A Machine Learning Approach for Rhythmic Analysis of North Indian Classical Music

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Music plays a vital role in our day-to-day life, especially in today's digital age. Computational musicology is an interdisciplinary area in which computational methods are used to analyze musical structures. While western classical music is extensively explored, North Indian classical music remains to be explored computationally. However, rhythmic analysis in North Indian Classical music is important as it serves in a multitude of applications e.g., intelligent music archival. Rhythm in North Indian classical music revolves around the primary concept of *Taal* - the cycle of beats of specific syllables and beats. Taken together, the main objective of the proposed study is to apply machine learning for the recognition of *Taal*. A dataset consists of 151 excerpts (2mins; 44.1 kHz; stereo; .wav), belonging to four popular *Taals* namely; Teentaal, Ektaal, Jhaptaal and Rupak. Acoustic features about fluctuation, onsets, event density, tempo, metroid, and pulse clarity will be extracted using MATLAB MIRToolbox. Support Vector Machine, Decision Tree, Naive Bayes, Random Forest, and k-Nearest Neighbor were applied on feature extracted data using Jupyter Notebook IDE with Python language. Among these classifiers, SVM obtained a higher accuracy (54.83%). When concerned with the evaluation metrics, SVM Obtained 66.67% with the cross-validation (5-fold). Further, SVM obtained higher accuracy when considering only the highly influential features that returned from the correlation metrics method. Even though the findings of the study would be limited by the consideration of a smaller dataset, the study would make a promising contribution through computationally exploring rhythmic patterns of a great musical tradition.

Key words: *Taal Recognition, North Indian Classical Music, Rhythmic Analysis, Computational Musicology*

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