Weekly Report – Week 1

Project Name: Person Re-identification
Course Name: CSE623 Machine Learning Theory and Practice
University Name: Ahmedabad University
Professor Name: Prof Mehul Raval
Team Members:

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Summary of Work Done This Week:

This week, our team focused on understanding the fundamentals of **Person Re-identification**, including key challenges and solutions from state-of-the-art research. We reviewed existing datasets, particularly **PRW (Person Re-identification in the Wild)**, which provides large-scale annotated pedestrian images captured from multiple cameras. Our main tasks included:

1. **Understanding the Re-ID Pipeline:**
    - Explored the two key components: **pedestrian detection** and **person recognition**.
    - Studied the impact of different detection and recognition models on re-identification accuracy.
2. **Dataset and Benchmarking:**
    - Analyzed the **PRW dataset**, which contains **932 identities and 11,816 frames**.
    - Reviewed benchmarking results for various CNN architectures such as **AlexNet, VGGNet, and ResNet**.
3. **Methods for Performance Improvement:**
    - Examined **cascaded fine-tuning**, where a detection model is trained first, followed by a classification model.
    - Understood **Confidence Weighted Similarity (CWS)**, which integrates detection scores into similarity measurements for better accuracy.
4. **Challenges Identified:**
    - The need for **high-precision pedestrian detection** to improve re-ID accuracy.
    - The trade-off between **detection recall and false positives**, affecting the quality of gallery images.
    - The importance of **feature extraction techniques** for better representation learning.

Plan for Next Week:

Based on our findings, we will move on to **Feature Extraction and Optimization Techniques** for re-identification. Our key objectives will be:

1. **Feature Extraction Methods:**
    - Implement **CNN-based embeddings** for better identity discrimination.
    - Compare **hand-crafted features vs deep-learning features** in terms of accuracy.
2. **Fine-tuning Detection Models:**
    - Train pedestrian detectors on **custom datasets** to improve performance.
    - Evaluate different CNN architectures for feature extraction.
3. **Metric Learning Techniques:**
    - Experiment with **distance metrics (Euclidean, cosine similarity, and learned metrics)** to improve person matching.
4. **Preliminary Implementation:**
    - Start implementing **bounding box annotation and object detection** using deep-learning frameworks.

Conclusion:

Our team has gained a strong theoretical understanding of **Person Re-identification** and its challenges. Moving forward, we will focus on **feature extraction** and optimizing detection models to improve accuracy.