



BCSE424L - Machine Learning for Robotics

Automated Gait-Based Human Identification System

Done by,

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Presentation Outline

- Introduction
- Problem Statement & Objectives
- Methodology
- Results & Discussion
- Conclusion & Future Scope





Introduction

Definition of Gait Recognition

Gait recognition identifies individuals using unique walking patterns, providing a biometric identification method.

Significance in Security Surveillance

Utilized for non-invasive monitoring, enhancing security frameworks by allowing seamless and unobtrusive individual identification.

Applications in Healthcare

Facilitates patient monitoring through analysis of walking patterns, aiding in early diagnosis of mobility issues.

Problem Statement & Objectives

Challenges of Gait Recognition

Occlusion and variable walking styles significantly complicate gait recognition accuracy, often disrupting identification processes.

Impact of Environmental Factors

Environmental variances such as terrain and obstacles contribute to inconsistencies during gait signature capture and analysis.

Project Objectives

Aim to enhance gait identification precision while ensuring effective application in dynamic, real-world environments.



Methodolgy

Machine Learning Models

Employs SVM, CNN, and LSTM models for effective classification of extracted gait features.



Data Collection Process

Involves video preprocessing and frame extraction to create structured datasets for analysis.

Feature Extraction Techniques

Utilizes methods like pose estimation and silhouette analysis to capture essential gait characteristics.



Results and Discussion

Accuracy Rates Achieved: Experiments demonstrated a peak accuracy rate of 85%, although variability remains influenced by external factors.

Key Challenges Faced: Occlusion and distinct walking styles greatly hinder reliable identification, necessitating innovative solutions for improvement.

Methodological Enhancements: Proposed improvements include advanced filtering techniques and machine learning algorithms to improve capture consistency.

Problem Statement:

Automatic Light Control Using Gait Recognition:

In homes, offices, and public spaces, lighting systems often use manual controls or passive infrared (PIR) motion sensors, which have limitations such as inability to distinguish humans from pets, reliance on line-of-sight, poor performance in low light, and lack of personalization. Gait recognition—identifying individuals by their walking patterns—provides a more reliable and advanced solution for human presence detection, enabling automated and personalized lighting control while overcoming these drawbacks.

Smart Surveillance Systems:

Detect if a person enters a restricted area

Trigger alerts only when a human is present (not animals or moving objects)

Entry Control and Access Monitoring

Detect presence at doors or access points before unlocking

Can be combined with other authentication methods

Conclusion:

With the real-time gait recognition of human with web camera will help us in solving the problem statements that are mentioned above.

Such as:

When human is detected, the lights in the home will be turned on. This solves the first problem of turning on the lights by identifying human but not just motion detection which can be caused by pets in the home, or even the curtains.

The entry doors at the malls can differentiate between human and other moving objects to open the doors.

Future Scope

Gait Identification

Findings: Current studies indicate significant promise in identifying individuals through unique gait patterns across varying conditions.

Future Research

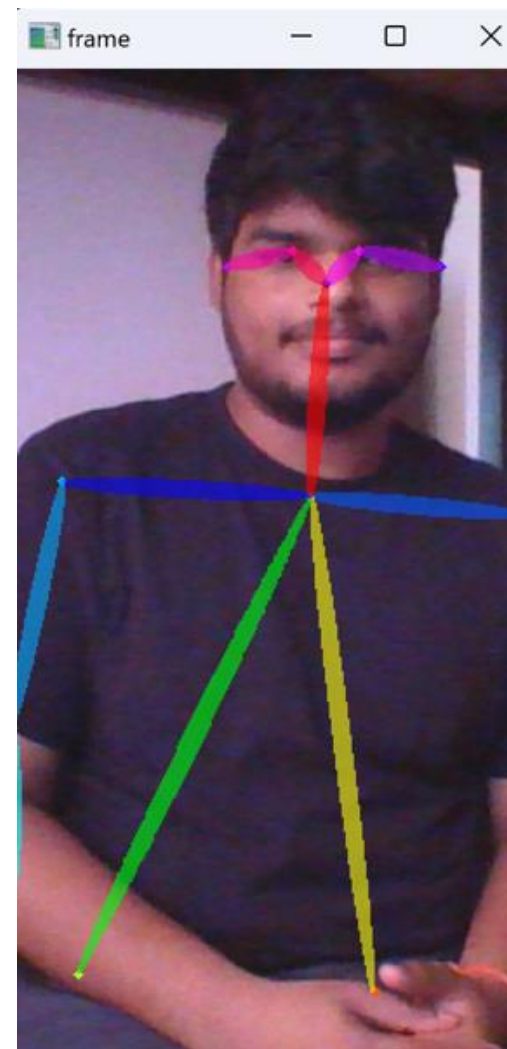
Directions: Focus on leveraging larger datasets and real-time processing advancements to refine gait recognition efficacy and scalability.

Diverse Application Areas:

Applications span surveillance, biometrics, and healthcare diagnostics, enhancing operational efficiency and patient care accuracy.

Results:

```
Windows PowerShell
Processing time: 0.09431 seconds
1/1 [=====] - 0s 63ms/step
Processing frame: 173
✓ Human detected
Processing time: 0.09445 seconds
1/1 [=====] - 0s 64ms/step
Processing frame: 174
✓ Human detected
Processing time: 0.08007 seconds
1/1 [=====] - 0s 63ms/step
Processing frame: 175
✓ Human detected
Processing time: 0.07840 seconds
1/1 [=====] - 0s 64ms/step
Processing frame: 176
✓ Human detected
Processing time: 0.07970 seconds
1/1 [=====] - 0s 58ms/step
Processing frame: 177
✓ Human detected
Processing time: 0.07870 seconds
1/1 [=====] - 0s 65ms/step
Processing frame: 178
✓ Human detected
Processing time: 0.08079 seconds
1/1 [=====] - 0s 62ms/step
Processing frame: 179
✓ Human detected
Processing time: 0.07814 seconds
```



Input image



Result



Video Recording of Gait based Human detection:

Drive Link :- [click here](#)