SIZER: A Dataset and Model for Parsing 3D Clothing and Learning Size Sensitive 3D Clothing
Supplementary

Garvita Tiwari[1], Bharat Lal Bhatnagar[1], Tony Tung[2], and Gerard Pons-Moll[1]

[1] MPI for Informatics, Saarland Informatics Campus, Germany
[2] Facebook Reality Labs, Sausalito, USA
{gtiwari,bbhatnag,gpons}@mpi-inf.mpg.de, tony.tung@fb.com

1 Experiments and Results

1.1 Variation in garment with size

As mentioned in the introduction, variation across different sizes can be very subtle, and hence it is difficult to visualize the changes in size. We report average error margin overall sizes in the main manuscript, here we present a detailed analysis of change in per-vertex location and surface area of garment meshes when going from one size to another in table 1 and table 2. This is calculated on ground truth data, to show how much variation in terms of scaling and fine details occur when we change garment sizes. We can see that the change is not uniform for all garments and even for a garment class, change from small to medium is different from small to large size. In the case of garments like pants, vests, etc, they are slim fit garments, hence the margin is relatively smaller.

Table 1: Average per-vertex difference from size A to size B for all garment classes (in mm).

Garment	S → M	S → L	M → L	M → XL	L → XL
Polo T-Shirt	29.07	43.49	29.61	36.23	28.19
T-Shirt	28.19	44.35	27.53	35.21	26.37
Shirt	32.66	44.27	32.23	43.24	30.59
Coat	32.52	47.38	30.43	53.17	33.66
Hoodies	36.02	49.22	34.67	47.35	33.21
Vest	25.20	42.62	26.50	53.42	29.72
Pants	29.08	35.33	28.89	35.87	25.52
Shorts	44.94	51.29	34.80	45.82	39.15
Shorts2	18.07	35.32	19.53	34.47	29.40

Table 2: Change in surface area from size A to B (in %).

Garment	S → M	S → L	M → L	M → XL	L → XL
Polo T-Shirt	17.83	35.34	16.06	33.11	15.38
T-Shirt	18.53	34.54	13.56	27.46	14.21
Shirt	16.44	29.69	11.37	24.26	15.42
Coat	12.68	26.33	14.33	24.46	13.67
Hoodies	14.57	23.95	8.82	23.46	12.45
Vest	14.02	21.62	7.31	21.09	12.85
Pants	12.83	18.56	11.18	21.87	11.26
Shorts	20.58	40.46	17.99	39.23	16.79
Shorts2	13.35	34.03	19.42	38.07	20.07

1.2 SizerNet on other garment classes

We also present the results of *SizerNet* for other garment classes like hoodies, coats, vests, T-shirts, etc. Figure 1 shows the resized garment for the given input mesh and the heatmap of change in per-vertex location with respect to the input(parsed) garments. From figure 1 we can see that the changes are prominent near the boundaries because of the length of garment changes(sleeve length and hem length). For garments like shorts, a T-shirt, hoodies we can see more change as compared to a shirt, coat, etc. This is because of the garment style(e.g. slim fit for coat and shirt) and hence does not vary much with changes in size. We add more results for new garment classes in figure 2.

Table 3: Average per vertex error (V_{err} in mm) and surface area(A_{err} in %) of predicted of proposed method for garment resizing for more garment classes.

Garment	Error-margin		Average-pred		Linear Scaling		Ours	
	V_{err}	A_{err}	V_{err}	A_{err}	V_{err}	A_{err}	V_{err}	A_{err}
Vest	35.46	15.41	25.81	2.98	29.63	7.37	16.03	1.84
Coat	39.43	18.29	23.13	3.16	43.64	9.93	15.37	1.75
Hoodies	40.09	16.65	26.39	4.74	41.42	8.78	15.89	1.46
T-Shirt	32.23	21.66	-	-	34.59	7.83	14.98	1.39
Shorts2	27.35	24.98	19.82	4.71	36.32	5.69	16.83	2.21

