GAIT RECOGNITION USING DEEP LEARNING

Samar Pratap Singh | Dr. Jaisakthi S M | School of Computer Science & Engineering

Introduction

Gait information is easily collected from distance, which stands for an enormous advantage regarding other techniques, especially when the identification is not assisted by the analyzed person, e.g., criminal investigations. Besides, since it does not require sophisticated equipment for data extraction, these methods are commonly cheaper than other approaches, majorly due to the popularization of surveillance systems and the advent of cell phones equipped with accelerometers, which transformed the burden of extracting data signals into a straightforward task.

Motivation

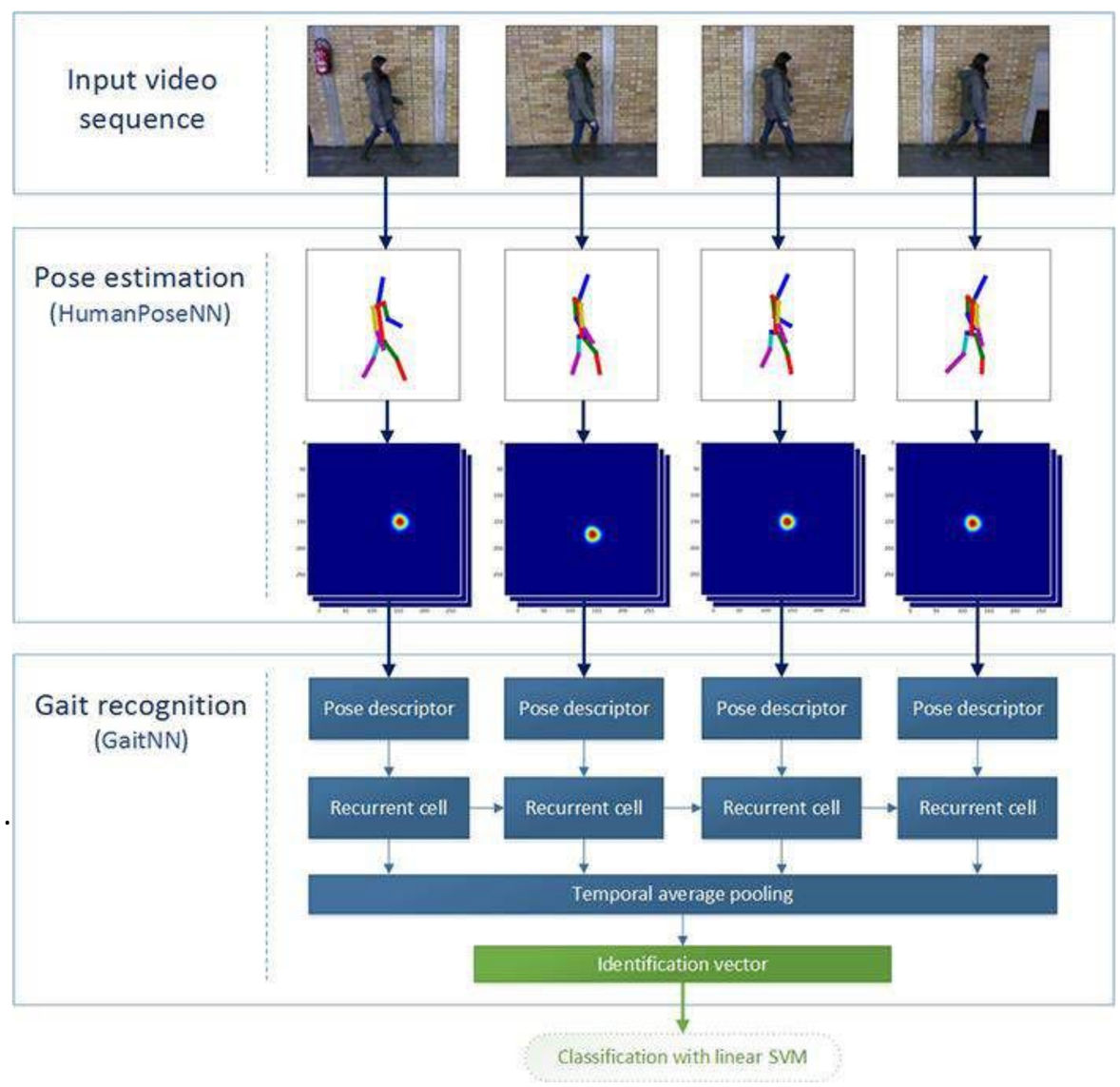
The motive is to explore machine learning techniques and understand their pros and cons on employing gait patterns for authenticating users. This system is one of the distinctive attributes. Using a database which consists of multiple types of behaviors such as; running, walking, standing and sitting.

SCOPE of the Project

- The system takes the input video sequence.
- HumanPoseNN estimates the pose of the Input data.
- The pose descriptor in the GaitNN takes the each pose sequence.
- The data from the pose descriptor is processed to Recurrent cell, which passes it to the Temporal averaging pooling.

