

인공지능 기술을 활용한 연구 내용 소개

ACK 2023 신진학자 워크숍



문화지식융합대학
데이터사이언스 전공

2023. 11. 3.
권범

1. About Me

❖ Profile (1/2)

○ Education

2012. 3. ~ 2018. 2.	Ph. D. degree School of Electrical & Electronic Engineering, Yonsei University, Seoul, South Korea	 YONSEI UNIVERSITY
2008. 3. ~ 2012. 2.	B. S. degree School of Electronic Engineering, Soongsil University, Seoul, South Korea	 Soongsil University

○ Research Area

- Artificial Intelligence and Its Applications
- Computer Vision, Wireless Communication, etc.

○ Career

2021. 9. ~ 2023. 8.	Dongyang Mirae University <i>Assistant Professor @ Department of Artificial Intelligence</i> , Seoul, South Korea	 동양미래대학교 DONGYANG MIRAE UNIVERSITY
2019. 10. ~ 2021. 8. (1 year 11 months)	Samsung Electronics Company, Ltd. <i>Staff Engineer @ Network Business</i> , Suwon, South Korea	
2018. 3. ~ 2019. 9. (1 year 7 months)	Agency for Defense Development (ADD) <i>Senior Engineer @ The 1st Research and Development Center</i> , Daejeon, South Korea	 국 방 과 학 연 구 소 Agency for Defense Development

1. About Me

❖ Profile (2/2)

○ Research Projects – *Principal Investigator*

Title: **Survey of Technology for Extracting Terrain Features from Satellite Images**

Research Period: 2023. 9. 11. ~ 2023. 12. 8.

Funding Agency: Agency for Defense Development (ADD)



Title: **Multimodal Emotion Recognition and Expression Technologies for Realistic Interaction in Metaverse**

Research Period: 2022. 9. 1. ~ 2025. 2. 28.

Funding Agency: National Research Foundation of Korea (NRF)



Title: **Method of Implementing Channel Coding for Multi-Receiver Millimeter Wave Data Link**

Research Period: 2022. 8. 1. ~ 2022. 10. 31.

Funding Agency: Agency for Defense Development (ADD)

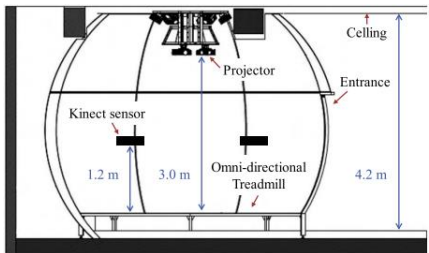


2. Research Overview

Multimodal AI Convergence Technology

Observation Platforms

Recording Studio



Camera



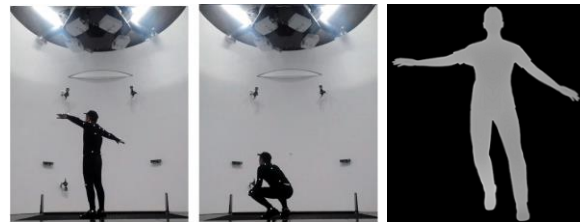
Recorder



Instrument

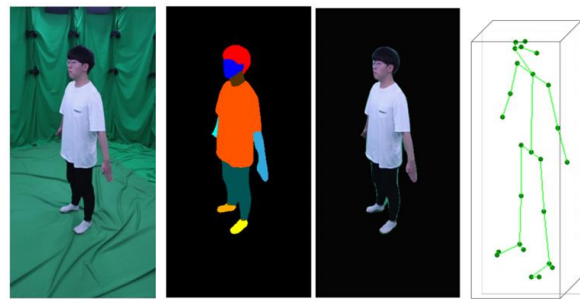


Multimodal Data Collection



Infrared (IR)

