DensePose

...

What is DensePose

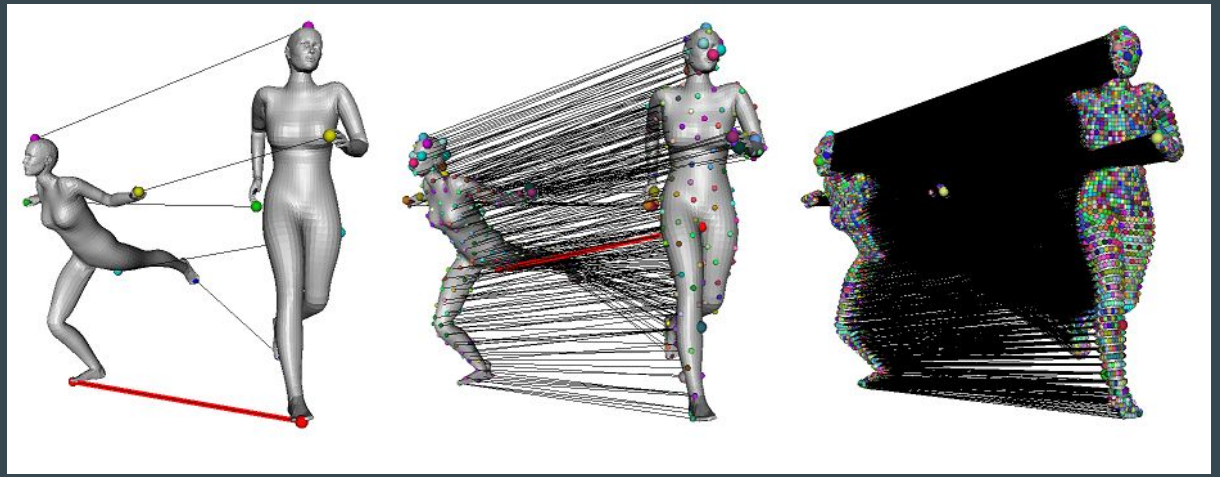
Facebook

3D surface-based representation

COCO-DensePose

Definition

Dense correspondence



DensePose

Establish dense correspondence from a 2d image to a 3d surface-based representation of the human body

