Many models of intonation patterns for American English have been proposed by linguists and phoneticians. However, none of them, including both auditory-analysis models and instrumental-analysis models, seems to be accepted as valid and reliable. We believe that one of the best approaches to the study of intonation is the one in which the instrumentally extracted physical data (the frequency contour) are processed until they match the auditory recognition of intonation contrast. A number of data processing techniques (normalization, transformation, and feature extraction) were tested and introduced in this study to increase the validity of the patterns to be obtained by the instrumental technique. The principle of "relevancy" or "distinctiveness" in linguistic signals and the computation of the index of signal detectability (d') were used as the criteria to measure and compare the validities of the developed computer algorithms.

The computer programs developed in this study were tested at each step of the data processing using three sets of utterances, and also in an integrated set of a simulation program developed for determining intonation patterns. The digital technique was found to be useful to determine intonation patterns of American English for a theoretical study of the intonation system, and also for a practical application of building a teaching machine which can help foreign students or persons with speech problems learn American intonation effectively.