Discovering Rāga Motifs by Characterizing Communities in Networks of Melodic Patterns
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Indian art Music
- Hindustani (North-Indian), Carnatic (South-Indian) music
- Rāga: melody framework, Tāla: rhythm framework
- Rāga: svaras, aroha-arvoha, Characteristic phrases
- Oral pedagogy, essentially audio music repertoire

Goals
- Discovery of melodic motifs in audio recordings
- Determining musically relevant similarity threshold
- Characterization of melodic patterns (gamaka, composition specific or characteristic)

Method
- Represent melody by predominant pitch
- Automatic tonic identification
- Pattern discovery
- Undirectional network (G), weight: \( W_{ij} = e^{-D_{ij}/T} \)
- Disparity filtering, \( p = \{99.9, 99, 90, 80, 50, 0\} \%
- Threshold: clustering coefficients (G and G_p)
- Community characterization: scoring criterion

Results
- Histogram of \( \mu_p \) for all 100 melodic phrases
- Mean \( \mu_p \) and standard deviation \( \sigma_p \) of \( \mu_p \) for each rāga.

Evaluation
- 44 hours of polyphonic audio recordings
- 139 vocal, 21 instrumental performances
- 10 rāgas, 16 pieces each, 57 artists
- 10 characteristic communities per rāga
- 10 professional Carnatic musicians
- Binary rating: Yes or No
- Mean (\( \mu_p \)) per phrase

Conclusions
- Topological properties of the pattern network can be used for determining similarity threshold.
- Functional roles of the patterns can be exploited for pattern characterization.
- Proposed methodology is successful in identifying musically meaningful melodic patterns.

References