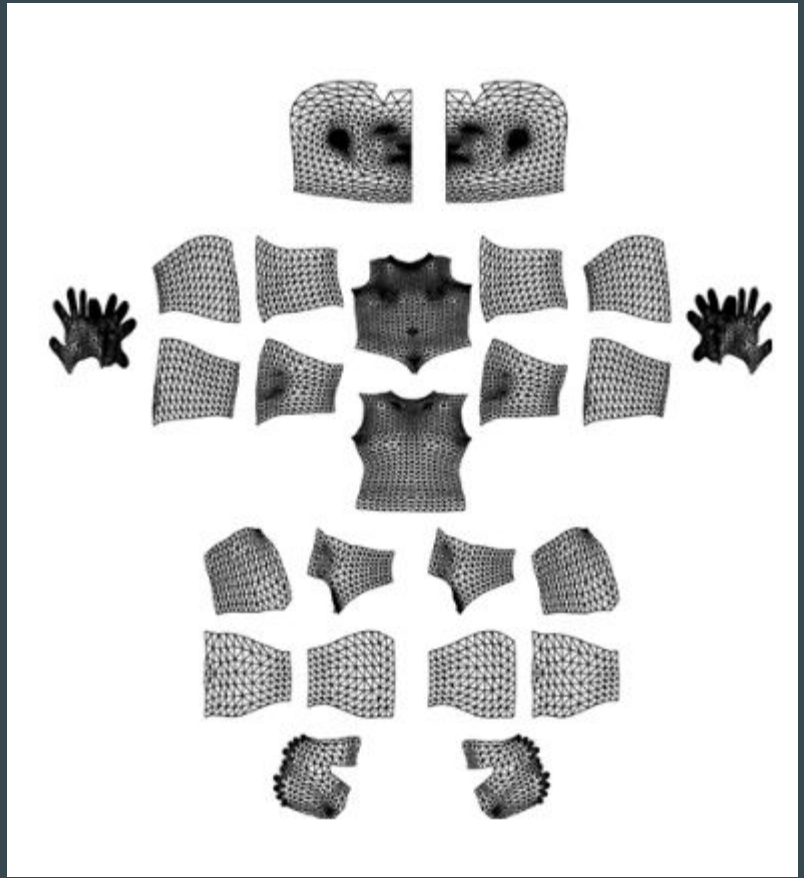
Annotation

COCO- DensePose dataset

Manual annotating 3d models

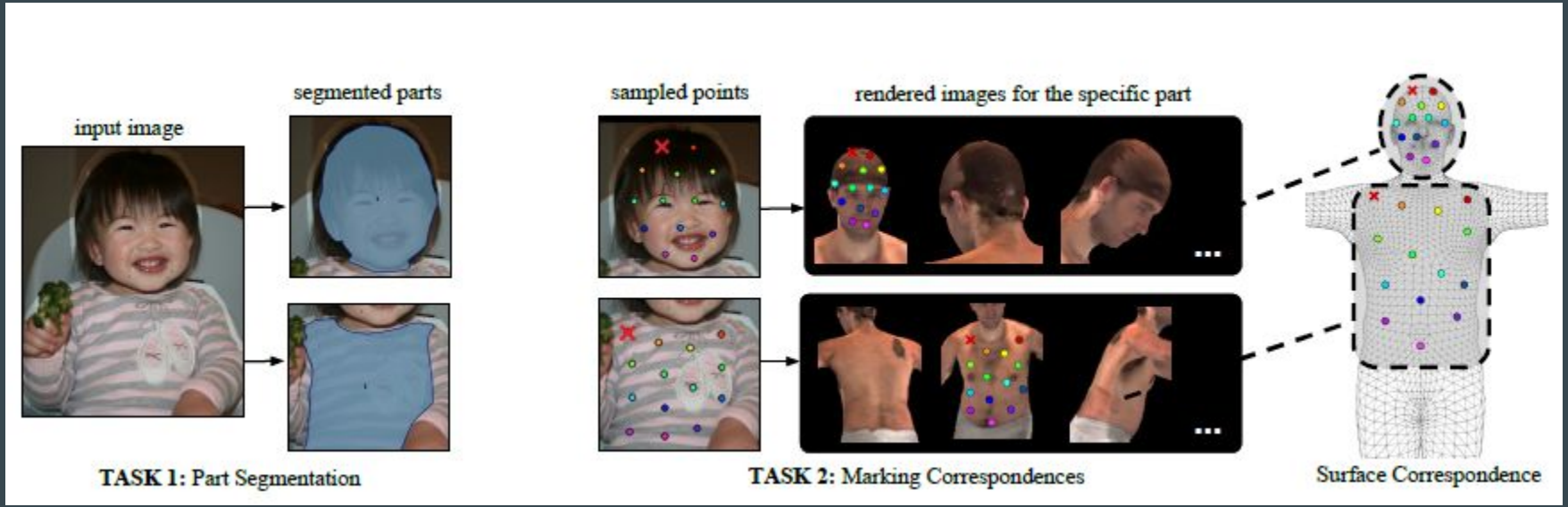
Each pixel - unique surface coordinate

50 000



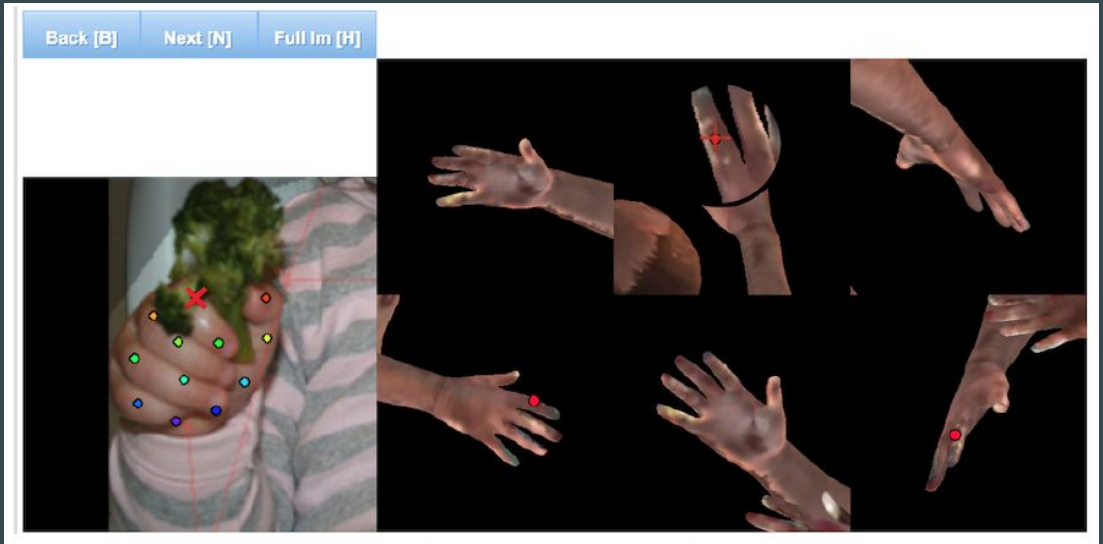
Annotation

From 2d to 3d



Annotation

Six pre-rendered views of the same body part



Annotation

