
ECCV'20
ONLINE
23-28 AUGUST 2020
16TH EUROPEAN CONFERENCE ON
COMPUTER VISION
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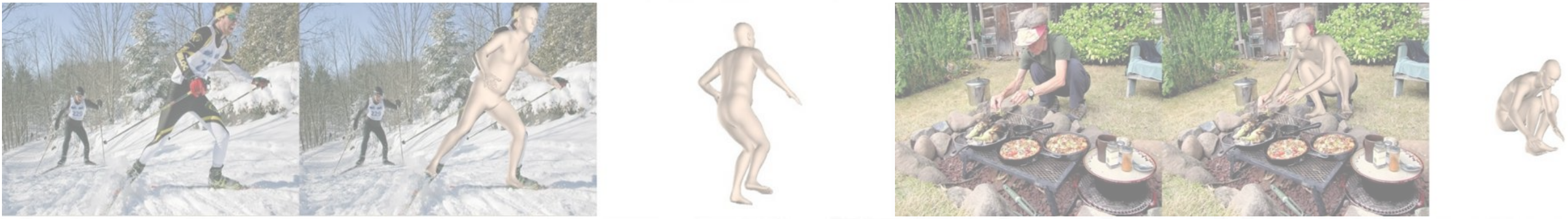
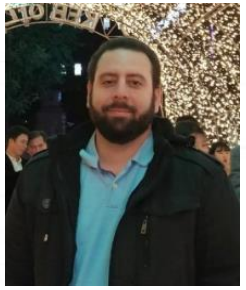
GEORGE MASON UNIVERSITY



Hierarchical Kinematic Human Mesh Recovery



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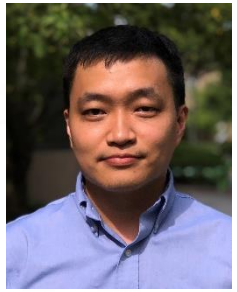

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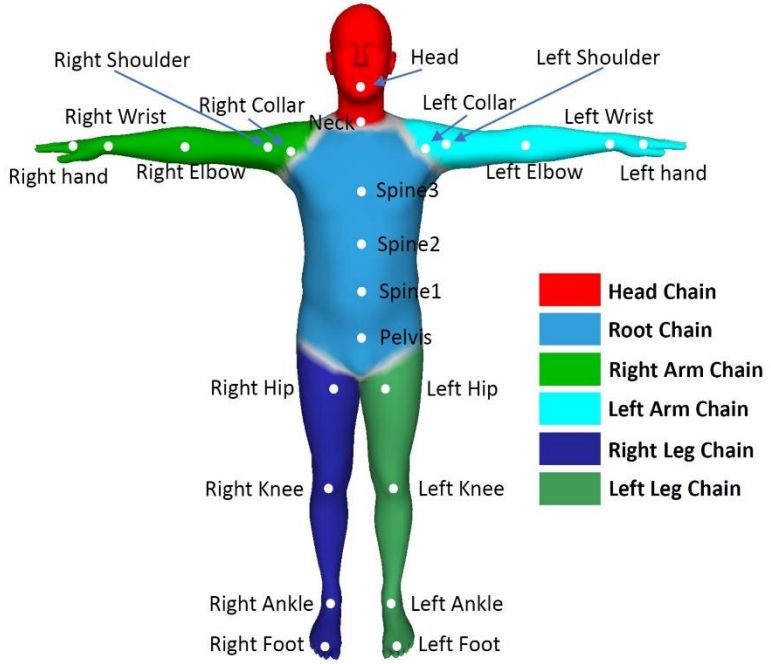
*equal contribution, work during internship with United Imaging Intelligence

Contributions

➢ Hierarchical kinematic chain regressor

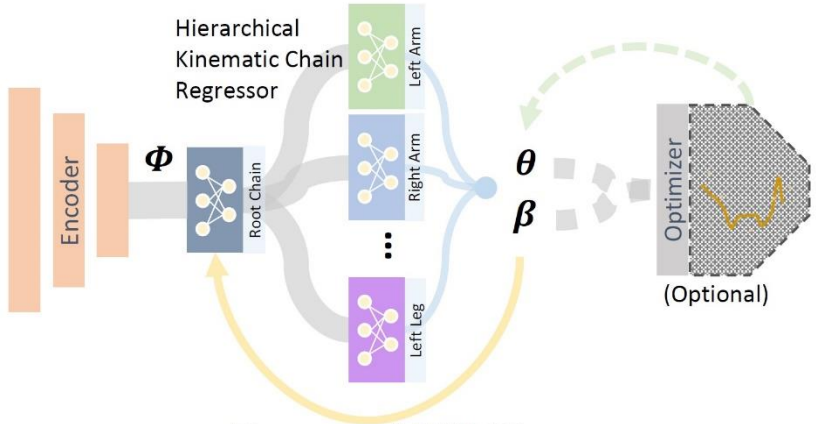
- A new parameter regressor explicitly exploiting structural constraints of human body model;
- Flexible to be used in encoder-regressor or encoder-regressor-optimizer paradigms.



