

3D Daily Activity Recognition Dataset for Elderly-care Robots



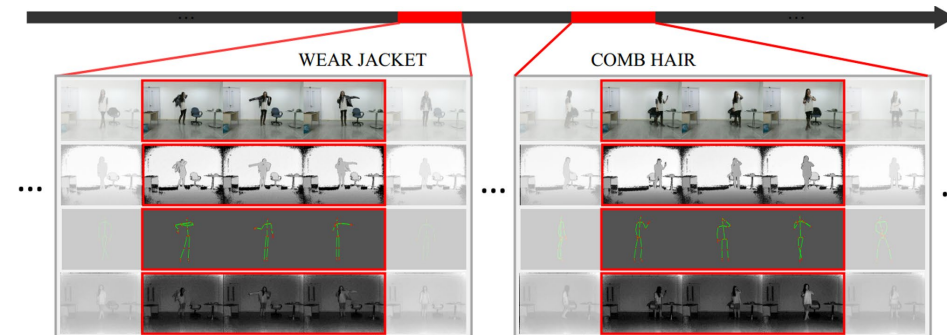
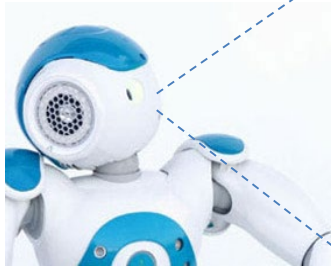
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Dohyung Kim

HRI Lab, ETRI

Action Recognition for Robots

- Action recognition is a fundamental technology to understand the intentions of human behavior and grasp the daily life patterns of human users.

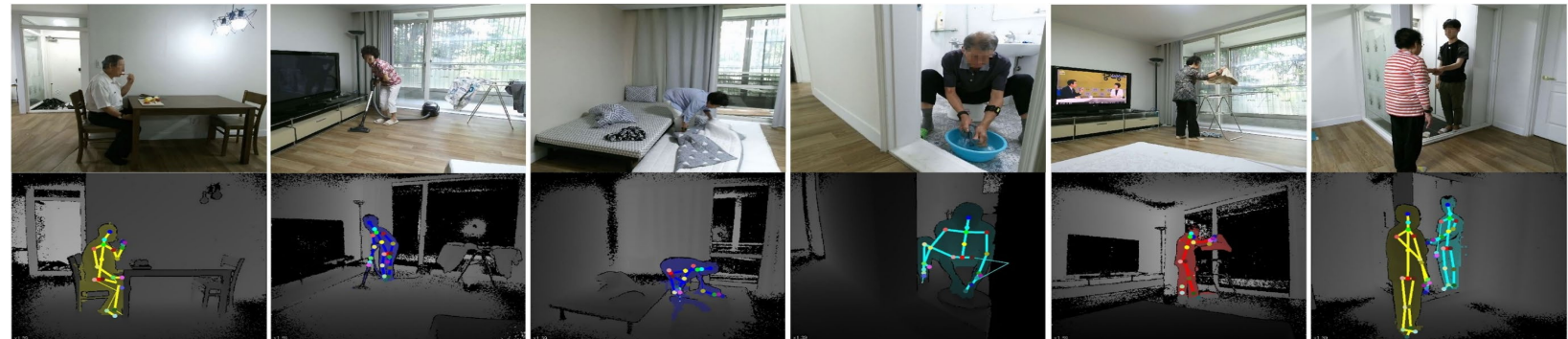


ETRI-Activity3D dataset

<https://ai4robot.github.io/etri-activity3d-en/>

Item	Contents
Number of samples	112,620
Number of action classes	55
Number of subjects	100 (50 old people, 50 young people)
Collection environment	Residential Environment in Apartment
Data modalities	RGB videos, depth map frames, body index frames, 3D skeletal data
Sensor	Kinect v2

