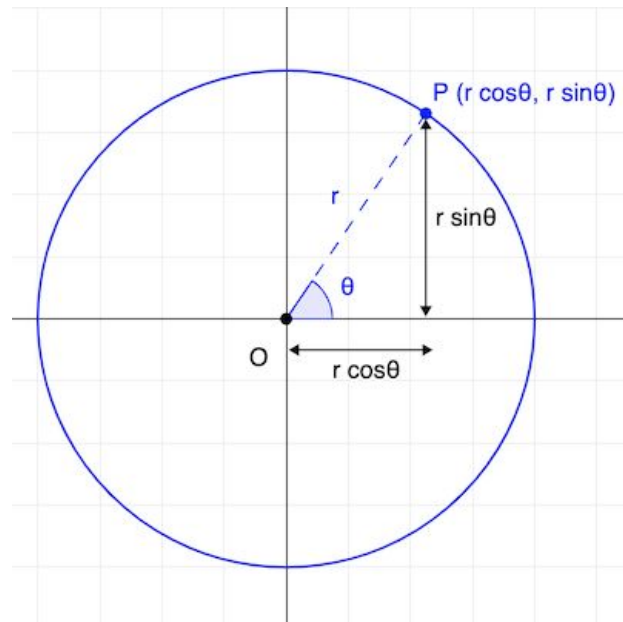


Implicit Function : Overview

Implicit Function:

$$f(x,y) = x^2 + y^2 - r^2$$

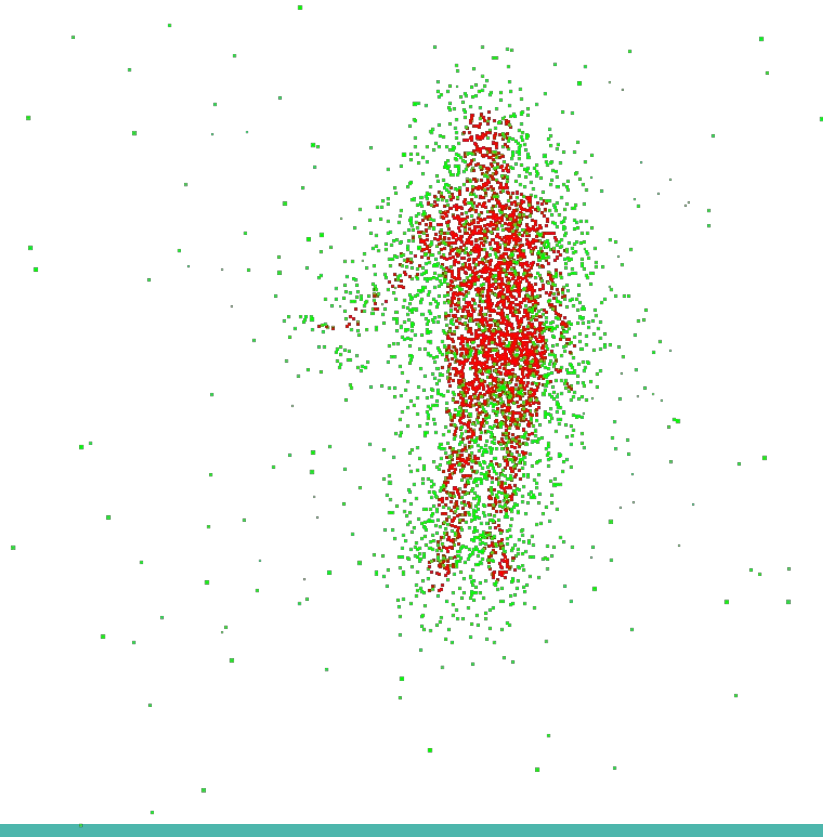
$f(x,y) = 0$ represents the boundary of the circle.



