Automated Music Recommendation using Similarity Learning

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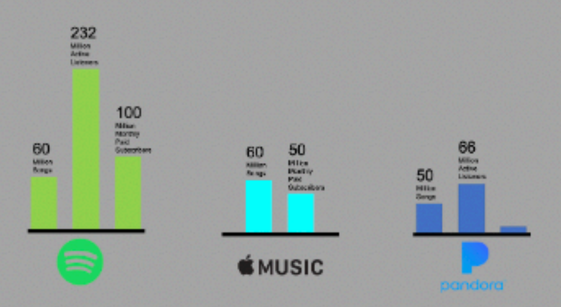
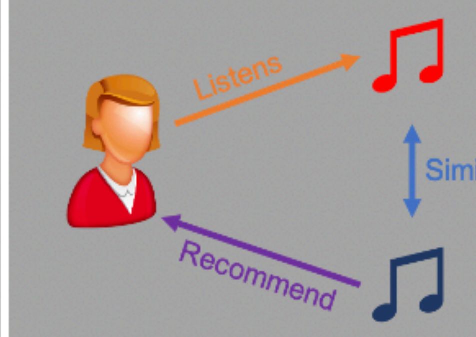
Similarity Learning for Music Recommendation ?

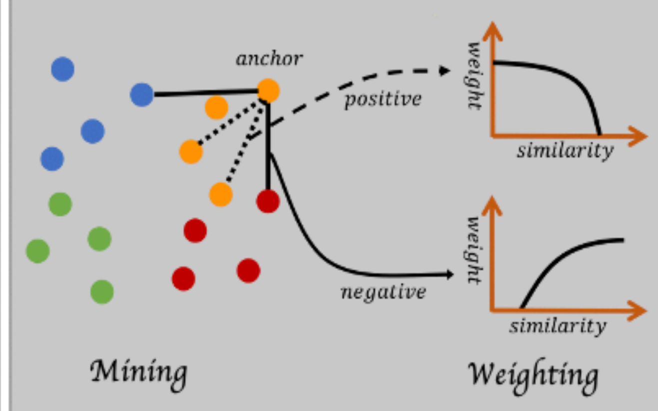


With the growth of digital music collections, automated music recommendation has become an increasingly relevant topic.

Collaborative Filtering methods, although popular, suffer from the Cold-Start Problem.



Content-Based methods mitigate the effect of the Cold-Start Problem but are heavily reliant on the quality of music features.

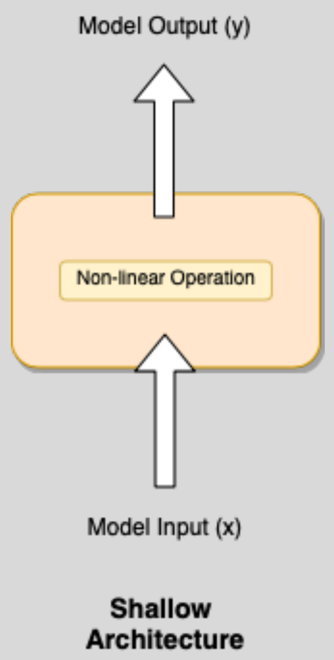


Similarity Learning is a valid approach to **Content-Based music recommendation**, due to its ability to extract meaningful music features from songs.

Architectures

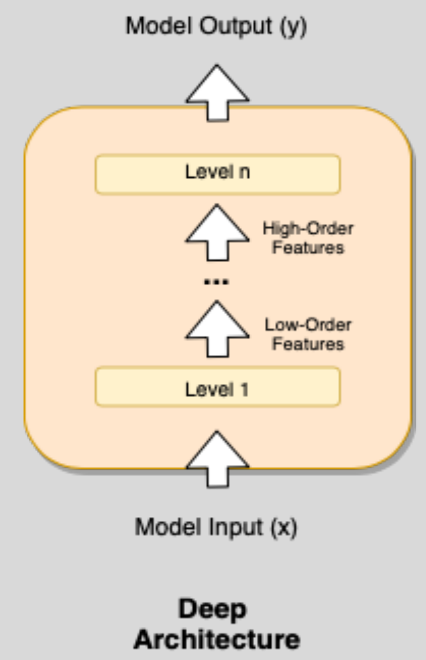
Two types of architectures were tested for feature extraction, namely :

Shallow Architectures



Rely on a single transform to extract features from music audio.