Collected Data	Resolution	File Format	Size
RGB Videos	1920x1080	MP4	296 GB
Depth Map Frames	512x424	PNG	4.08 TB
Body Index Frames	512x424	PNG	42.60 GB
3D Skeletal Data	25 joints	CSV	20.83 GB
Total			4.44 TB



< Examples of daily activities in the proposed dataset >

Major Characteristics (1/3)

1. A new visual dataset based on observations of the daily activities of the elderly

Activity Selection

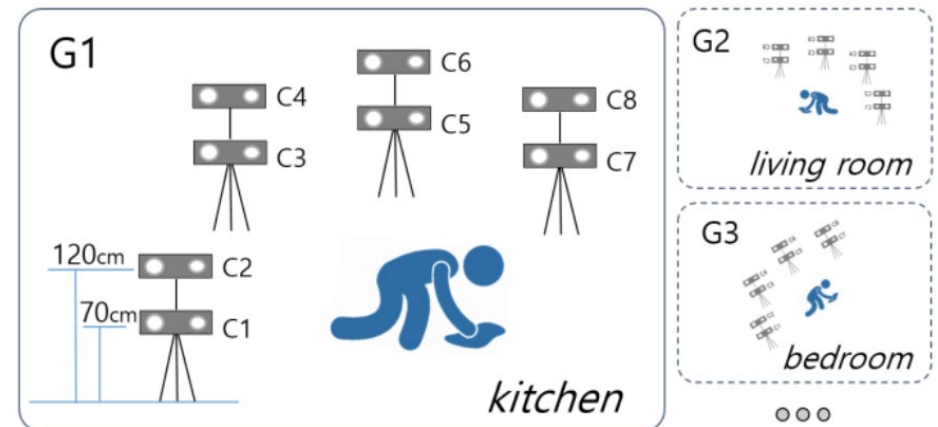
Method	Goal	Select most frequent activities of older people
	How	Observing one day of older people
	Participants	53 Elderly People (age > 65)
	Dates	2017-06-15 ~ 2017-07-05
Result	No. observed activities	245
	Frequent activities	<ol style="list-style-type: none">1. Watching TV2. Meal-related activities (eating, preparing foods, washing dishes)3. Defecation (using toilet)4. Phone call5. Taking medications6. Washing face and brushing teeth7. Wearing and taking off clothes

Action Classes

ID	Action description	ID	Action description
1	eating food with a fork	29	hanging out laundry
2	pouring water into a cup	30	looking around for something
3	taking medicine	31	using a remote control
4	drinking water	32	reading a book
5	putting food in the fridge/taking food from the fridge	33	reading a newspaper
6	trimming vegetables	34	handwriting
7	peeling fruit	35	talking on the phone
8	using a gas stove	36	playing with a mobile phone
9	cutting vegetable on the cutting board	37	using a computer
10	brushing teeth	38	smoking
11	washing hands	39	clapping
12	washing face	40	rubbing face with hands
13	wiping face with a towel	41	doing freehand exercise
14	putting on cosmetics	42	doing neck roll exercise
15	putting on lipstick	43	massaging a shoulder oneself
16	brushing hair	44	taking a bow
17	blow drying hair	45	talking to each other
18	putting on a jacket	46	handshaking
19	taking off a jacket	47	hugging each other
20	putting on/taking off shoes	48	fighting each other
21	putting on/taking off glasses	49	waving a hand
22	washing the dishes	50	flapping a hand up and down (beckoning)
23	vacuuming the floor	51	pointing with a finger
24	scrubbing the floor with a rag	52	opening the door and walking in
25	wiping off the dining table	53	fallen on the floor
26	rubbing up furniture	54	sitting up/standing up
27	spreading bedding/folding bedding	55	lying down
28	washing a towel by hands		

Major Characteristics (2/3)

2. A realistic dataset considering the service situation of human-care robots



Major Characteristics (3/3)

3. A large-scale RGB-D dataset that overcomes the limitations of the reported datasets



< Examples of NTU RGB+D 120 dataset >

TABLE I. COMPARISON BETWEEN ETRI-ACTIVITY3D AND OTHER PUBLICLY AVAILABLE DATASETS FOR 3D DAILY ACTIVITY RECOGNITION. DATA MODALITIES: (RGB)VIDEO, (D)EPTH, (S)KELETON, (I)R.

