BVRIT HYDERABAD College of Engineering for Women

Department of Information Technology

# Human Action Imitation using Gait Classifier

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# Abstract

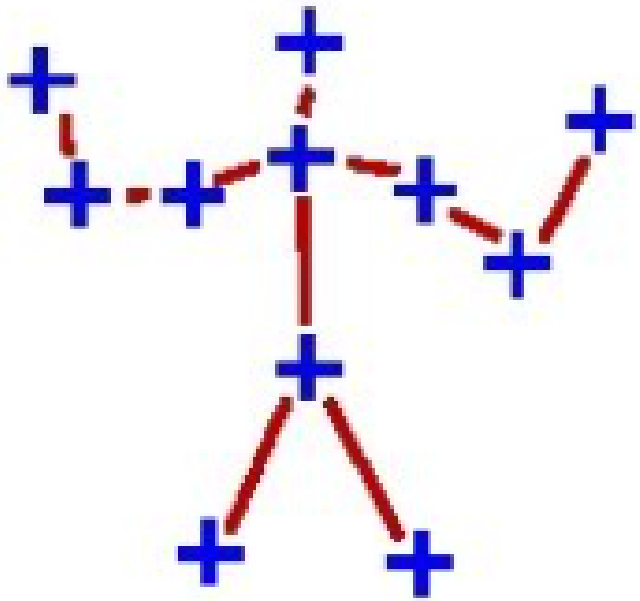
Human action imitation is a computer vision problem that tries to estimate human body joints location and decide how they are connected to each other in the body. Human action imitation is a way of retrieving actions from the video emerged from Content Based Video Retrieval (CBVR). Human action imitation has gained popularity because of its wide applicability in automatic retrieval of videos of particular action using visual features. In the human action Imitation the most common stages for action recognition includes: object and human segmentation, feature extraction, activity detection and classification. Human action imitation has wide application prospect in the field of video surveillance, human-computer interaction, virtual reality, etc.

# Introduction

- Human action imitation plays a significant role in human-to-human interaction and interpersonal relations. Because it provides information about the identity of a person, their personality, and psychological state.
- The human ability to recognize another person's activities is one of the main subjects of study of the scientific areas of computer vision and machine learning.
- Among various classification techniques two main questions arise: "What type of action?" (i.e., the recognition problem) and "Where in the video?" (i.e., the localization problem). When attempting to recognize human activities, one must determine the kinetic states of a person, so that the computer can efficiently recognize the activity.

# Problem Statement

- Human Action Imitation or HAI for short, is the problem of predicting what a person is doing based on a trace of their movement by imitating their actions using Gait Classifier.

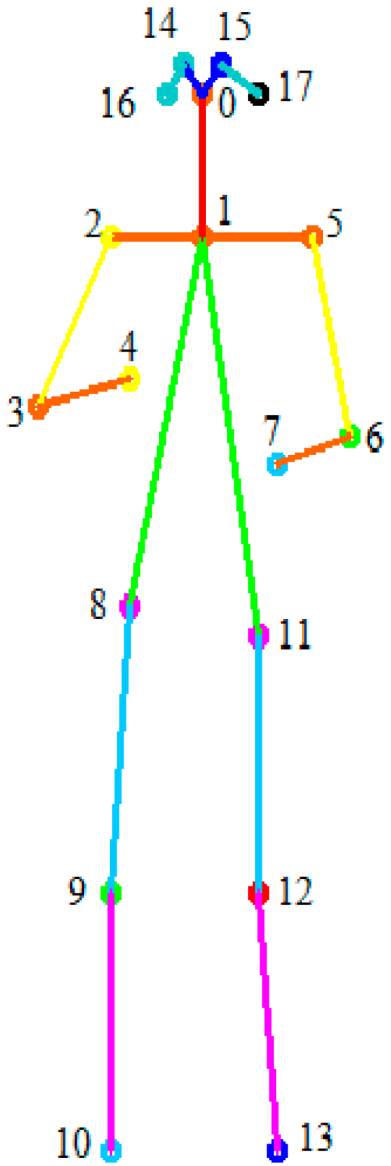


# Literature Survey

| Year | Name of the Author | Title of the Paper | Journal | Outcome |
|---|---|---|---|---|
| 2021 | S. U. Yunas, A. Alharthi and K. B. Ozanyan | Multi-modality sensor fusion for gait classification using deep learning | IEEE | This paper has presented an end to end approach of multi-modal sensor fusion for gait classification that takes values from AIS and FS as inputs. The effectiveness of this sensor fusion has been tested and verified using DL based ANN and CNN. ANN with accuracy 88% and CNN accuracy 91% |
| 2021 | D. Deng | DBSCAN Clustering Algorithm Based on Density | IEEE | DBSCAN is a classical density-based clustering algorithm, which is widely used for data clustering analysis due to its simple and efficient characteristics. The purpose of this paper is to study DBSCAN clustering algorithm based on density. This paper first introduces the concept of DBSCAN algorithm, and then carries out performance tests on DBSCAN algorithm in two different data sets. |

