# Interpretation of KNN Analysis

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1. Overall Performance: The embeddings show strong class separability. The best model achieved a Macro AUC of 0.964, indicating excellent classification potential.

2. Best Distance Metric: **Cosine distance** consistently outperformed euclidean distance (best AUC 0.964 vs 0.949). This suggests that the **direction** of the embedding vectors is more informative than their absolute magnitude for this task.

3. Optimal K value: The optimal number of neighbors (k) was found to be **15** for the best performing model. A higher k-value generally implies a smoother decision boundary, making the model more robust to noise.

4. F1-Score vs. AUC: The best Macro F1-score (0.763) is slightly lower than the AUC. This is common and can indicate that while class probabilities are well-ranked (high AUC), the optimal decision threshold might be harder to find, especially for minority classes.

5. Practical Application (Top-3 Accuracy): The Top-3 accuracy is very high (around 0.944). This is extremely valuable for clinical or research use-cases where the model can act as a recommendation system, presenting a short list of potential syndromes for a specialist to review.