

Recognition of Musical Melody Lines using Machine Learning

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Summary

This project is an investigation into the possibility of using machine learning as a way to identify melodic lines that are performed live, such as being sung or played on an instrument such as the piano.

Steps of the project:

- Creation of software to transform audio into an encoding such as MIDI
- Creation and training of a learning model using training data
- Testing of the model with new data

Model Creation and Training

- Using Hidden Markov Models (HMMs) due to:
 - The sequential nature of the data being processed
 - Their use in other projects similar to this one, such as folk music classification based off melody lines^{[1][2]}
- Train model with mix of MIDI database of melody lines and audio samples
- Test model with both melodies from the database and audio samples to determine best way to create the HMMs for the melody identification

Key Questions:

- Develop or find a way to measure similarity between melodic lines. Then, under this measure of similarity, what is the tolerance range for the model to still be correct?
- How many notes are needed for the model to recognize the melody line?
- What effects does transposing the melody line have on the performance of the algorithm?
- How does the model behave when there is a mistake in the performance of the melody, such as a wrong note or a fluctuation in the speed?
- How does the model perform if the input quality of the melody line is poor?

^[1]Chai, Wei, and Barry Vercoe. "Folk music classification using hidden Markov models." Proceedings of international conference on artificial intelligence. Vol. 6. No. 6.4. sn, 2001.

^[2]Miotto, Riccardo, and Nicola Orio. "Automatic identification of music works through audio matching." International Conference on Theory and Practice of Digital Libraries. Springer, Berlin, Heidelberg, 2007.