**Abstract**

The speech recognition systems may be designed based on any one of the sub-word unit phoneme, tri-phone and syllable. The phonemes are a set of base-forms for representing the unique sounds in a particular language. In supervised phoneme classification, the segmentation of phoneme, features and class label are given and the goal is to classify the phoneme. Phoneme classification and recognition can be useful in applications such as spoken document retrieval, named entity extraction, out-of-vocabulary detection, language identification, and spoken term detection. In trained speech, each phoneme occurs clearly in speech waveform. In spontaneous speech, due to co-articulation effect, influence of adjacent phonemes is present in each phoneme where left and right context frame information plays vital role in accurate phoneme classification. In the proposed work, three discriminative classifiers like Multilayer Perceptron, Naive Bayes and Support Vector Machine are used to classify 25 phonemes of Tamil language. The approximate boundaries of phoneme identified using Spectral Transition Measure (STM). After segmentation, Mel Frequency Cepstral Co-Efficient (MFCC) of 9 frames including 4 left context frames, 1 centre frame corresponding to the phoneme and 4 right context frames are extracted and used as input to classifiers. Tamil word dataset prepared to cover 25 phonemes of the language. The performance of the classifiers are analysed and results are presented.