Deep Architectures



Use numerous different transforms to extract features from music audio.

Features

Using the above architectures, we extracted the following feature sets:

1. **MFCCs (**Mel-frequency Cepstral Coefficients) [3]: Shallow architecture features.
2. **Categorical Cross-Entropy Loss Features**: Deep architecture features. Extracted using a PRCN [1] and trained with Categorical Cross-Entropy Loss.
3. **Similarity Learning Features**: Deep Architecture features extracted using a PRCNN that was trained using similarity learning (Triplet Loss) [2].

Results

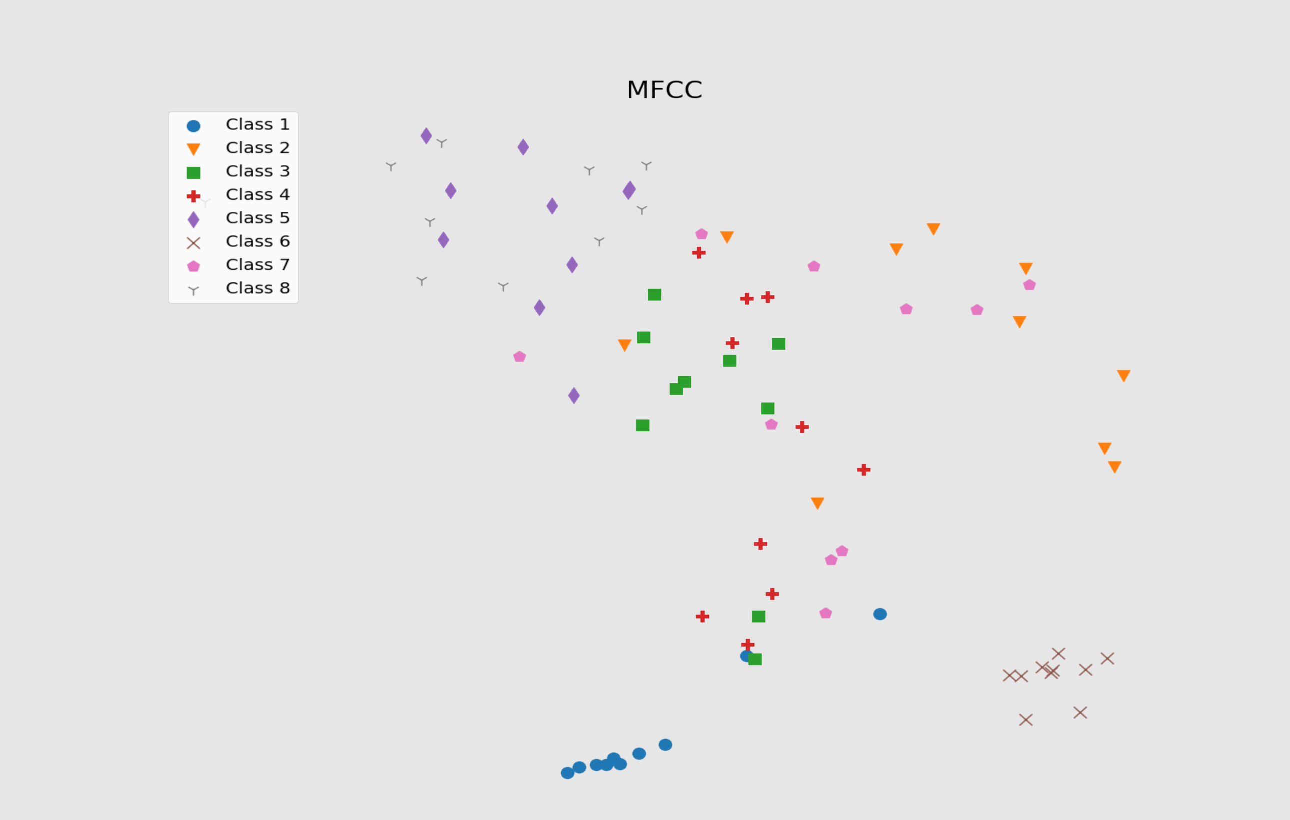


Figure 1. MFFCs

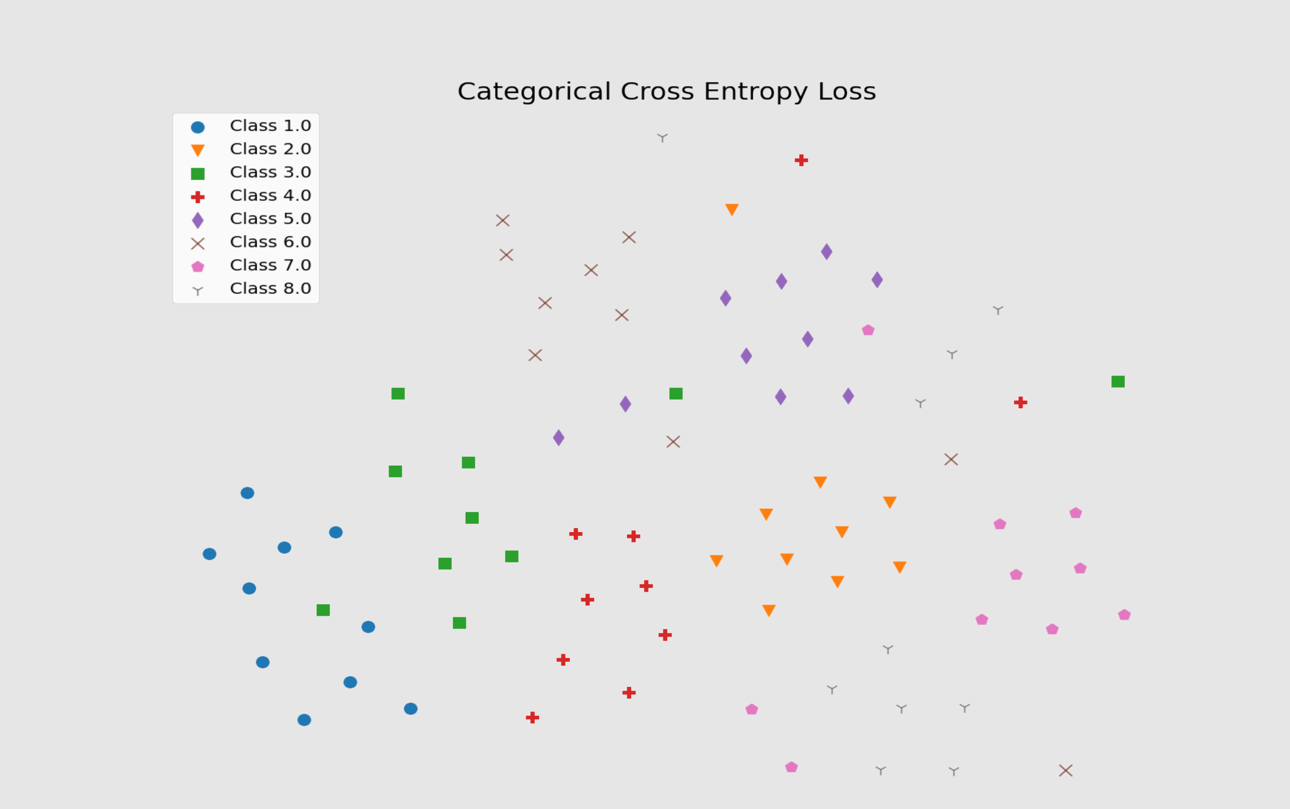


Figure 2. Categorical Cross-Entropy Loss features

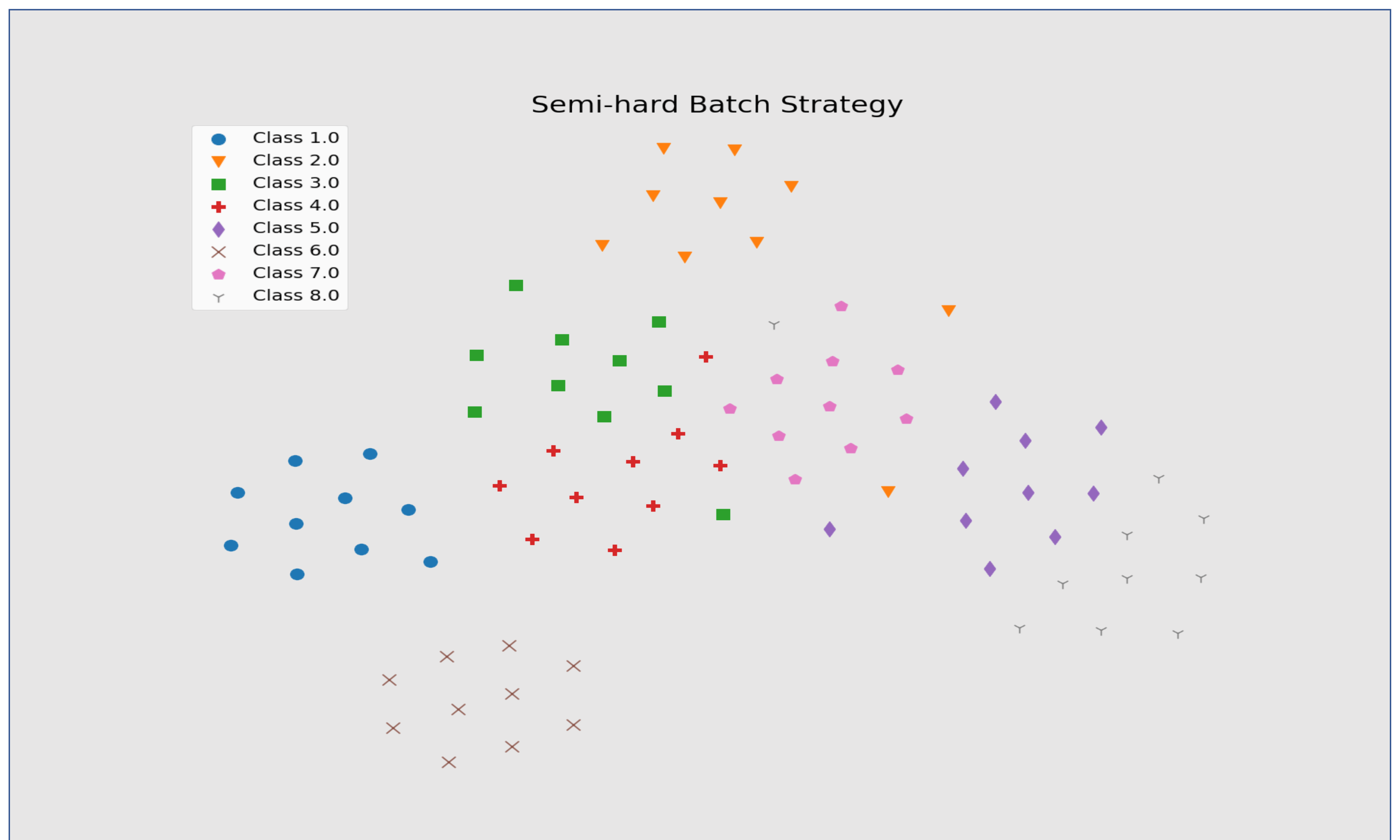
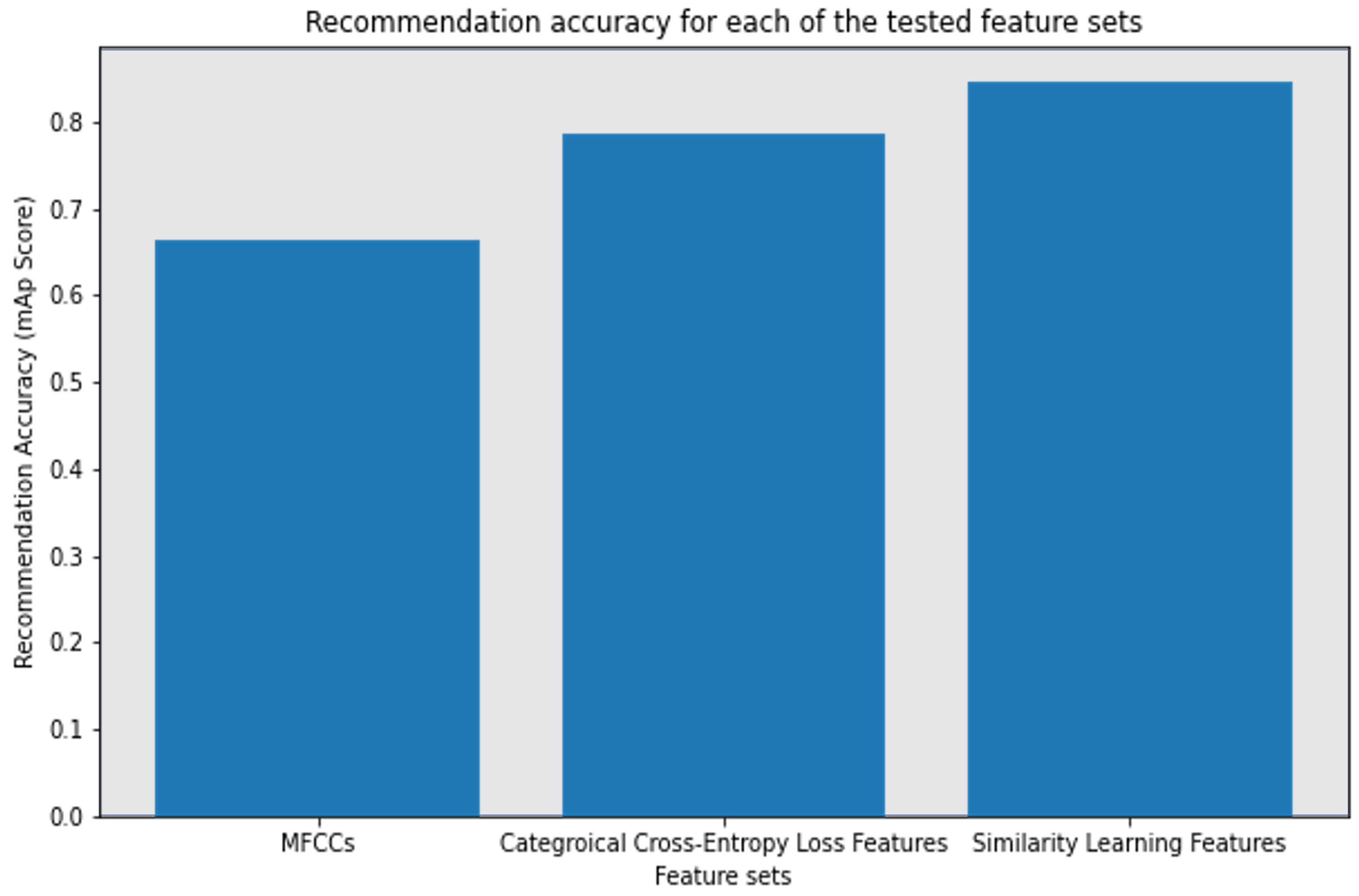


Figure 3. Similarity Learning features.



Discussion

From the results the following deductions can be made:

1. Features extracted using Similarity learning are the most accurately grouped.
2. In a general sense, the features extracted using deeper architectures lead to better groupings, which inevitably lead to better predictions.
3. Although the MFCCs were correctly grouped for some of the classes, they were not accurate for all of the classes, which was the case similarity learning features.

Future Work

In Future work I would like to :

1. Further explore the use of similarity learning for automatic music recommendation
2. Compare the performance of collaborative filtering methods to content-based methods.

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References

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2. Schroff, F., Kalenichenko, D., Philbin, J.: Facenet: A unified embedding forface recognition and clustering. In: Proceedings of the IEEE conference oncomputer vision and pattern recognition. pp. 815–823 (2015)
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