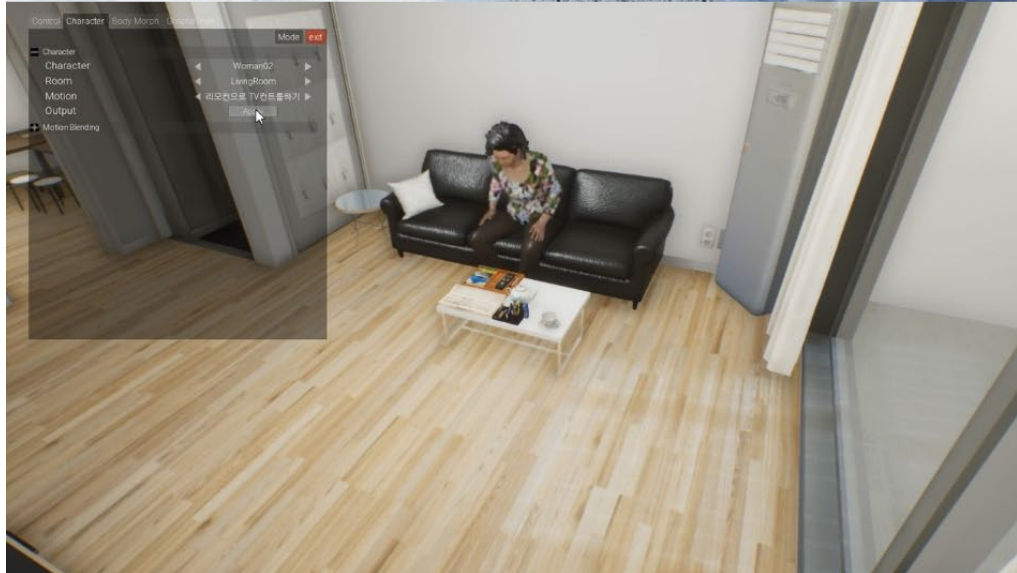
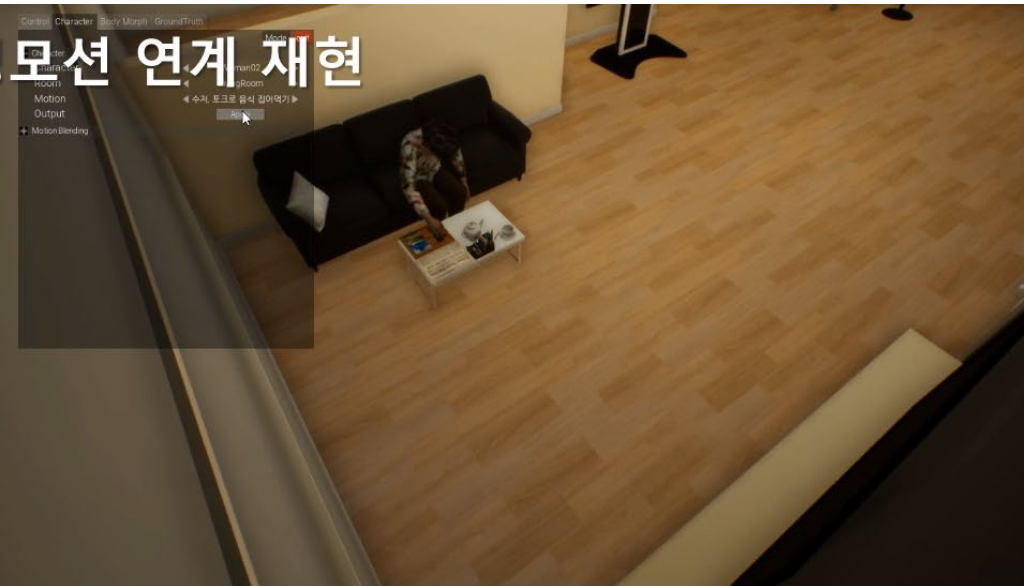
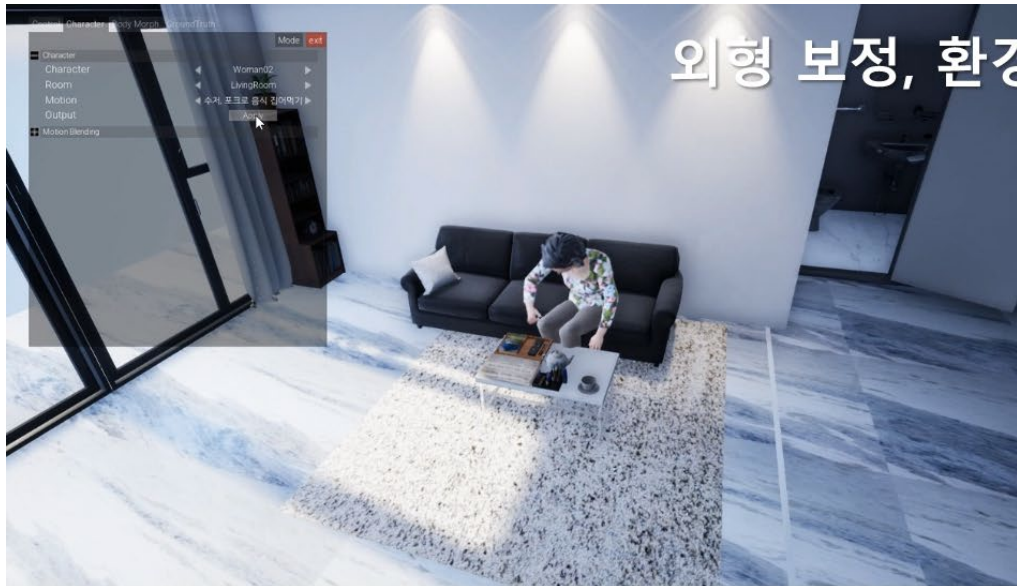
Datasets	#Samples	#Sub	#Act	Modalities
RGBD-HuDaAct [3]	1,189	30	13	RGBD
MSRDailyActivity3D [4]	320	10	16	RGBDS
Act4 ² [5]	6,844	24	14	RGBD
CAD-120 [6]	120	4	10+10	RGBDS
Office Activity [7]	1,180	10	20	RGBD
UWA3D Multiview II [8]	1,075	10	30	RGBDS
NTU RGB+D [9]	56,880	40	60	RGBDSI
NTU RGB+D 120 [10]	114,480	106	120	RGBDSI
Toyota Smarthome [11]	16,129	18	31	RGBDS
ETRI-Activity3D	112,620	100	55	RGBDS

Extension of the ETRI-Activity3D dataset (1/2) – Living Lab

3D daily activity dataset of the elderly in the home environment where the elderly actually live



Extension of the ETRI-Activity3D dataset (2/2) – Virtual Environment



Summary: The characteristics of ETRI-Activity3D

- (1) The daily activities of the elderly were recorded from the robot's point of view.
- (2) Action classes were determined based on the observations of the daily activities of the elderly
- (3) The dataset acquisition was performed in an apartment reflecting the living conditions of the elderly, not in a laboratory.
- (4) The probable service situation of the human-care robots was considered.
- (5) The dataset provides the large amount variation in views, distances and backgrounds.
- (6) The dataset is the second largest dataset in daily living activity recognition domain in terms of number of subjects and video samples.



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