1.3 Draping Results

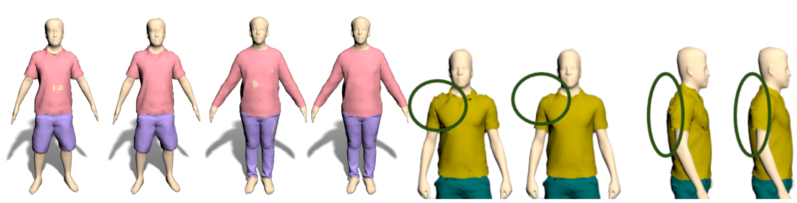
We can also drape a garment mesh on a body and change its shape. For this, we take garment mesh as input to SizerNet which is encoded (f_w^{enc}) into lower-dimensional latent vector and we append β of a new body and input and desired size labels ($\delta_{\text{in}}, \delta_{\text{out}}$) in the latent space. The decoder (f_w^{dec})) then predicts displacement from garment template and drape the input garment mesh on this new body. Figure 4 shows the results of draping garment on various people, without changing the size of garment. We present the results for shirt, pants, t-shirt and short pants.

1.4 Ablation study

We experiment with the significance of each loss function introduced in the method section. We present our result with and without using the interpenetration term in the training and as shown in 5(a,b), the network produces fewer intersections when trained with $\mathcal{L}_{\text{interp}}$. Quantitatively, in ParserNet, 6.9% vertices of the predicted garment mesh intersects with the underlying body, which reduces to 3.5%, when trained with $\mathcal{L}_{\text{interp}}$. This difference is more prominent in polo t-shirt, t-shirt and hoodies, and less in case of shirt class. We also show our results with laplacian loss term and we see smooth surface in prediction, especially near the shoulder region, where our network produces some noisy details, in figure 5(c).

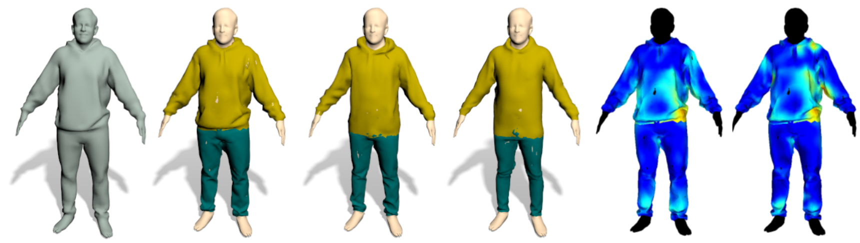
Table 4: Ablation study of Loss functions in ParserNet

Loss	Shirt	Polo-T-Shirt	ShortPants	Pants
$\mathcal{L}_{\text{interp}} + \mathcal{L}_{\text{lap}} + \mathcal{L}_{\text{3D}}$	14.56	14.33	16.07	17.24
$\mathcal{L}_{\text{interp}} + \mathcal{L}_{\text{3D}}$	14.41	14.34	16.08	17.09
$\mathcal{L}_{\text{3D}}$	14.23	14.27	15.98	16.93

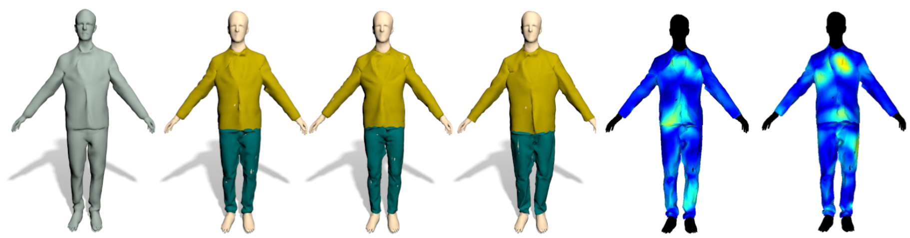


(a) (b) (c)