Depth



RGB

Segmentation

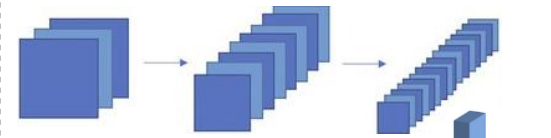
Silhouette

Skeleton

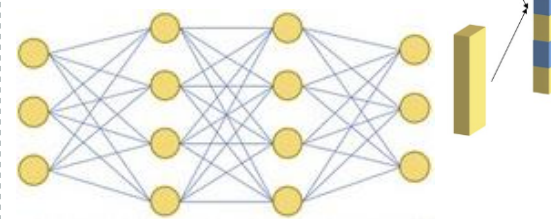
Multimodal Deep Learning

Data Processing & Analysis

Data Synchronization



Multimodal Deep Learning Architectures



Multimodal Data Fusion

Multimodal AI Applications

Multimodal Model

Action Recognition

Abnormal Action Recognition

Emotional Gesture Generation

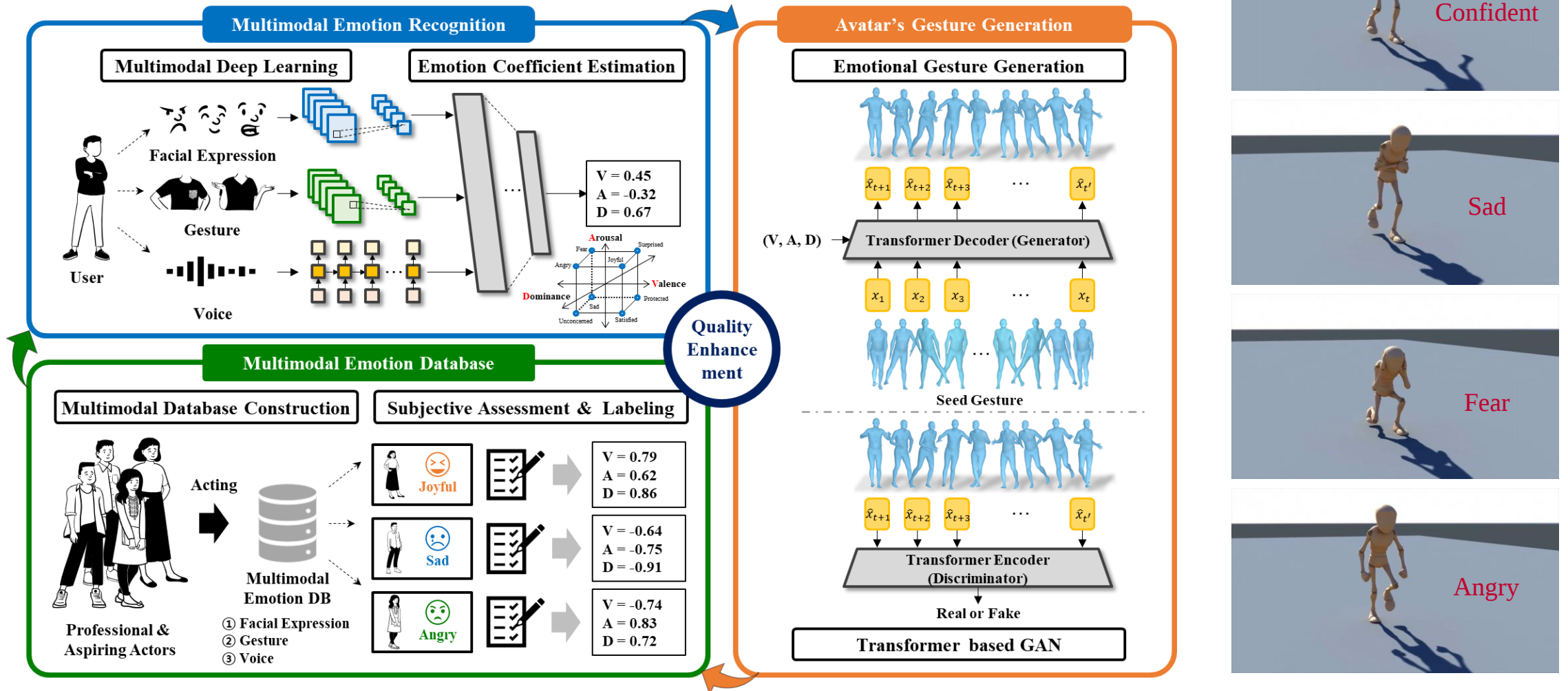
Emotional Face Generation

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2. Research Overview

Modality: *Video* + *Voice*

✓ Emotion Recognition and Emotional Gesture Generation



2. Research Overview

Modality: *Text*

- ✓ Development of Method for Estimating the Compression Type of Text Data and Parameter Using Deep Learning

In recent years, the demand for Virtual Reality (VR) services has risen due to advancements in VR technology. The market for VR services is expanding beyond that for gaming [1], education [2], and rehabilitation services [3]. In this vein, the use of VR technology in virtual training has attracted considerable research attention. To reduce the cost of training and improve its effectiveness, various industries, such