Name(s)	Project Number
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Project Title

PhonoNet: Deep Learning for Raga Identification in Indian Classical Music

Abstract

Objectives

Indian Classical music is an improvisational form of music based on ragas, melodic frameworks which are passed down through a fading oral tradition. I aimed to provide computational prediction of ragas so singers can receive live feedback when learning and so important features of the music can be preserved digitally in my machine learning system.

Methods

First, my system computed the short-term-fourier transform of the input audio data to form a chromagram representation of the notes being sung. This data was augmented using a novel transpositional data augmentation algorithm and split into 150 second chunks. The raga information was learned from these chunk samples using a deep convolutional neural network. The deep network was then modified with a recurrent layer to allow processing of multiple chunks in sequence, allowing full length songs to be learned.

Results

Experiments identified the optimal system which uses 150 second chunks and 12 chroma bins with data augmentation. This joint system achieved 78.9% accuracy on raga prediction from chunks and 98.9% accuracy on identification from chunks, a new state-of-the-art for raga detection.

Conclusions

The PhonoNet system documents the structure of Indian Music with deep networks and provides live feedback mechanisms for learning the art form. The proposed hierarchical system can extend to other tasks with long temporal sequences, and the proposed data augmentation algorithm may be applied to any form of music processing. These other applications will be pursued as future work in addition to extending the PhonoNet system to other forms of world music.

Summary Statement

I created a computational system capable of understanding and preserving the fading art of Indian classical music.

Help Received

The open-source Hindustani music dataset used was obtained freely online through the Universitat Pompeu Fabra's website.