

DEVELOPMENT OF A COMPUTER BASED ANALYSIS AND LEARNING SUPPORT SYSTEM FOR NORTH INDIAN CLASSICAL MUSIC

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Despite the recent paradigm shift of the teaching practice pertaining to North Indian Classical Music (NICM) has transformed the computer based learning support system essential and pivotal, the currently available software from this class hinders the user from exposing to the colourful, intricate and subtle passages of NICM due to the shades of Western musical connotations in their structures.

In this work, a full-fledged computer based analysis and learning support system addressing the salient features of NICM, which are not embedded in currently available counterparts has been designed and implemented.

One main type of aforementioned unique features includes the user friendly notation editor facilitated with microtones in several languages and the interpreter based on traditional *Bhathkande* system. The other features include transparent instrument modelling techniques, such as physically inspired synthesis and embedding original techniques for articulation in synthesis based on Autoregressive Moving Average (ARMA) process and tone modulation. Pertaining to modelling, attention was focused to the realization of timbre, possessing highly nonlinear and complex attributes such as of Sitar. The near perfect implementation of articulation techniques, such as *Meend*, *Gamak* and *Gazette* using ARMA modelling are some noteworthy contributions. Further, harmonic content of sound is superimposed on a parameterized amplitude envelop in modelling nonlinear *triggering timbre* of Santoor and the resonance vibration of *sympathetic strings* of Sarod to the near perfection.

A validation technique for sound generated by a softsynth is devised using timbral properties, namely *spectrum-centroid*, *tristimulus* and *zero-crossing* rate. The properties of timbre of Sitar, Sarodhs and Santoor of several breeds are identified with the aid of a mapping defined using aforementioned timbral properties. The results show that the zone occupied by the synthesized Sitar string in the validation timbre space is closer to that of natural Sitar in contrast to commercially available synthesizers.