Kinematic Chains

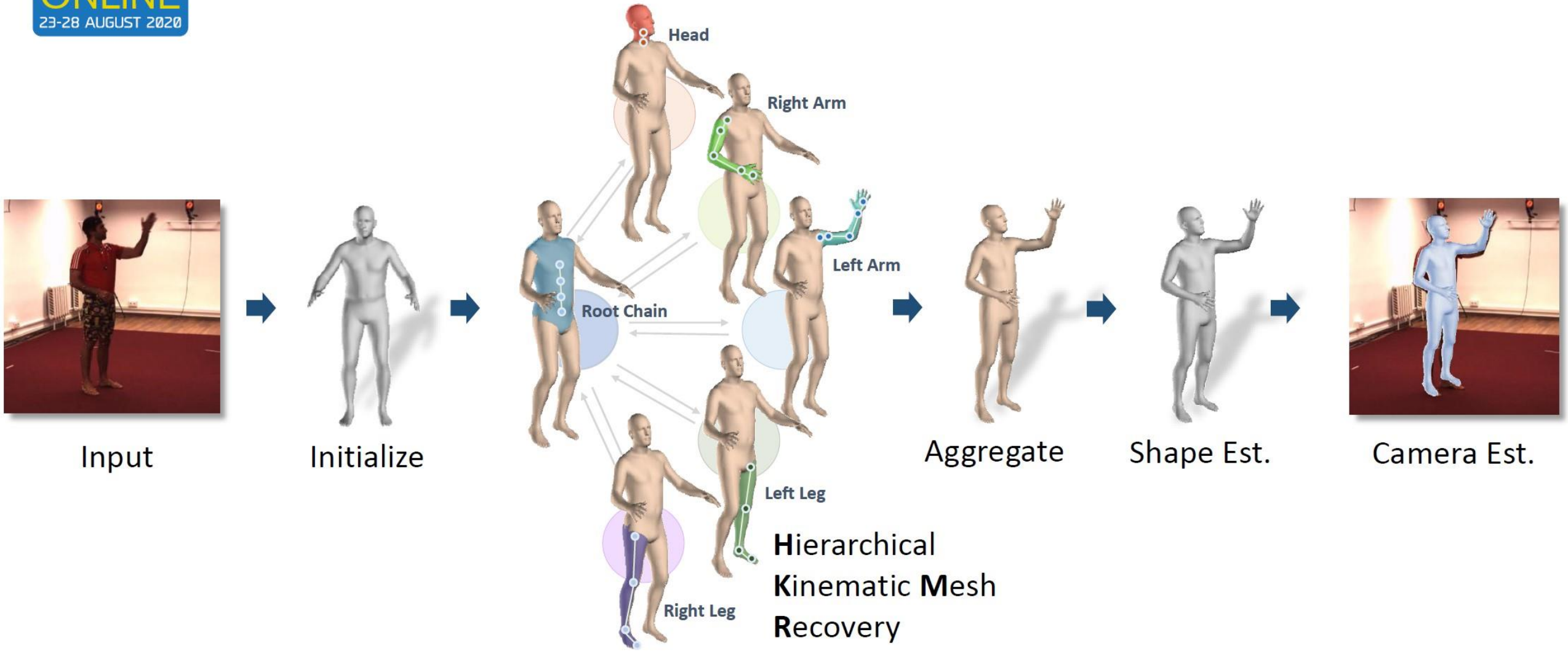
➢ Robustness to occlusions

- Achieving substantial performance improvement on data under a wide variety of occlusion conditions.



