Annotation Variance Analysis for Optimal Feedback Correction

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Detection of note onsets in string instruments is still a major challenge in music signal processing. Previously, we used the annotations of four musicians (based on the Hayden Op74 finale, normal speed, repetition 12, bar 1-49s) to define the ground truth of a string quartet. We also employed annotations generated by 24 annotators of the same music piece to calculate timing errors between the annotation onsets for each instrument and the ground truth. This work presents the observed effects of differences in sample annotations and variations in key parameters of the bounded Generalized Least Squares (bGLS) model on linear phase correction of string instruments. Summarily, probability distribution objects of annotation errors for each instrument were created from the sample database of all 24 annotators with an assumption of normal distribution. Simulations of individual instruments synchronizing with a metronome were carried out using the model proposed by Repp, Keller and Jacoby 2012, based on a predetermined set of initial values. The bGLS method was then used to estimate model parameters from the response, with and without annotation errors added. Overall, our results show that increasing alpha values results in relatively higher estimates of the timekeeper response and reductions in the motor response. Furthermore, higher timekeeper values induce a corresponding increase in alpha estimates and a reduction in motor response intervals. Varying the motor response, however, appears to have little or no impact on the alpha and timekeeper estimates across all instruments.