Local and Global Key-Finding in Symbolic and Audio Sources Based on Hidden Markov Models and Key Profiles

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This model is based on the ensemble method described in this paper [3] and a substitution to the model submitted in 2018,[1] which used a single HMM. The ensemble was configured using 10 key profiles and 3 key transition *ratios*. Figure 1 shows the key profiles. The key transition ratios are 5, 10, and 15.
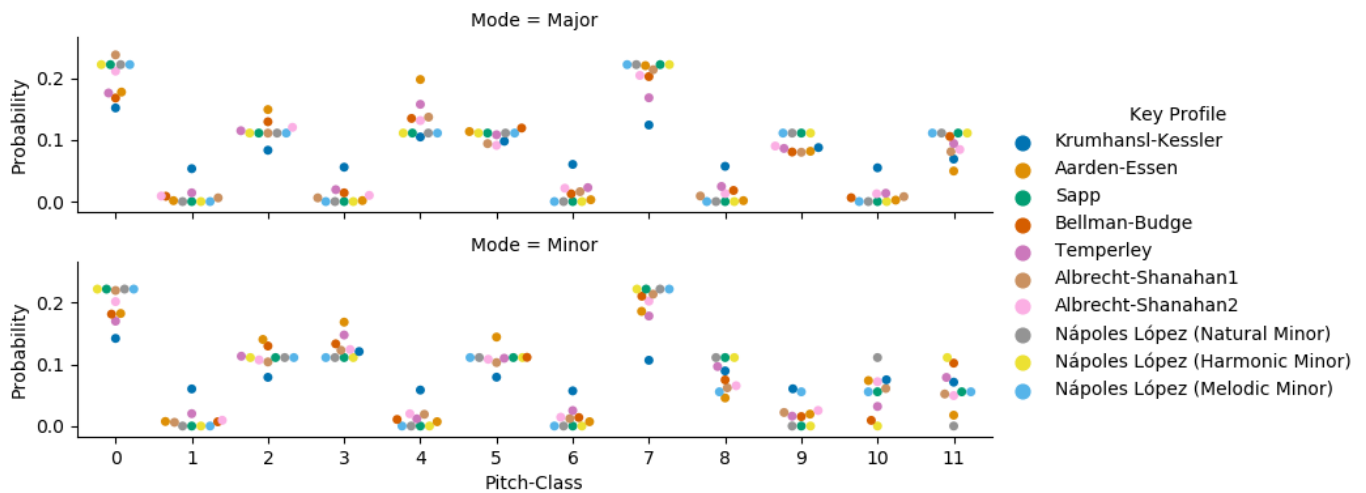

Figure 1: Key profiles used in the ensemble.

A preliminary test showed that the custom key profile *Harmonic Minor* generalized best when using a single Hidden Markov Model (HMM), however, different key profiles perform best in different datasets, therefore, we decided to include a varied set of key profiles in the ensemble.

This model was trained on full examples of music, it has not been tested whether training on 30 seconds of music (as evaluated in the MIREX task) would increase (or reduce) the performance of the model . The meta-classifier is a Logistic Regression classifier with the same parameters described in [3]. Other meta-classifiers (i.e., SVM, NaiveBayes, MLP) were tested, obtaining similar results. The datasets used for training consist of the ones described in this paper [2], except for the one denoted as *Classical Music*, which we replaced with an audio-synthesized version of the dataset used here [1] and an internal dataset of our own.

References

[1] Joshua Albrecht and Daniel Shanahan. The Use of Large Corpora to Train a New Type of Key-Finding Algorithm: An Improved Treatment of the Minor Mode. *Music Perception: An Interdisciplinary Journal*, 31(1):59–67, 2013.

[2] Filip Korzeniowski and Gerhard Widmer. Genre-Agnostic Key Classification With Convolutional Neural Networks. In *Proceedings of the 19th International Society for Music Information Retrieval Conference*, pages 264–270, Paris, France, September 2018. ISMIR.

[3] Néstor Nápoles López, Claire Arthur, and Ichiro Fujinaga. Key-Finding Based on a Hidden Markov Model and Key Profiles. In *Proceedings of the 6th International Conference on Digital Libraries for Musicology*, DLfM '19, New York, NY, USA, 2019. ACM.

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[1]https://www.music-ir.org/mirex/wiki/2018:Audio_Key_Detection_Results
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