Methodology

- The system takes the input video sequence.
- HumanPoseNN estimates the pose of the Input data.
- The pose descriptor in the GaitNN takes the each pose sequence.
- The data from the pose descriptor is processed to Recurrent cell, which passes it to the Temporal averaging pooling.
- All temporal features are finally aggregated with Average temporal pooling into one-dimensional identification vector with good discriminatory properties.



Input Data : video_frames

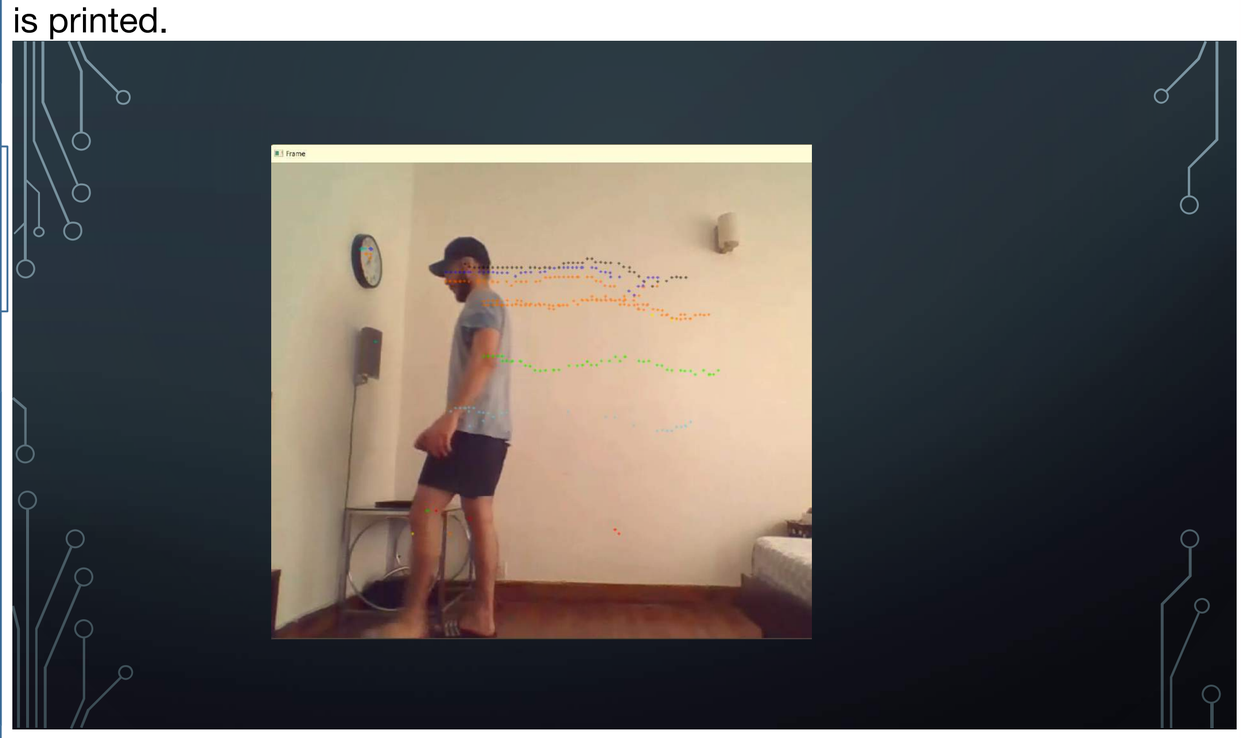
Gait Recognition:
The dummy code shows how to generate the identification vector form the input data video_frames.

