# **Segmentation and Analysis of Taniavartanam in Carnatic Music Concerts**

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### **Motivation Feature Engineering** Mridangam Ghatam Khanjira 0.5 0 -0.5 D D R D **Ereq (KHz)** 0.5 0.1 1 Time (s) 1.5 2.5 0.5 2

Relevant MIR task.

ISMIR 2:02:3

- Applications
  - Enriched and informed music listening Ο
  - Appreciation for listeners Ο
  - Fast navigation Ο
  - Concert summarization Ο
  - Musicological analysis Ο
  - Auto-Tagging Ο

- Rhythm and Tempo Features
  - Auto-Correlation Function (ACF) on Onset **Detection Function (ODF)**
  - Average Stroke Density (ASD)
- Spectral Feature: Narrow Band Spectrogram (NBS)
- Spectral and Rhythm Posteriors



### Dataset

# Methodology

### **Term Definitions**

	No. of Abhiprāya	No. of Concerts	<b>Duration ~ (hrs:mins)</b>
Mridangam	51	16	02:24
Mrid + Ghat	86	18	04:56
Mrid + Khanj	94	21	05:47
Total	231	55	12:08



Segment	Audio fragment between any two adjacent detected boundaries		
Segment	that may or may not cover a complete section.		
Section	A primary portion of the taniāvartanam. A section can contain		
Section	multiple compositions and multiple segments.		
	A modifier to tala that decides the number of strokes per beat,		
Nade	The subdivision structure within a beat in CM		
	Chaturaśra, Tiśra, Khanda are different kinds of nade-s		
Abhipraya (AB)	A rhythmic elaboration in a particular nade during tani.		
Korapu (KP)	A musical dialogue between the musicians during performance.		
Earans(EA)	The first part of the conclusion in tani where the		
rarans (FA)	percussionists play fast to gain momentum toward the end.		
Mohra (MO)	Popular rhythmic structure played after the farans hinting		
wionia (WO)	the climax of taniāvartanam.		
Korvai (KO)	Stroke patterns that are played three times, concluding the tani.		

### Solo Mridangam Tani







# **Segmentation Results**

Case	Section	Precision	Recall	F1-Score
Multiple Percussion _	AB	0.92	0.99	0.96
	КР-ҒА-МО-КО	0.82	0.89	0.86
	Overall	0.87	0.94	0.91±0.03
Single Percussion	AB	0.7	0.82	0.74
	FA-MO-KO	0.82	0.86	0.83
	Overall	0.75	0.84	0.79±0.05

# **Contributions**

- A diverse dataset of tani recordings having primary section labels
- An example of adapting available MIR methods to  $\bullet$ genre-specific problems by performing appropriate feature engineering

# Conclusion

- Addressed an unexplored problem, structural segmentation, and labeling of tani audios according to different Nadais, Mohras and Korvais.
- A culture-specific approach clearly benefits both the feature choice and modeling.

Scan accompanying QR code for Dataset details and supplementary material.

