Computational analyses of coarticulatory processes in Karnatak music

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Abstract
In the South Indian music tradition known as Karnatak music, *svaras* (notes) are often performed with *gamakas* (ornamentation), which can involve oscillations, slides and brief movements to neighbouring pitches. However, the specific *gamaka* performed in a given context is not typically prescribed by notation or theoretical texts, but is instead acquired through the learning of phrases orally/aurally. Musicians and musicologists have long observed that the choice of *gamaka* is dependent on melodic context (Swift 1990; Subramanian 2007; Morris 2011), a phenomenon theorized using the concept of coarticulation: where the performance of a unit (in this case a *svara*) is influenced by that which precedes or follows it (Pearson 2016).

In this talk, we present an extension of our earlier analyses (Nuttall et al. 2024, 2025), exploring coarticulatory processes in Karnatak music through a combination of distance-based clustering, codependency analysis, and deep *svara* embeddings. This study draws on an expanded dataset of performances annotated by Karnatak musicians at both the *svara* and *svara*-form (*svara* with *gamaka*) levels. We show how coarticulatory influences on *svara* vary with increasing contextual scope and identify additional contributing factors, such as *svara* duration. Finally, we discuss the implications of this stylistic feature on computational tasks such as automated *svara* transcription, and demonstrate how such tasks can be improved by incorporating melodic contextual information into computational models for *svara* representation learning.

References

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