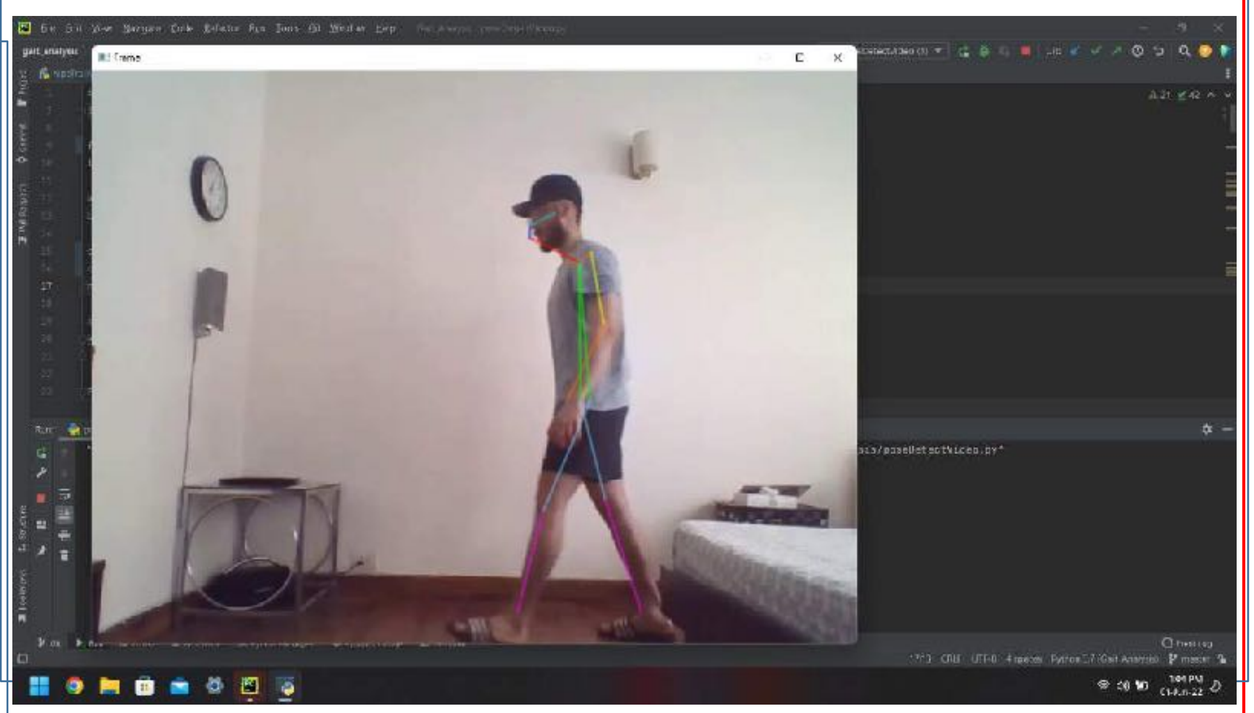
Pose Estimation:

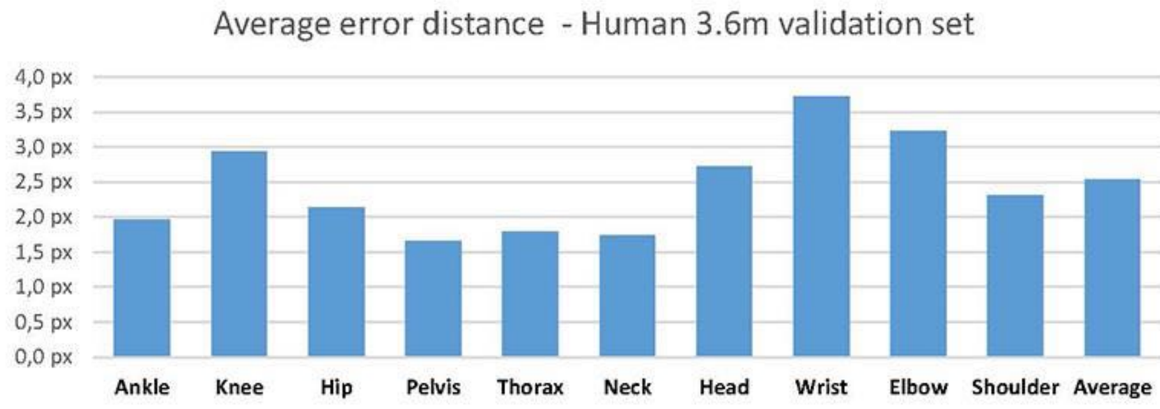
The first sub-network HumanPoseNN can be also used as a standalone network for 2D pose estimation problem.

Results

DUMYY POSE ESTIMATION:
After we run the dummy_pose_estimation.py, our dummy pose which we have in Images/dummy.jpg will be estimated and probability of each estimate is printed.







Conclusion

Gait recognition is a biometric technique that aims to determine the identity of humans based on the style and manner of their walk. In this paper, we developed a specialized deep CNN model, which consists of many layers, for human gait recognition. The advantage of the deep CNN is its ability to extract discriminative features and better classification, especially if the available training dataset is large. We empirically determined the appropriate architecture of the deep CNN for gait recognition. The proposed CNN is capable of overcoming many problems associated with gait recognition, especially when covariate factors are involved, and hence leads to better gait recognition performance.

Reference

*ao, T.; Gao, F.; Zhang, Q.; Ma, Y. Multi-feature gait recognition with DNN based on sEMG signals. Math. Biosci. Eng. 2021, 18, 3521–3542. [Google Scholar] [CrossRef]
*Mei, C.; Gao, F.; Li, Y. A determination method for gait event based on acceleration sensors. Sensors 2019, 19, 5499Luo, R.; Sun, S.; Zhang, X.; Tang, Z.; Wang, W. A low-cost end-to-end sEMG-based gait sub-phase recognition system. IEEE Trans. Neural Syst. Rehabil. Eng. 2019, 28, 267–276. [Google Scholar] [CrossRef] [PubMed]

.