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Intelligent Knee Sleeves: A Real-time Multimodal Dataset for 3D Lower Body **Motion Estimation Using Smart Textile**

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Introduction

The kinematics of human movements and locomotion The results show an average error of 7.21 degrees across all are closely linked to the activation and contractions of eight lower body joints when compared to the ground truth, muscles. To investigate this, we present a multimodal indicating the effectiveness and reliability of the Knee Sleeve dataset with benchmarks collected using smart system for the prediction of different lower body joints beyond wearables for human pose estimation. Our system knees. Our work offers a novel sensing modality that utilizes synchronized datasets that comprise time- complements traditional vision systems and enables human series data from the Knee Sleeves and the pose estimation without being impacted by visual obstructions corresponding ground truth labels from visualized in a seamless and confidential manner. This innovation has motion capture camera system. We employ these to potential applications from home fitness to sports analysis, generate 3D human models solely based on the personalized healthcare, and physical rehabilitation focusing on wearable data of individuals performing different pose and movement estimation. activities. We demonstrate the effectiveness of this ____ camera-free system and machine learning algorithms \lfloor in the assessment of various movements and exercises including extension to unseen exercises and individuals.





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Results

Scene	Pose	LHip	LKnee	LAnkel	LToe	RHip	RKnee	RAnkel	RToe
ll_seen	Avg	9.03	11.80	6.23	3.81	9.31	7.69	7.04	2.77
Inseen Fasks	BendSquat	17.50	14.20	12.30	4.25	17.90	15.10	12.10	5.12
	Hamstring Curl	12.70	18.00	6.13	2.71	12.40	16.90	6.49	4.13
	Leg Raise	10.20	19.80	9.05	2.56	9.55	16.20	9.29	5.50









NEURAL INFORMATION PROCESSING SYSTEMS