$$d_{i,k} = g(i, \hat{i}_k),$$

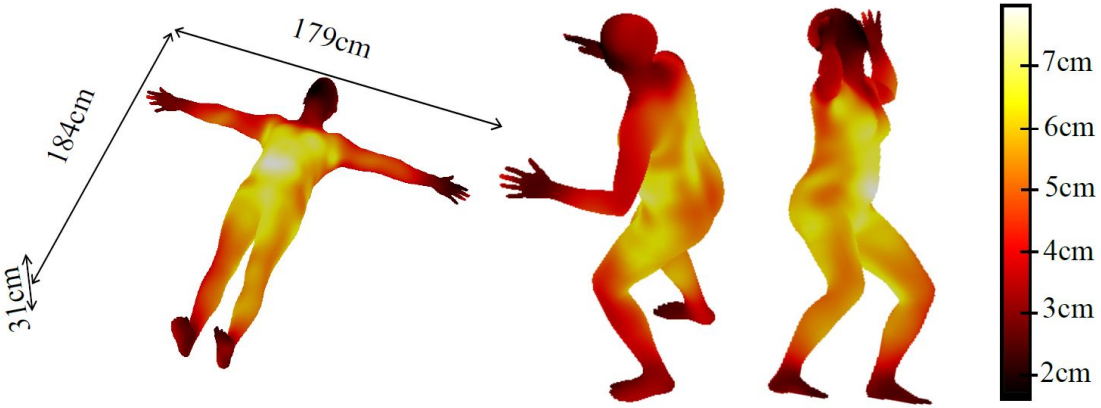
Pointwise evaluation

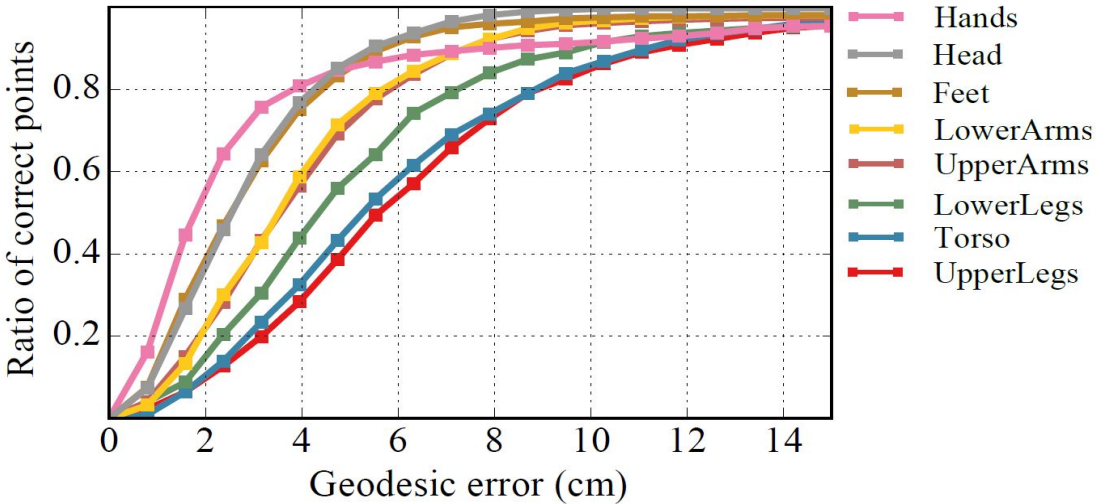
- Ratio of correct point
- AUC

Per-instance evaluation

- Geodesic point similarity

$$\text{GPS}_j = \frac{1}{|P_j|} \sum_{p \in P_j} \exp\left(\frac{-g(i_p, \hat{i}_p)^2}{2\kappa^2}\right)$$

