

Idea

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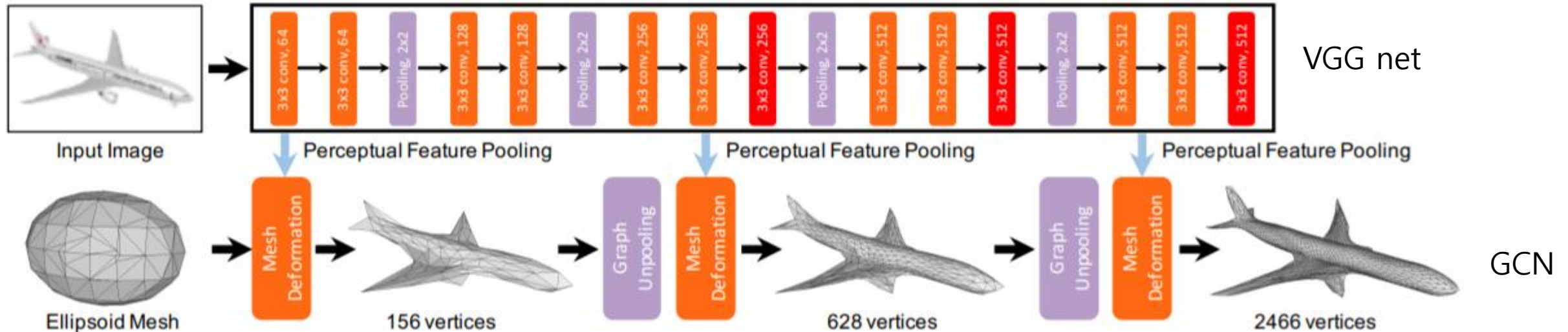
- Local image feature mapping
 - Dense pose
- Discriminator loss for each vertex
 - Angle
 - Edge length

Index

- Pixel2Mesh: Generating 3D Mesh Models from Single RGB Images
- Pose2Mesh: Graph Convolution Network for 3D Human pose and Mesh Recovery from a 2D Human Pose
- Graph Convolutional Adversarial Network for Human Body Pose and Mesh Estimation
- Semantic Graph Convolutional Networks for 3D Human Pose Regression

Pixel2Mesh

concatenate feature extracted from layer 'conv3_3', 'conv4_3', and 'conv5_3'

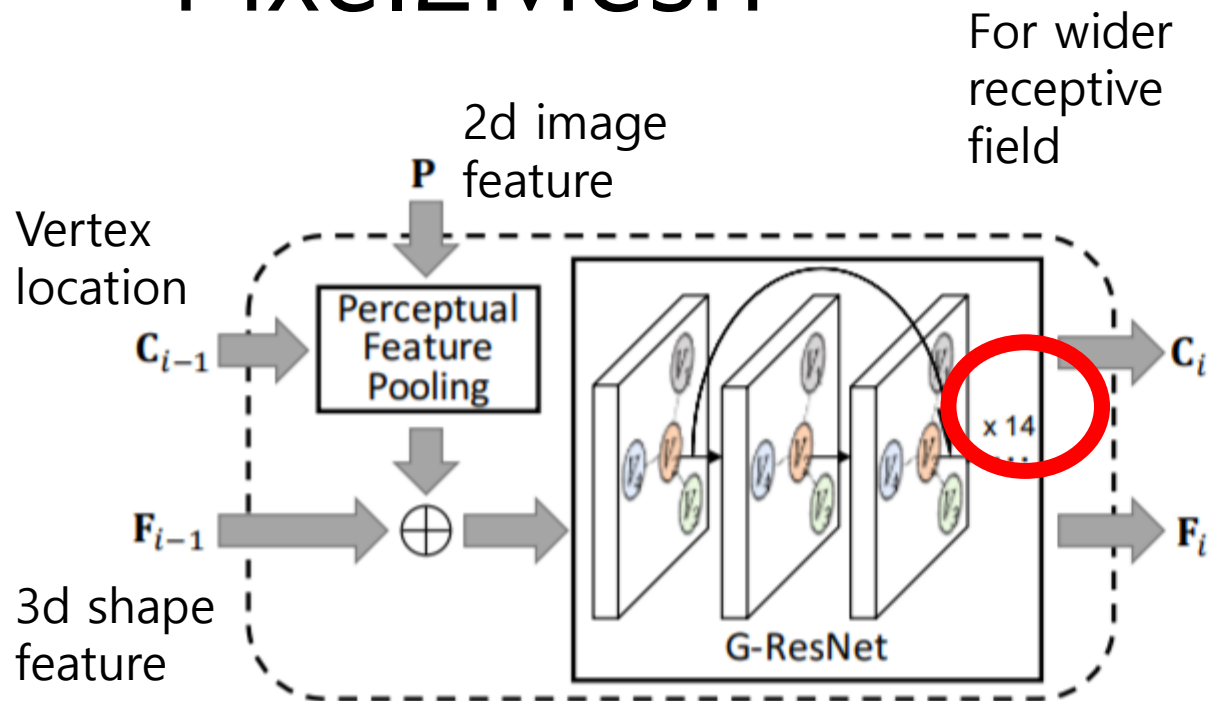


- Model learns to deform a mesh from a mean shape (Ellipsoid) to the target geometry.