Proposed HKMR

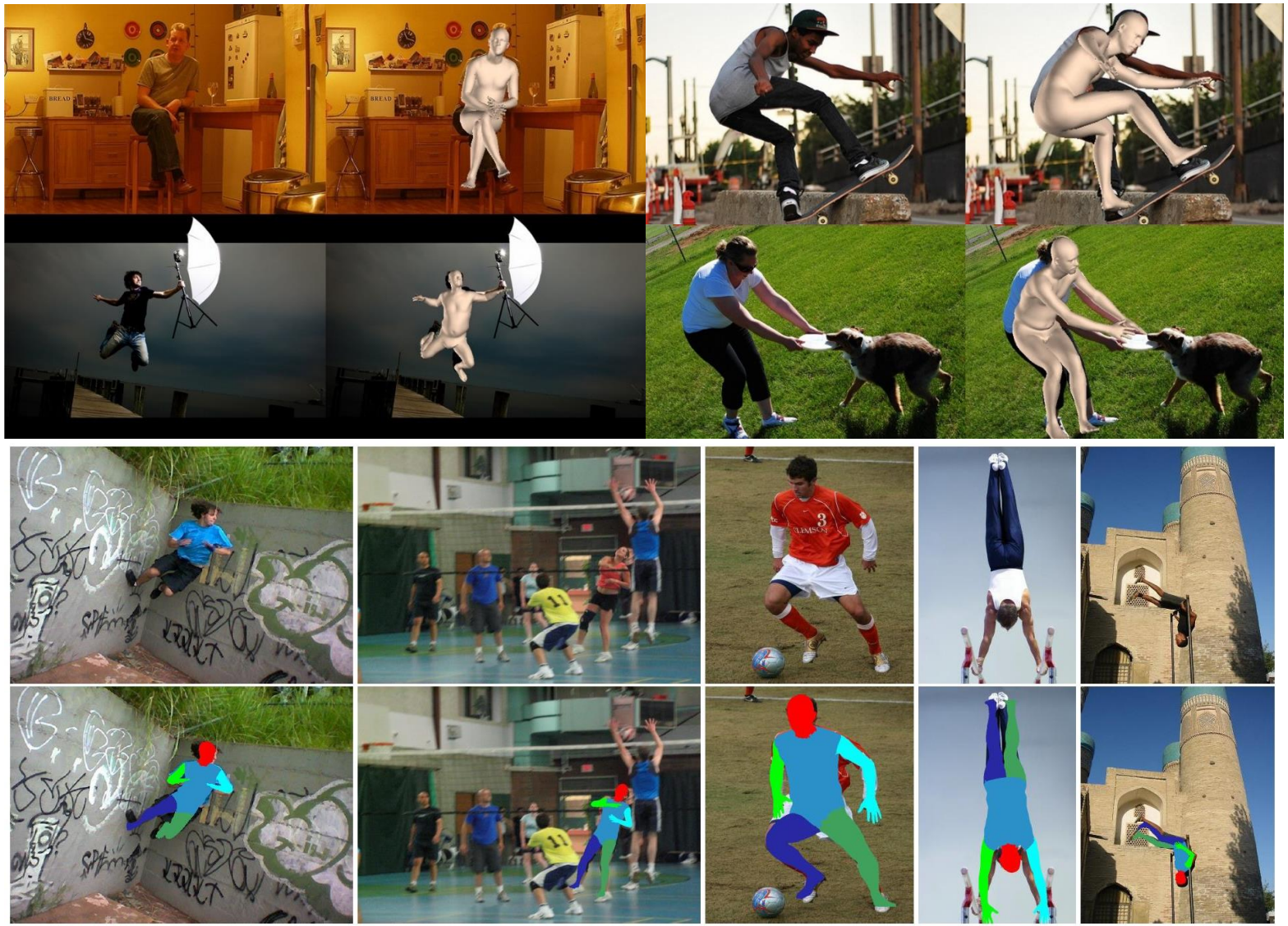
Hierarchical Kinematic Chain Regressor



Experimental Results

LSP	FB Seg.		Part Seg.	
	acc.	f1	acc.	f1
Oracle [3]	92.17	**0.88**	88.82	0.67
SMPLify [3]	91.89	**0.88**	87.71	0.64
SMPLify+[28]	92.17	**0.88**	88.24	0.64
HMR [5]	91.67	0.87	87.12	0.60
CMR [8]	91.46	0.87	88.69	0.66
TexturePose [21]	91.82	0.87	89.00	0.67
SPIN [6]	91.83	0.87	89.41	0.68
HKMR$_{MF}$	**92.23**	**0.88**	**89.59**	**0.69**

Human3.6M	P1	P2
HMR [5]	87.97	88.00
Arnab *et al.* [20]	-	77.80
HoloPose [16]	-	64.28
CMR [8]	74.70	71.90
DaNet [17]	-	61.50
DenseRaC [18]	76.80	-
VIBE [19]	-	65.60
SPIN [6]	65.60	62.23
HKMR$_{MF}$	**64.02**	**59.62**