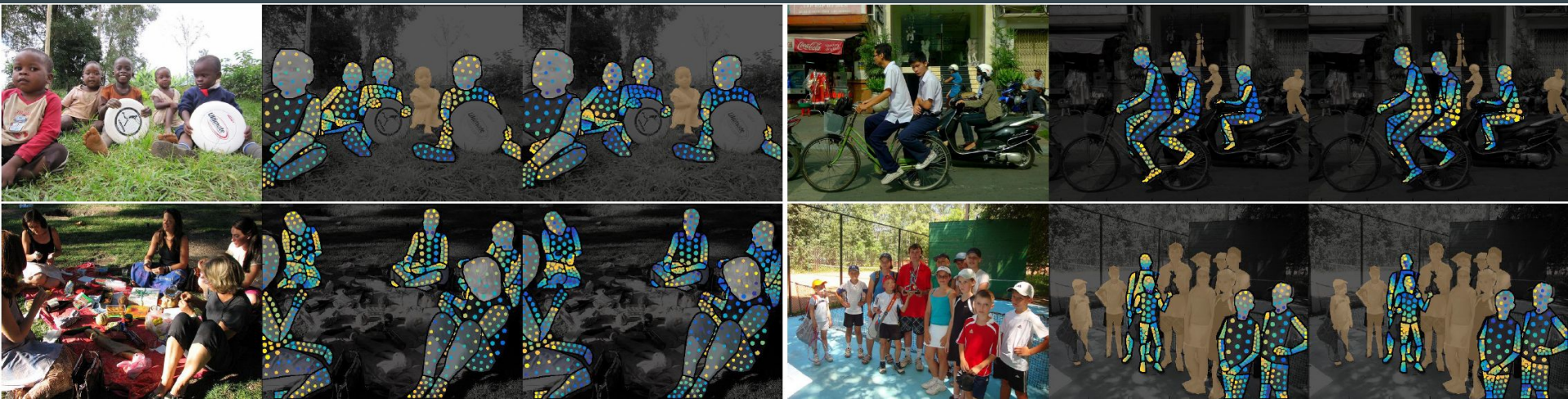


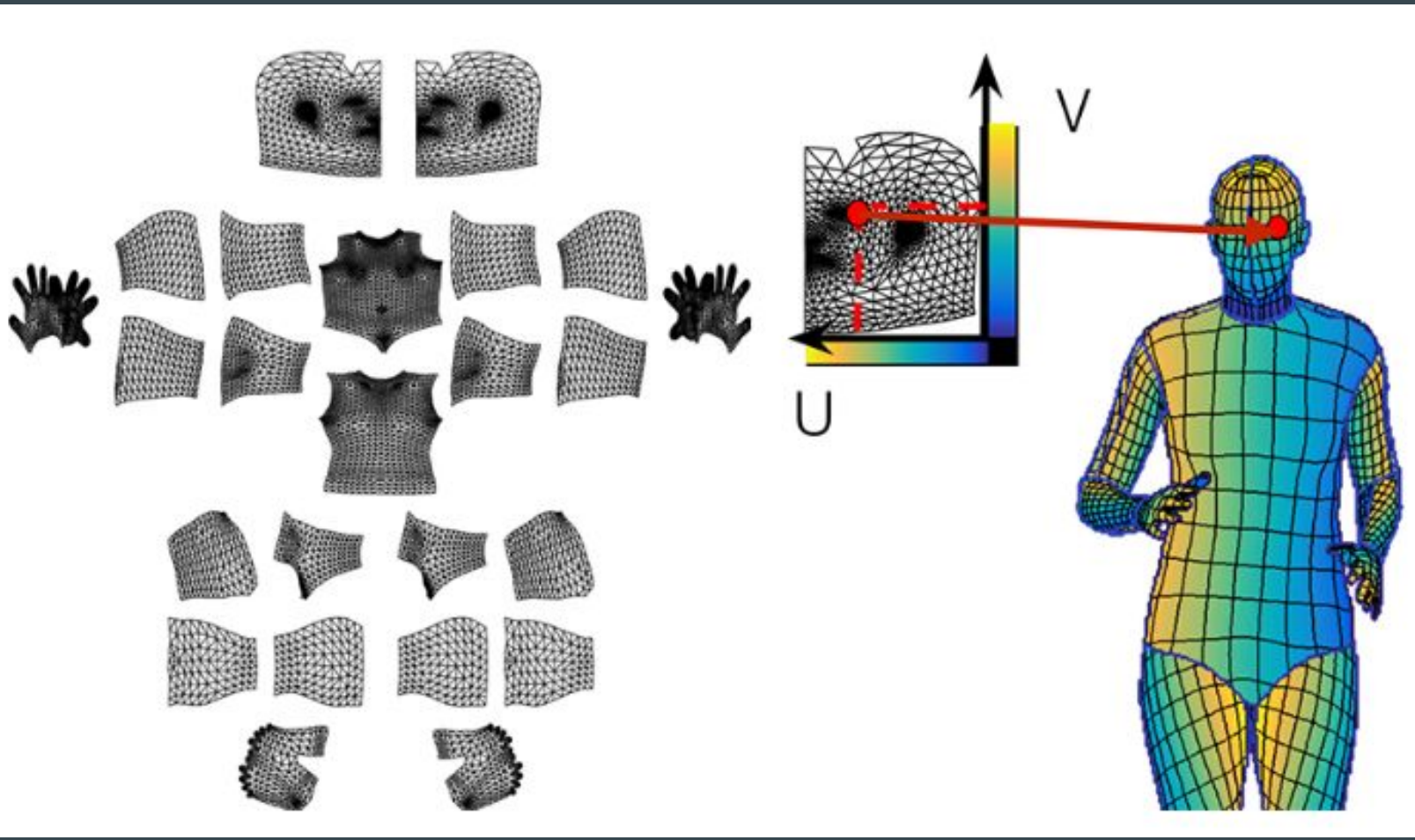


Annotation