Pixel2Mesh

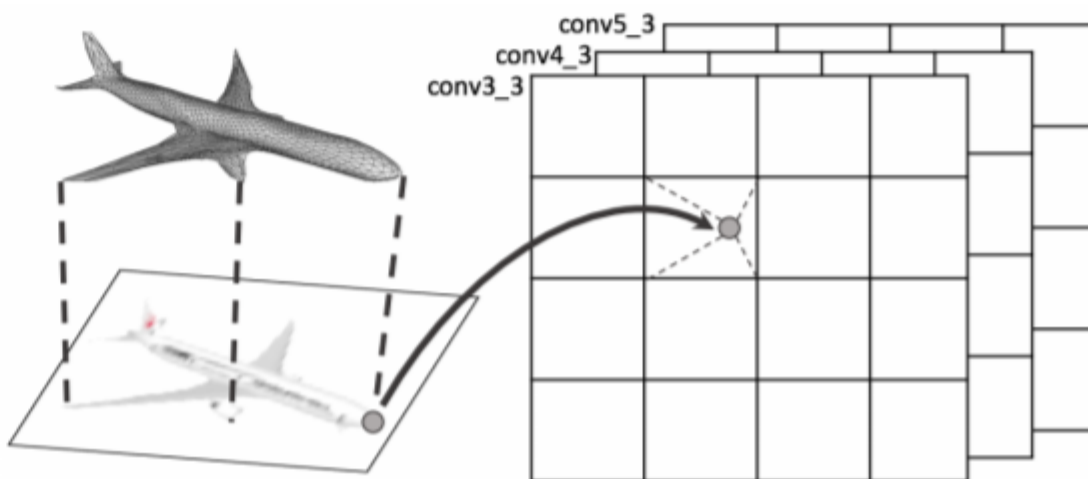
- Network trained to directly predict mesh with a large number of vertices is likely to make mistake in the beginning and hard to fix later (limited receptive field)
- With fewer vertices at the beginning stages, the network learns to distribute the vertices around to the most representative location, and then add local details as the number of vertices increases later

Pixel2Mesh



(a) Mesh Deformation Block

Known camera parameter



(b) Perceptual Feature Pooling

$$f_p^{l+1} = w_0 f_p^l + \sum_{q \in \mathcal{N}(p)} w_1 f_q^l$$

Pixel2Mesh

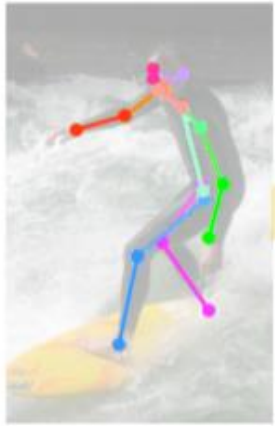
- **coarse to fine structure**
- How to map the image features to hidden surface?
- 3d shape feature is dependent on a location
- There is no semantic information on vertices during training.

Pose to mesh

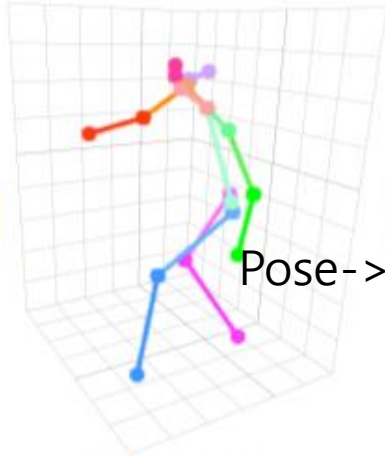
- appearance domain gap problem
- It avoids representation issues of the model parameters and leverages the pre-defined mesh topology

