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What are the contributions of this paper?

There are 3 major contributions that the SphereFace paper makes. First, they propose using the A-softmax (angular softmax) loss for CNNs to learn discriminative face features with a novel geometric interpretation. These features lie on a hypersphere manifold, matching previous hypotheses that faces themselves will lie on a manifold of the hypersphere. The second contribution is that the angular margin can be adjusted via a parameter m*, for which the authors derived lower bounds for such that the loss approximates the learning task that minimal distance between classes is larger than the greatest intra-class distance. Their third important contribution is to show that using angular margins are effective for the face recognition task by achieving high performance on multiple datasets across several benchmarks.*

Illustrate the three properties of the proposed A-Softmax.

- *1) The features learned through Softmax loss are angularly distributed instead of linearly (in normal softmax) and with adjustable difficulty*
    - *As m increases, the angular margin becomes larger, the constrained region of the manifold shrinks, and the learning task becomes more difficult*
- *2, 3) There is a minimal optimal m, for which the authors have derived some lower bounds*
    - *2) When doing binary classification, the lower bound for m >= 2 + sqrt(3)*
    - *3) When doing multi-class classification, the lower bound is m >= 3*
- *Introduces a geometric constraint such that it (the A-softmax) is sensitive to the angular relationship between feature vectors and the centroids for a class rather than just Euclidean distance*
    - *This is better for tasks like face recognition where there is a lot of intra-class variety in data*

What is the evaluative metric used for the LFW dataset? How is it calculated?

The evaluation metric is just accuracy (%) for both LFW and YTF. Accuracy is just calculated by # correct predictions / # test examples.