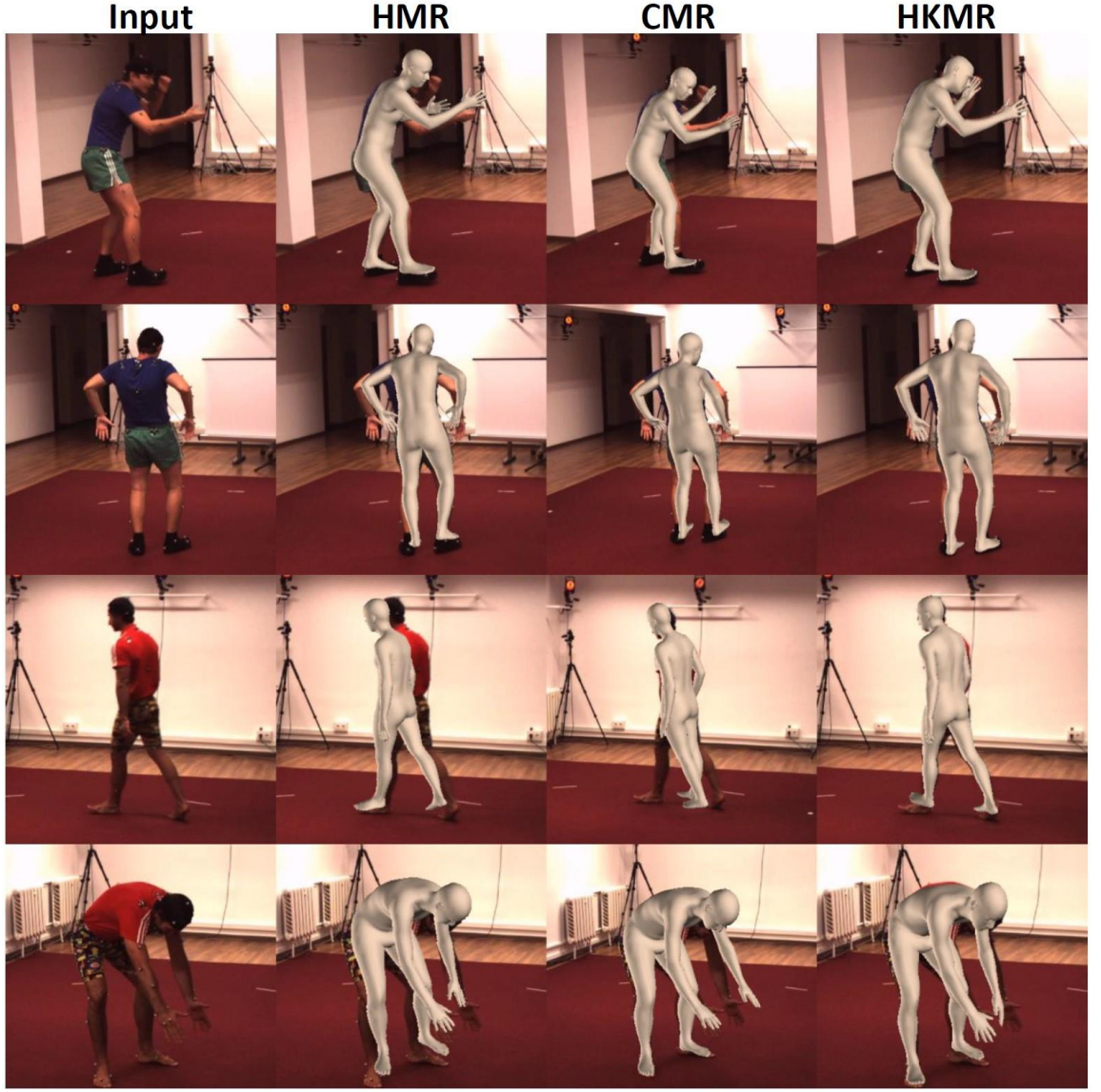
Analyzing HKMR

- Ablation study of the impact of various design consideration.

