**A Project Abstract on**

**Gait-Based Health Risk Detection**

**fulfilment of**

**grade for the subject**

**Artifical intelligence and Machine learning(24AD2001)**

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**Project title : Gait-Based Health Risk Detection**

* **Problem Statement :**
* Subtle changes in gait often signal health risks like falls, neurological disorders, or musculoskeletal issues, especially in elderly or recovering patients. Traditional detection methods are costly and invasive. This project aims to develop a video-based, machine learning system to automatically detect abnormal gait patterns, enabling early, non-invasive health risk identification.
* **Objectives**
* To develop a system that analyzes human gait using video input and computer vision.
* To extract key gait features such as step length, speed, and posture using tools like MediaPipe.
* To train a machine learning model to classify gait as “normal” or “risky.”
* To enable early detection of health risks such as falls, neurological disorders, and musculoskeletal issues.
* To provide a non-invasive, cost-effective solution suitable for smart homes, clinics, and rehabilitation centers.
* To support continuous monitoring and timely alerts for caregivers or medical professionals.
* **Proposed Methodology**

1. **Data Collection**
   * Gather walking video samples from individuals across different age groups and health conditions.
   * Ensure diversity in gait patterns to train a robust model.
2. **Preprocessing**
   * Use computer vision tools like **MediaPipe** to detect and track body landmarks.
   * Extract key gait features such as step length, stride frequency, joint angles, and posture alignment.
3. **Feature Extraction**
   * Convert raw video data into structured numerical features.
   * Normalize and clean the data to improve model accuracy.
4. **Model Development**
   * Train machine learning models (e.g., Decision Trees, SVM, or Neural Networks) to classify gait as “normal” or “risky.”

* **Expected Outcome**
* A functional system capable of analyzing gait patterns from video input using computer vision and machine learning.
* Accurate classification of gait as “normal” or “risky,” enabling early detection of health risks such as falls, neurological disorders, and musculoskeletal issues.
* A non-invasive, cost-effective solution suitable for smart homes, clinics, and rehabilitation centers.
* Improved health monitoring and timely alerts for caregivers and medical professionals.
* Demonstration of how AI and ML can be effectively applied to real-world healthcare challenges.

**Abstract**

* **Gait—the pattern of how a person walks**—can reveal important clues about their health. Subtle changes in walking style may indicate risks such **as falling, neurological disorders** (like Parkinson’s), or **musculoskeletal issues**. This project aims to develop a simple system that analyzes gait patterns using video input and machine learning to detect potential health risks.
* It Useful
* Helps **elderly people** avoid falls
* Detects **diseases early**
* Tracks **recovery after injury**
* Can be used in **smart homes** to alert family or doctors
* The system uses computer vision tools (such as MediaPipe) to extract key features from walking videos, including **step length**, **speed**, and **body posture**. These features are then processed using a machine learning model to classify gait as either "normal" or "risky." By identifying abnormal gait patterns early, the system can help in **preventing falls** and supporting timely medical intervention—especially for elderly individuals or patients recovering from injury.
* This project demonstrates how artificial intelligence can be applied to healthcare in a non-invasive, cost-effective way, making it suitable for smart homes, clinics, and rehabilitation centers.
* Basepaper reference: https://www.researchgate.net/publication/390840805\_Privacy-Preserving\_Abnormal\_Gait\_Detection\_Using\_Computer\_Vision\_and\_Machine\_Learning