Visualization of the annotation

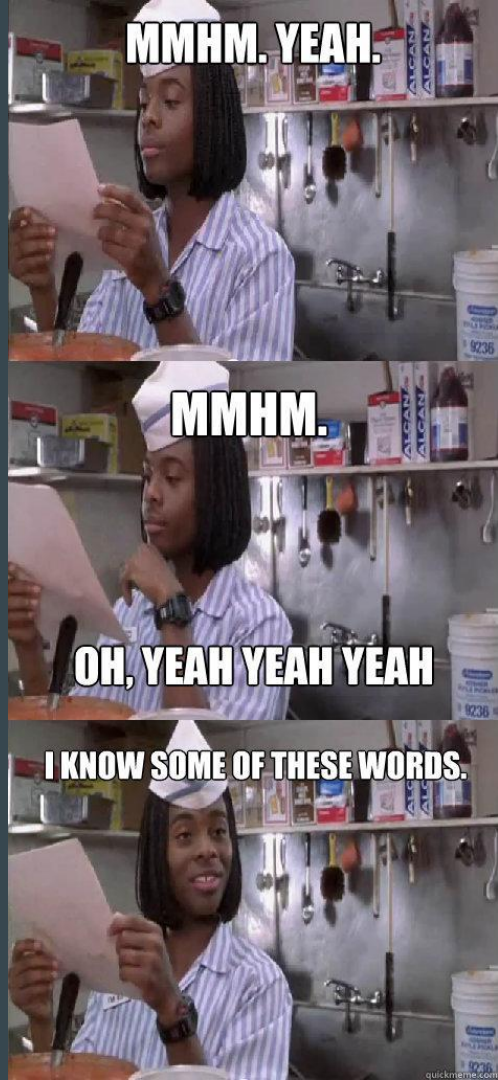
Image - U representation - V representation