	No joint hierarchy	Forward only	Discriminator	Full model
P1	77.10	75.99	74.21	**71.08**
P2	74.28	72.10	71.72	**67.74**

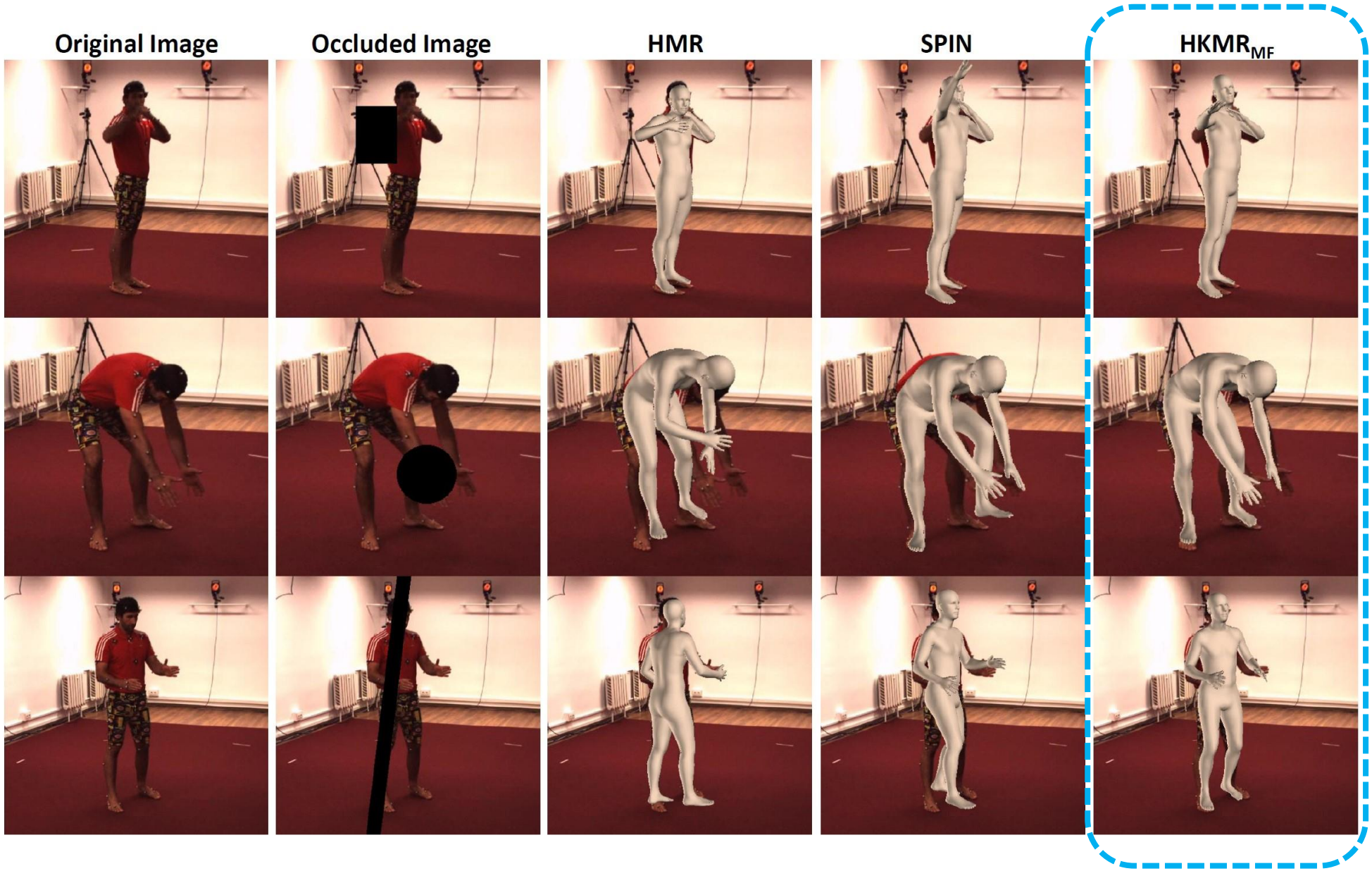
- Baseline architecture evaluation.

	#Param	Standard		Bar		Circle		Rectangle	
		P1	P2	P1	P2	P1	P2	P1	P2
HMR [5]	26.8M	87.97	88.00	98.74	98.54	95.28	91.71	100.23	99.61
CMR [8]	42.7M	74.70	71.90	82.99	78.85	83.50	79.24	89.01	84.73
HKMR	26.2M	**71.08**	**67.74**	**78.34**	**74.91**	**77.60**	**71.38**	**81.33**	**76.79**



Robustness to Occlusions

- Qualitative results under synthetic occlusions.
- Various occlusion patterns were tested.



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https://arxiv.org/abs/2003.04232