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暨计算机科学国家重点实验室开放周
学术论文

交互状态下的双手姿态与形状估计

作者：张宝文、王雁刚、邓小明、张寅达、谭平、马翠霞、王宏安

Interacting Two-Hand 3D Pose and Shape Reconstruction from Single Color Image，**ICCV**，2021

联系方式：邓小明, 13717981135, xiaoming@iscas.ac.cn

Motivation

Interacting hand reconstruction is desirable to express delicate body language and perform complex tasks.

Existing methods usually rely on

- depth camera;
- multi-view camera system;
- optimization over tracked motion sequence.

Introduction

We propose a novel deep learning framework to reconstruct 3D hand poses and shapes of two interacting hands from a single color image.

Our main contributions:

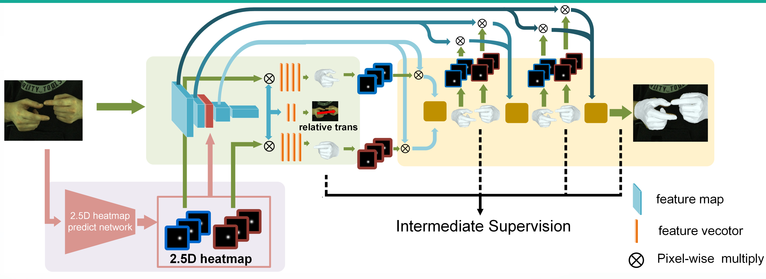
A novel deep learning architecture;

Pose-aware attention modules to extract the key features for each hand;

Cascaded refinement stage improving the performance conditioned on context of interacting hands;

Project Webpage:
https://baowenz.github.io/Intershape/

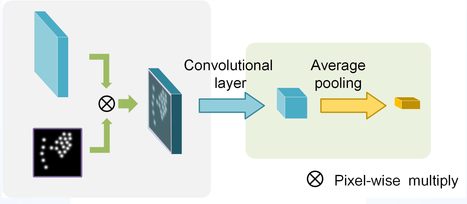
Network Architecture

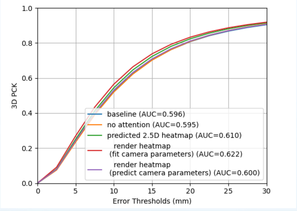


Our network first predict 2.5D heatmap for the joints of the two hands. Then use three branches to recover MANO model parameters of each hand and the relative transformation of two hands. Finally, refine the hand shape parameters jointly in a cascaded manner to respect the correlation context between the interacting hands.

Pose-Aware Feature Extractor

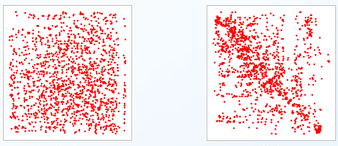
The attention maps are generated according to the projection of estimated 3D joints, which is proved to be efficient.





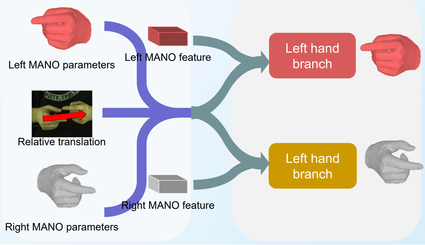
Context-Aware Refinement

Visual analysis of 2D manifold of paired (a) and unpaired (b) tow hand poses.

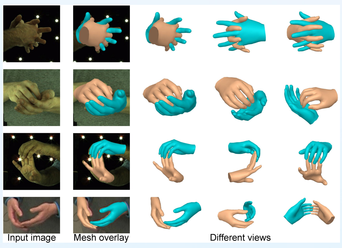


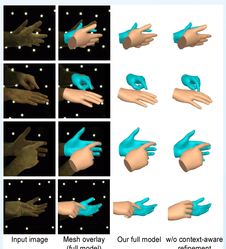
(a) (b)

Cascaded blocks use parameters of both hands for refinement.



Qualitative results





Ablation study

Ablation study of our network on InterHand2.6M.

	MPJPE	AUC(0-50mm)
baseline	14.218	0.734
no attention	14.095	0.735
predicted 2.5D heatmap	13.464	0.746
predict camera parameters	14.040	0.737
high level feature	13.986	0.737
cascaded single MANO parameters	13.170	0.752
our full model	**13.071**	**0.754**

Comparison with SOTA