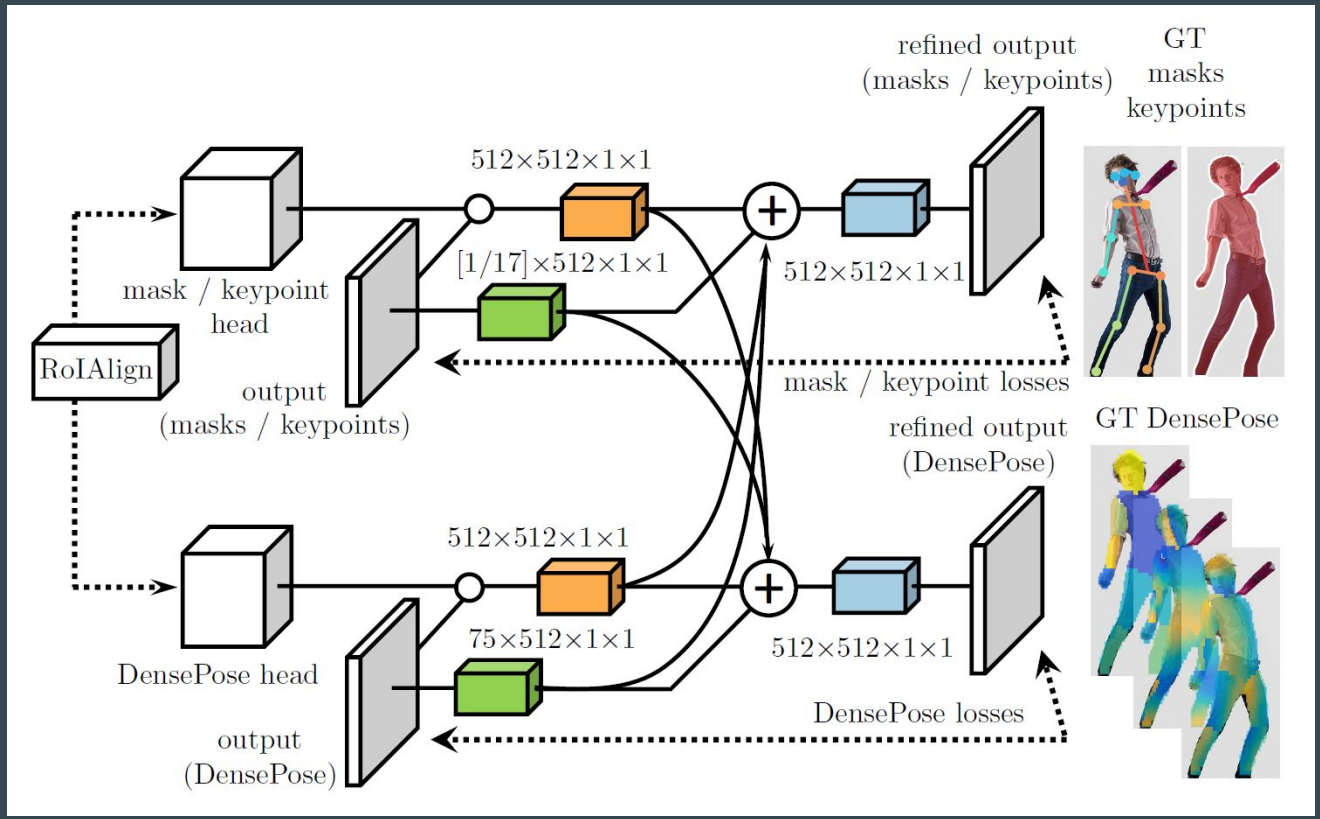

V
U

Model

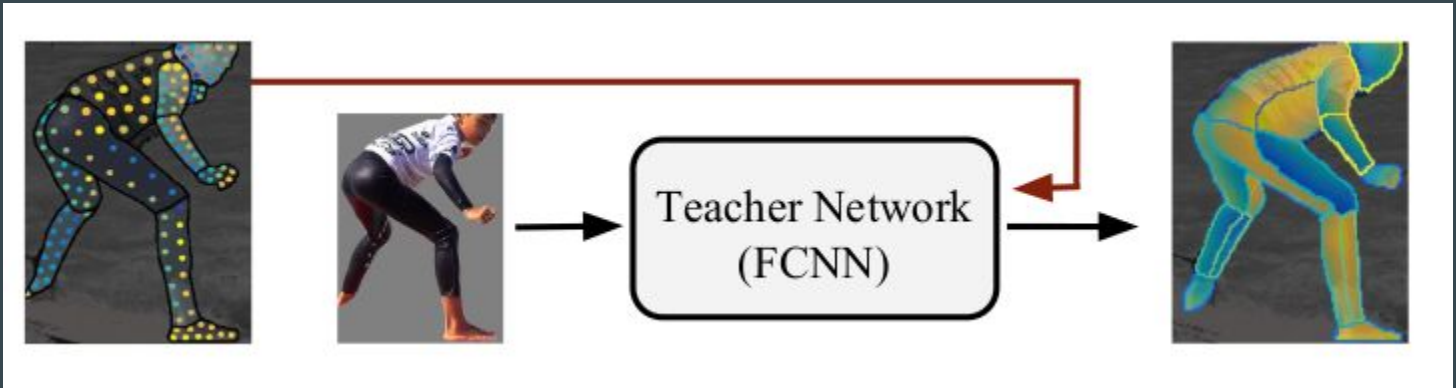
- Fully convolutional network
  - One network to rule them all.
- Region-based Dense Pose Regression
  - Based on Mask-RCNN
- Multi-task cascaded architectures
- Distillation-based ground-truth interpolation



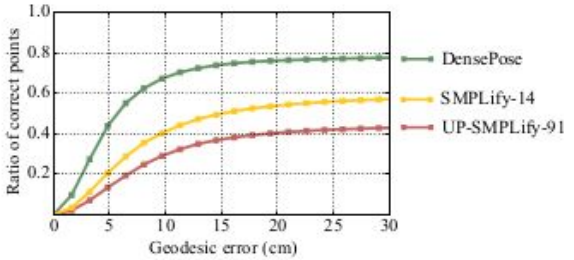
Multi-task cascaded architectures