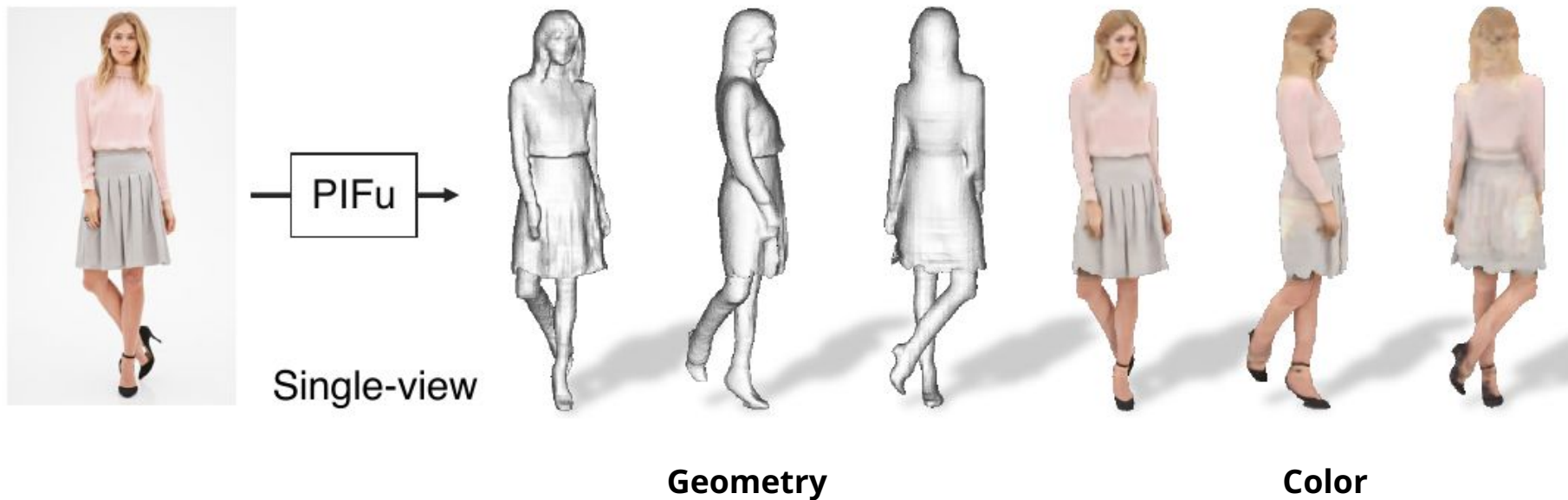
Implicit Function : Overview

Level Sets : https://mathinsight.org/level_sets

Implicit Function : Overview



PIFu: Pixel-Aligned Implicit Function for High-Resolution Clothed Human Digitization

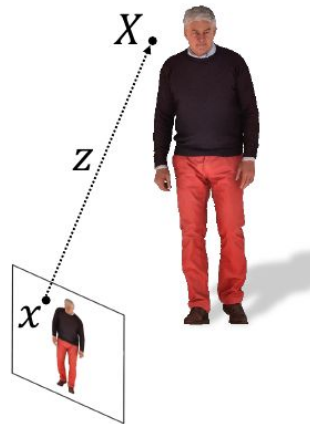
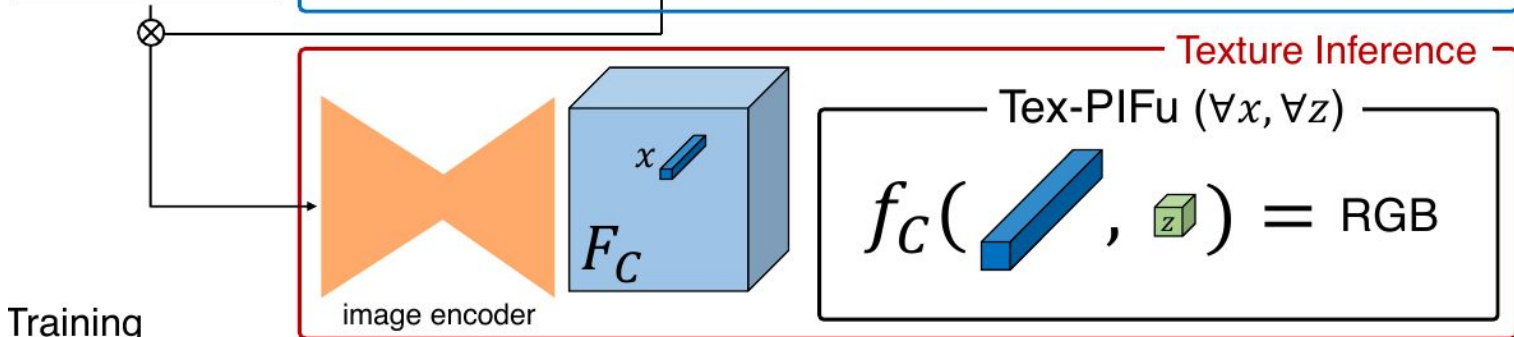
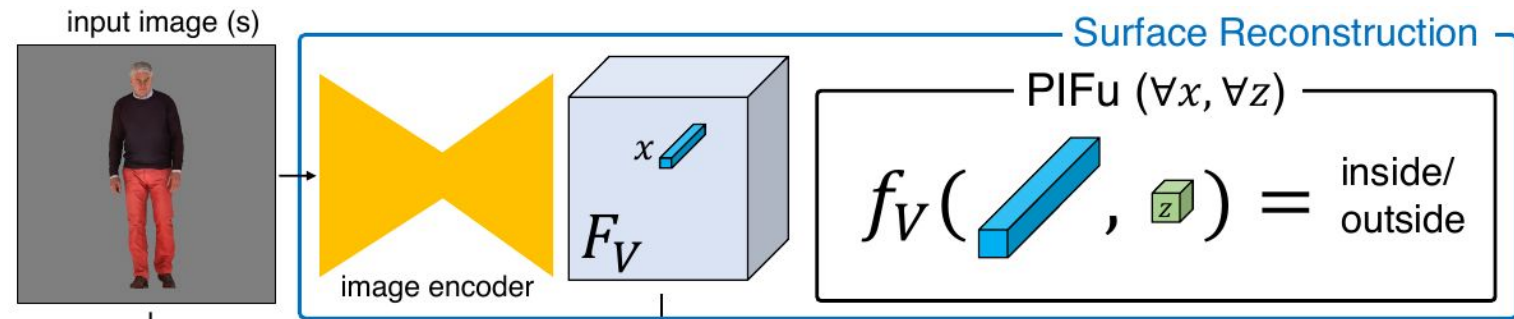