Pose to mesh

PoseNet



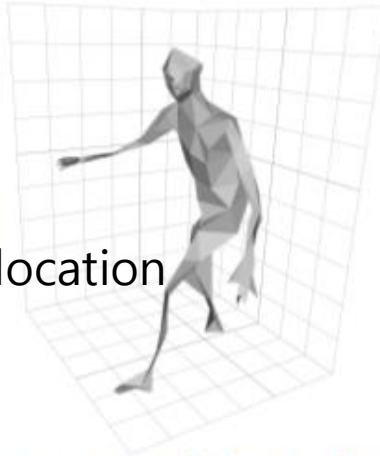
2D pose



3D pose

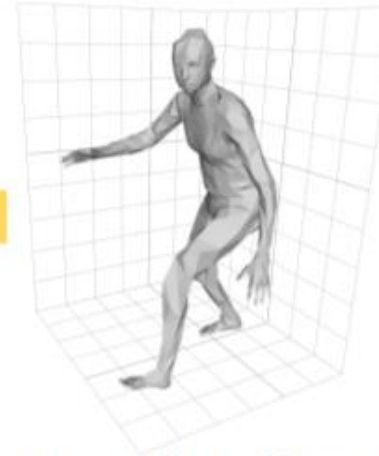
FC
Pose->mesh location

MeshNet



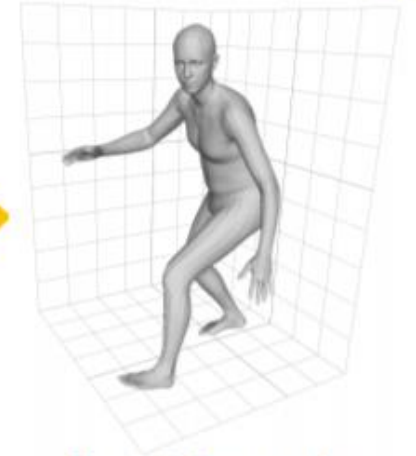
coarse 3D mesh

GCN



intermediate 3D mesh

GCN

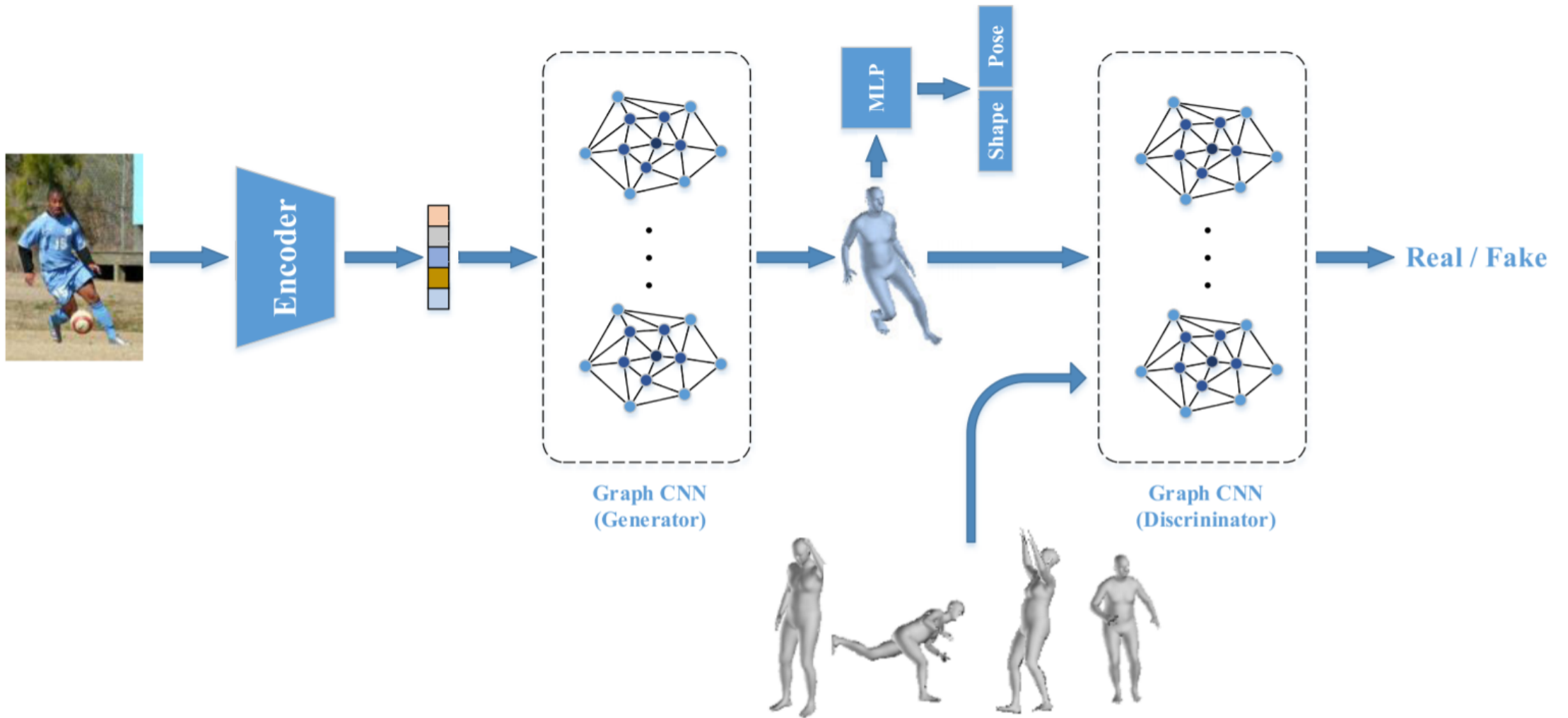


fine 3D mesh

Pose to mesh

- Only use pose information
- Vertex have semantic information since their location are regressed from FC layer. (i.e. they are regressed from their own weights.)
- Interpenetration can be prevented by applying discriminator error on 3d pose or coarse 3D mesh

Graph Convolutional Adversarial Network for Human Body Pose and Mesh Estimation



Semantic info binding

Before training

- Hard to use local image feature
- Easy to use discriminator
- Good for fine tuning

After training

- More flexible
- Good for global registration

table

Semantic info binding Coarse to fine	Before training	After training
O	Pose2Mesh	Pixel2Mesh
X	GraphHMR	