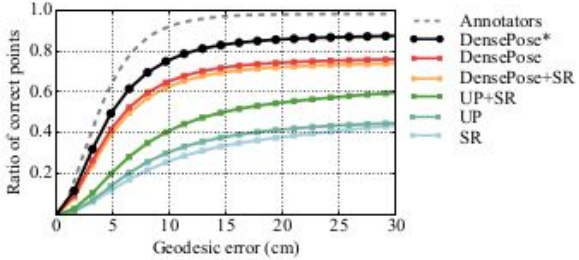


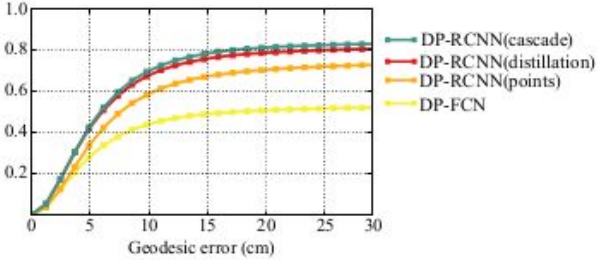
Distillation-based ground-truth interpolation



Results


Ratio of correct points
Geodesic error (cm)
DensePose
SMPLify-14
UP-SMPLify-91


Ratio of correct points
Geodesic error (cm)
Annotators
DensePose*
DensePose
DensePose+SR
UP+SR
UP
SR


Geodesic error (cm)
DP-RCNN(cascade)
DP-RCNN(distillation)
DP-RCNN(points)
DP-FCN