Link to PIFu Notebook

<https://tinyurl.com/y3cremhx>

Architecture

Geometry Module

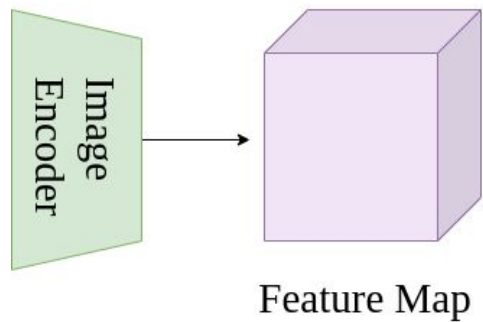


Data Generation

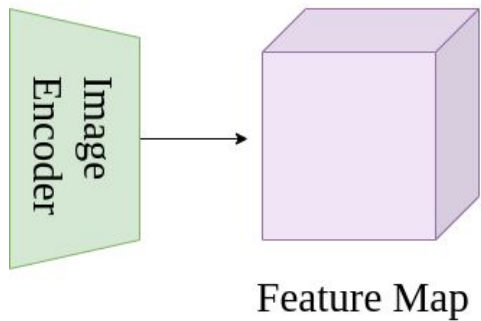
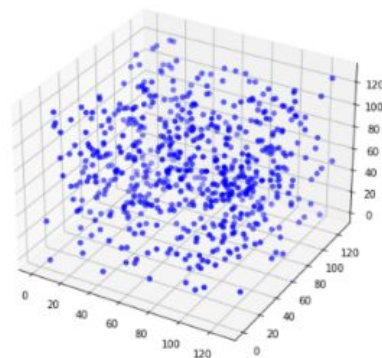
Input for preprocessing:

- Mesh
- Texture map
- Material file

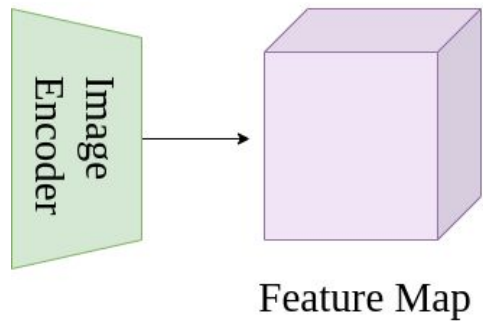
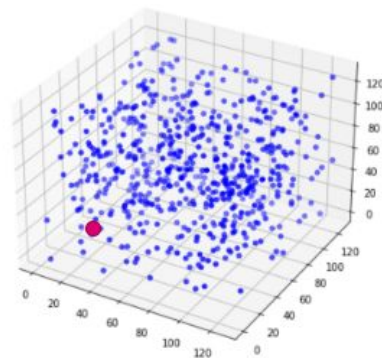
Geometry Module