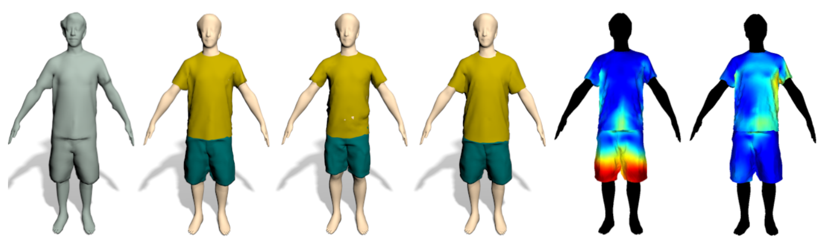
Fig. 5: (a,b) Results of ParserNet trained without and with $\mathcal{L}_{\text{interp}}$. (c) Results of network when trained with $\mathcal{L}_{\text{lap}}$.



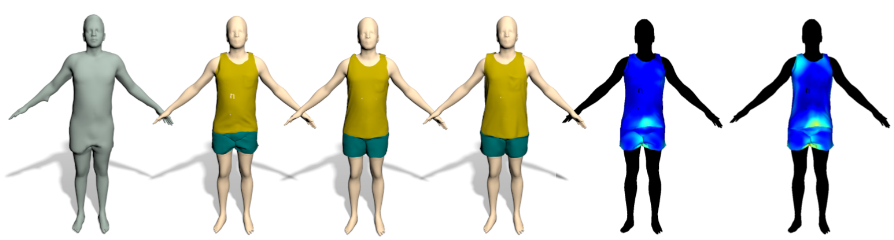
(a) Large(input, parsed), Medium, Small.



(b) Large(input, parsed), Medium, X-Large.



(c) Medium(input, parsed), Small, Large.



(d) Small(input, parsed), Medium, Large.

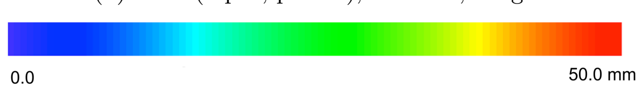
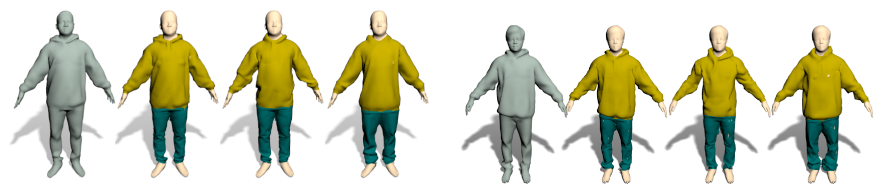
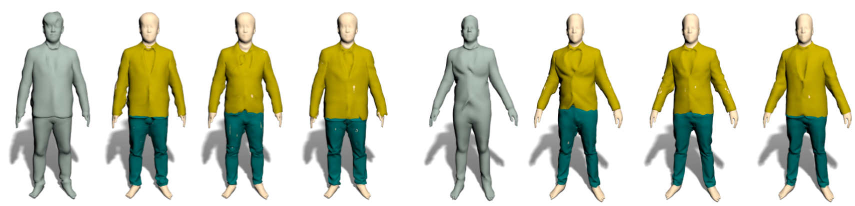


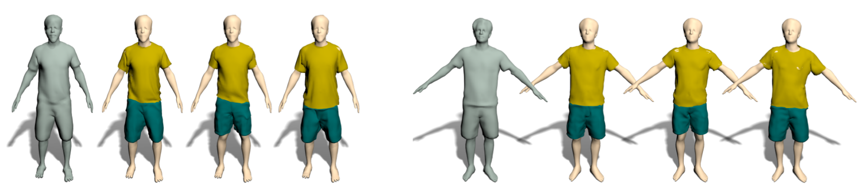
Fig. 1: L to R: Input single mesh, parsed multi-layer mesh from ParserNet, Resized garment in two new sizes, heatmap of change in per vertex error on original parsed garment for two new sizes.