as the military and firefighting, have attempted to develop virtual training simulators. To provide a trainee with an interactive and immersive environment, it is necessary for a virtual training simulator to recognize actions performed by the trainee. For this reason, human action recognition methods have been introduced as a major component of successful virtual training

Text Data

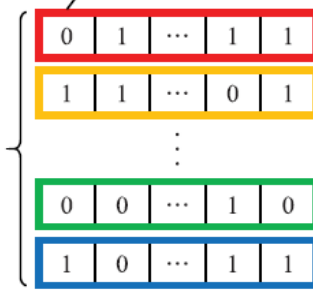
Input

11101001...10101010
01101100...01101011
11001010...00001101
00100111...10101110
00101100...01001011
11101001...11101101
00100100...01001100

Encoded Data

Divide
N chunks

$1 \times M$ -dimensional vector of $\mathbf{K}(i)$



Reshape

$m \times m$ -dimensional vector of $\mathbf{B}(i)$

Element-wise
sum

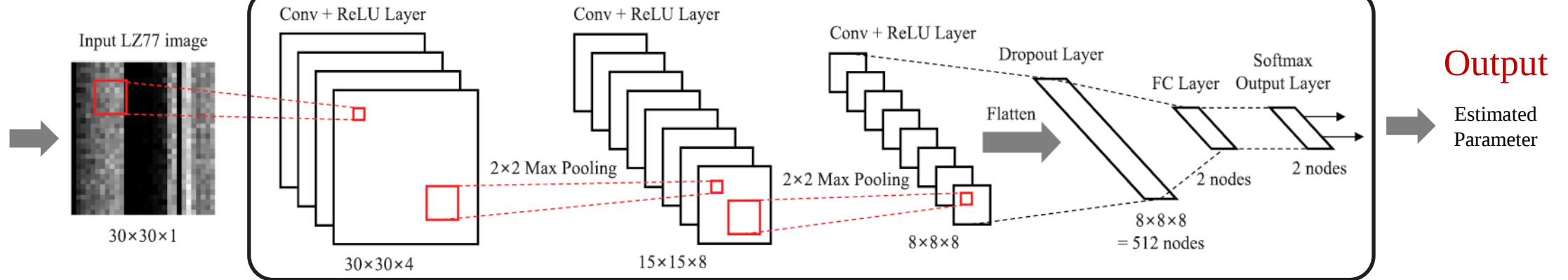
$m \times m$ -dimensional vector of $\mathbf{Z}$

Normalize

$m \times m$ -dimensional vector of $\mathbf{I}$

LZ77 image

Convolutional Neural Network



Beom Kwon et al., “Accurate Blind Lempel-Ziv-77 Parameter Estimation via 1-D to 2-D Data Conversion Over Convolutional Neural Network,”
IEEE Access, vol. 8, pp. 43965-43979, 2020.

THANK YOU!

Q & A

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