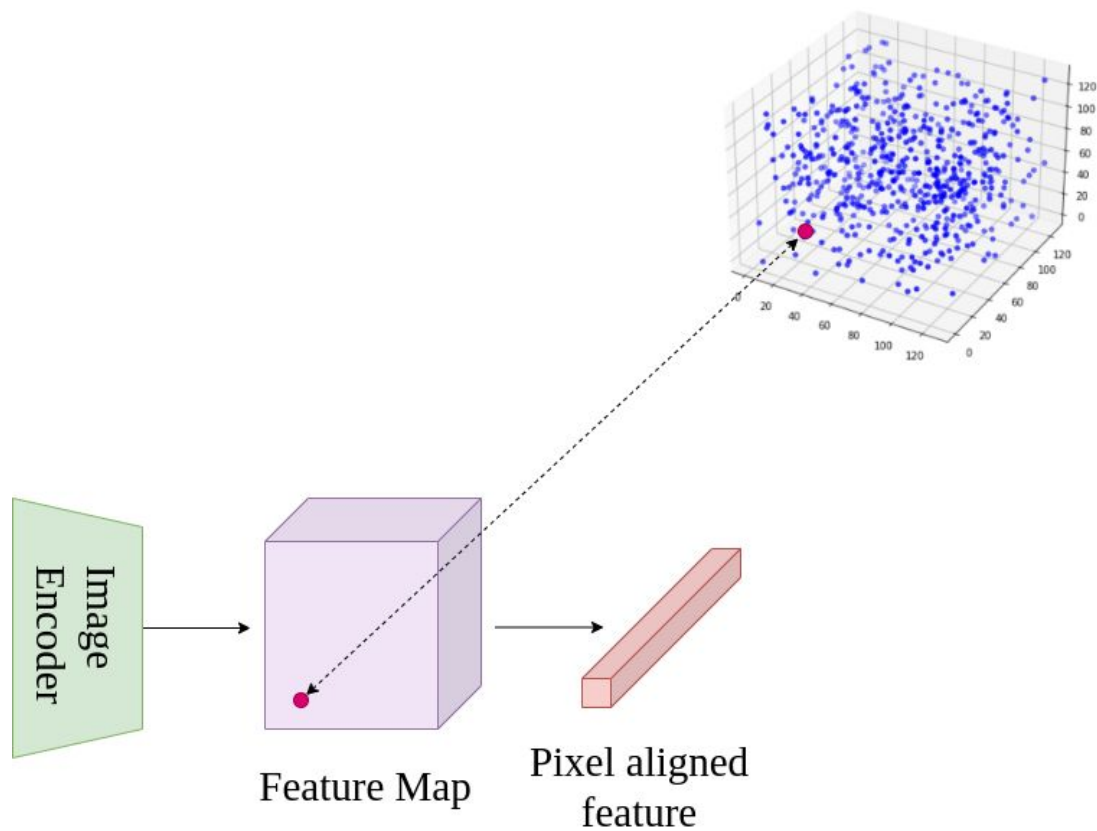
Geometry Module



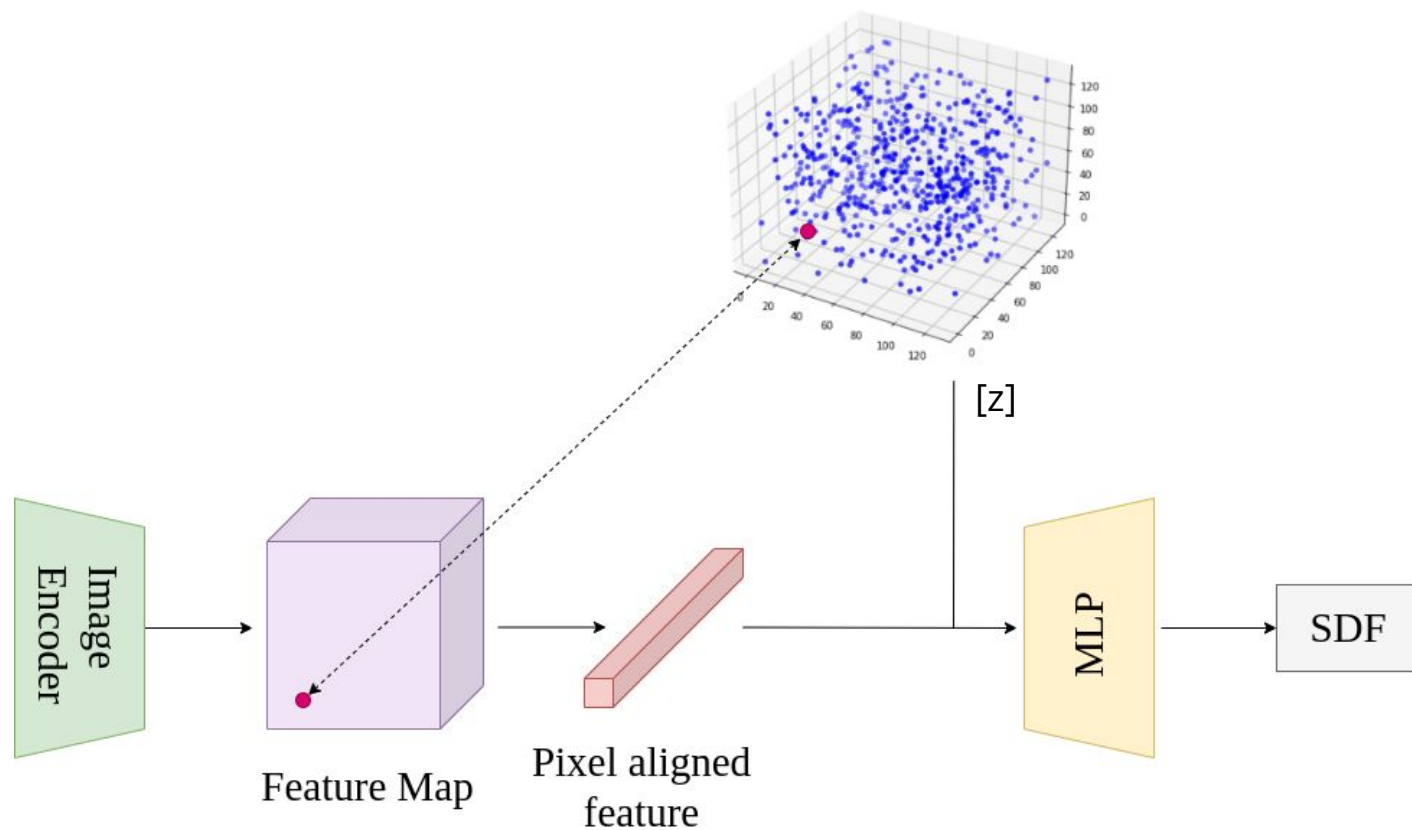
Geometry Module



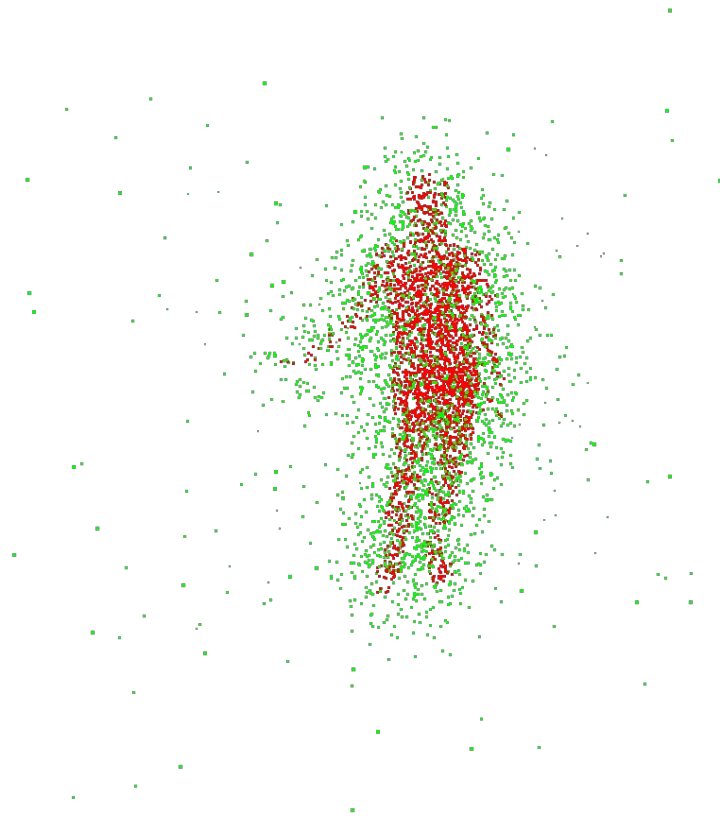
Geometry Module



Geometry Module



Point Sampling



PIFuHD: Multi-Level Pixel-Aligned Implicit Function for High-Resolution 3D Human Digitization*

