Triplet Loss

Extension of Contrastive Loss with Triplet Structure

Triplet Components

Anchor — Reference sample

Positive — Sample similar to anchor

Negative — Sample different from anchor

🔍 Triplet Mining

Careful triplet selection strategy needed for effective learning

Hard Negatives: Most difficult negative samples

Semi-Hard Negatives: Medium difficulty negative samples

Loss Formula

$$\max(d(a,p) - d(a,n) + margin, 0)$$

Penalizes when anchor is closer to negative than to positive

Mining Approaches

Online Mining   **Offline Mining**

⚡ Efficiency

More efficient than Contrastive Loss (One optimization step per triplet)

💡 Applications

1. Face Recognition (FaceNet)
2. Person Re-identification
3. Fine-grained Similarity Learning