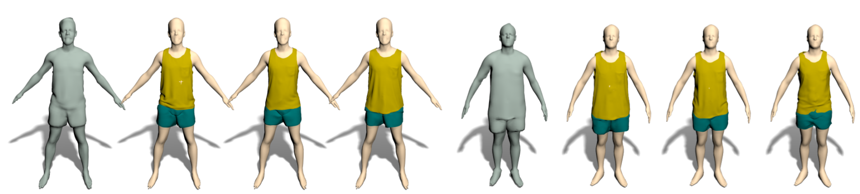
(a) Medium(input, parsed), Small, Large. (b) Medium(input, parsed), Small, Large.



(c) Large(input, parsed), Medium, XL. (d) Medium(input, parsed), Large, XL.



(e) Medium(input, parsed), Small, Large. (f) Small(input, parsed), Medium, Large.



(g) Medium(input, parsed), Small, Large. (h) Large(input, parsed), Medium, Small.

Fig. 2: SizerNet results on other garment classes.

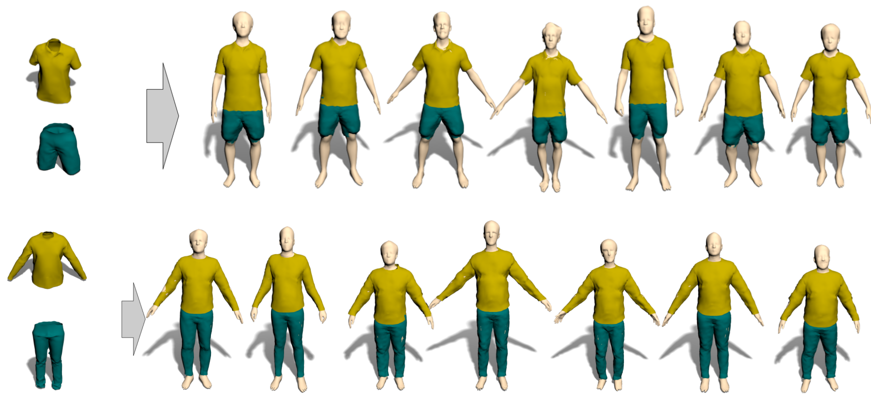
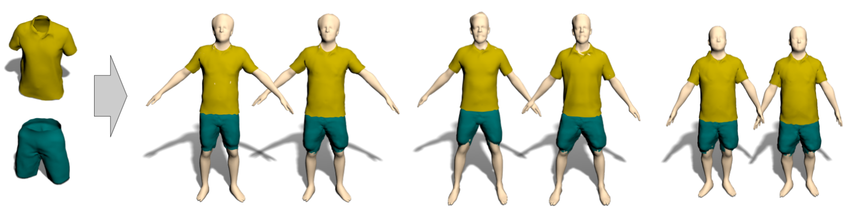
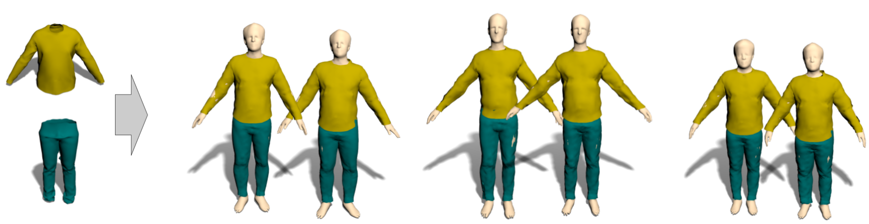


Fig. 3: Left: Input uppper and lower garment, Right: Draped on various body shapes.



(a) Input (Medium) (b) Small, Medium (c) Small, Large (d) Small, Medium.



(b) Input (Large) (b) Medium, Large (c) Large, Medium (d) Small, Medium.

Fig. 4: Left: Input uppper and lower garment, Right: Draped on various body shapes in new garment sizes.