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Jason Saragih²

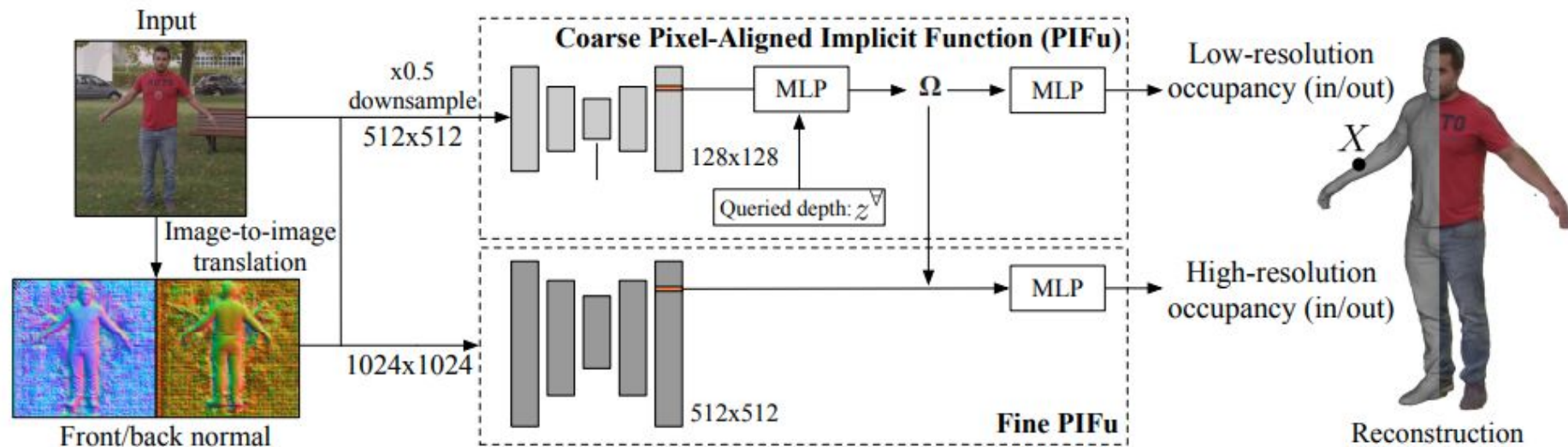
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$$f^L(\mathbf{X}) = g^L(\Phi^L(\mathbf{x}_L, \mathbf{I}_L, \mathbf{F}_L, \mathbf{B}_L,), Z)$$

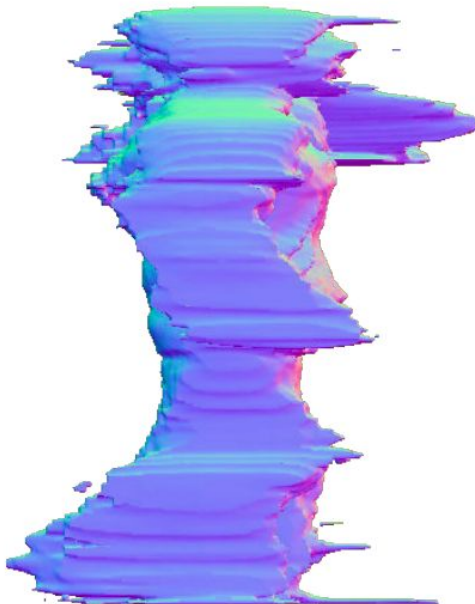
$$f^H(\mathbf{X}) = g^H(\Phi^H(\mathbf{x}_H, \mathbf{I}_H, \mathbf{F}_H, \mathbf{B}_H,), \Omega(\mathbf{X}))$$



(a) Input



Front



Side

(b) Sliding window wo/ 3D context



Front



Side

(c) Sliding window w/ 3D context



(a) Input



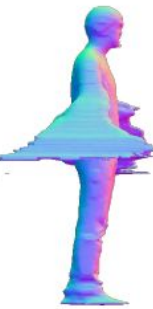
(b) Fine module only



(c) Fine module + Global image feature



(d) Single-level PIFu



(e) Multi-level PIFu

<https://www.youtube.com/watch?v=uEDqCxxvF5yc&t=257s>

Any Questions ?

