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Progress (Literature Review):

- Tencent AI Research Paper: [Range Loss for Deep Face Recognition with Long-Tailed Training Data](#)
 - Tencent is the current leader for MegaFace and LFW competitions.
 - Presents a way to overcome the long-tailed distribution of data (few people with many photos, many people with few photos).
 - We empirically find that popular training methods in deep face recognition, i.e. contrastive loss, triplet loss, and center loss, all suffer from long tail distributions, while removing long tailed data can improve the recognition performance.
 - Extensive experiments and analysis on two famous face benchmarks demonstrate the proposed range loss can largely relieve the long-tail effect and achieve superior performance than previous methods.
 - Some equations of loss functions:

$$\mathcal{L}_R = \alpha \mathcal{L}_{R_{intra}} + \beta \mathcal{L}_{R_{inter}} \quad (1)$$

α, β - parameter constants.

$$\mathcal{L}_{R_{intra}} = \sum_{i \in I} \mathcal{L}_{R_{intra}}^i = \sum_{i \in I} \frac{k}{\sum_{j=1}^k \frac{1}{D_j}} \quad (2)$$

I - The complete set of Identities in a batch.

D_j - The j th largest distance.

$$\mathcal{L}_{R_{inter}} = \max(m - D_{Center}, 0) = \max(m - \|\bar{x}_{\mathcal{Q}} - \bar{x}_{\mathcal{R}}\|_2^2, 0) \quad (3)$$

D_{Center} - The shortest distance between class centers.

m - a parameter that specifies a max margin for which the loss will not be computed.

The final loss function with softmax:

$$\mathcal{L} = \mathcal{L}_S + \lambda \mathcal{L}_R = - \sum_{i=1}^M \log\left(\frac{e^{W_{y_i}^T x_i + b_{y_i}}}{\sum_{j=1}^n e^{W_j^T x_i + b_j}}\right) + \lambda \mathcal{L}_R \quad (4)$$