Project Title:
Metaheuristic Optimization of Human Pose Populations for Enhanced Pose Estimation

Objective:

The objective of this project is to develop and evaluate the performance of various metaheuristic optimization algorithms (Genetic Algorithm, Particle Swarm Optimization, Ant Colony Optimization, and Grey Wolf Optimizer) for refining a population of human poses to better align with ground truth pose data (GTPose).

Problem Description:

Given a dataset of ground truth human poses (GTpose.mat) and an initial population of candidate poses (PopulationPoses.mat), the project aims to:

1. **Design the proper methodology diagram for each of the optimization algorithm.**
2. **Define an appropriate fitness function (metrics)** to quantify the similarity between candidate poses and the ground truth poses.
3. **Design and implement four metaheuristic optimization approaches** (Genetic Algorithm, Particle Swarm Optimization, Ant Colony Optimization, and Grey Wolf Optimizer) to optimize the population of candidate poses.
4. **Design Evaluation Framework:**
   - The performance of each algorithm will be evaluated using both quantitative and qualitative metrics. The quantitative metrics are designed to measure the accuracy, efficiency, and effectiveness of pose optimization:
     - **Quantitative Metrics**
     - **Computational Efficiency**
     - **Qualitative Assessment**

The primary objective is to optimize the pose population to minimize the difference between the candidate poses and the ground truth poses, ensuring a better match.

Expected Outcomes:

- A **comparative analysis** of the four metaheuristic algorithms based on various quantitative metrics (e.g., MJPE, PCK, PEA) and computational efficiency.
- Identification of the most suitable algorithm(s) for human pose optimization in terms of both accuracy and efficiency.
- Demonstration of **improved pose estimation accuracy** through optimization.

links.

- https://www.researchgate.net/publication/231521391_Documentation_Mocap_database_HDM05
- https://resources.mpi-inf.mpg.de/HDM05/