| Year | Name of the Author | Title of the Paper | Journal | Outcome |
|---|---|---|---|---|
| 2020 | A. Rohan, M. Rabah, T. Hosny and S. -H. Kim | Human Pose Estimation-Based Real-Time Gait Analysis Using Convolutional Neural Network | IEEE | This paper, proposed approach uses the human pose estimation method to classify the abnormalities found in a specific person's gait by giving 97.3% accuracy. |
| 2020 | D. C. Luvizon, D. Picard and H. Tabia | Multi-Task Deep Learning for Real-Time 3D Human Pose Estimation and Action Recognition | IEEE | This paper, presented a new approach for human pose estimation and action recognition using multi-task deep learning. The proposed method is trained with mixed 2D and 3D data using CNN architecture by giving the accuracy 87.7% |
| 2017 | C. J. Dhamsania and T. V. Ratanpara | A survey on Human action recognition from videos | IEEE | This paper comprehensively discusses the methods and limitations in the field of human action recognition. Trajectory based approach, hierarchical approach, semantic descriptor based approach, spatio-temporal interest point based approaches are used widely for human action recognition. Thus the human action recognition methods conclude that the progress in the field of action recognition is encouraging. |

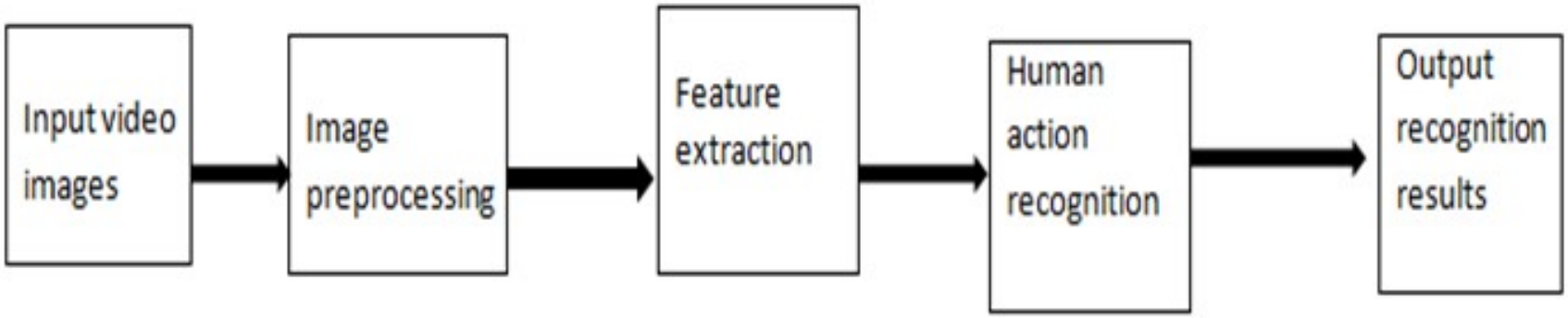
# Pose Detection




**Joints used in this work**

0- Nose
1- Neck
2- Right Shoulder
3- Right Elbow
4- Right Wrist
5- Left Shoulder
6- Left Elbow
7- Left Wrist
8- Right Hip
9- Right Knee
10- Right ankle
11- Left Hip
12- Left Knee
13- Left Ankle
14- Right Eye
15- Left Eye
16- Right Ear
17- Left Ear

# Work Flow


Input video images
Image preprocessing
Feature extraction
Human action recognition
Output recognition results

# Project Modules

## Preprocessing&Extraction Module :

- Image Preprocessing
- Feature Extraction
  - Adaptive background subtraction
  - Optical flow model

## Detection Module :

- Gait Classifier
- DBSCAN Algorithm

# Conclusion

- We referred some ieee papers, which we mentioned in the above literature survey slides. We came to know that Gait Classifier is more useful than other algorithms.

# References


1. D. C. Luvizon, D. Picard and H. Tabia, "Multi-Task Deep Learning for Real-Time 3D Human Pose Estimation and Action Recognition," in IEEE Transactions on Pattern Analysis and Machine Intelligence, 1 Aug. 2021.
2. M. Wang, J. Tighe and D. Modolo, "Combining Detection and Tracking for Human Pose Estimation in Videos," 2021 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2021
3. A. Rohan, M. Rabah, T. Hosny and S. -H. Kim, "Human Pose Estimation-Based Real-Time Gait Analysis Using Convolutional Neural Network," in IEEE Access, vol. 8, pp. 191542-191550, 2020
4. S. U. Yunas, A. Alharthi and K. B. Ozanyan, "Multi-modality sensor fusion for gait classification using deep learning," 2020 IEEE Sensors Applications Symposium (SAS), 2020
5. C. J. Dhamsania and T. V. Ratanpara, "A survey on Human action recognition from videos," 2017 Online International Conference on Green Engineering and Technologies (IC-GET), 2017


Thank You