Project 3 Metric

Definitions:

Event: An event is an interval in the ground truth which corresponds to a rocking activity occurrence. It can be defined by the start and end samples of the interval.

Detection: A detection is an interval in the predictions which corresponds to the rocking activity being detected. It can be defined by the start and end samples of the interval. As part of our pre-processing of the predictions, we removed any detection intervals smaller than 2 seconds in length. This improved performance for most of the teams. We will not do this for the submission in Proj3b, so if you think that this pre-processing (or some other one like applying a median filter) is helpful for your output then just apply it before you submit it.

Overlap: The overlap of an event and detection can be defined as $\frac{|E_i \cap D_j|}{|D_j|}$ where E_i is the ith event interval and D_j is the jth detection interval.

Metric:

When considering success in the detection of rocking motion, we want to ensure as low a false alarm rate as possible and as high as possible detection rate of an event. For this purpose, we will identify a detection with an event if it overlaps with the event more than 50%. By forcing the event to overlap with detection more than 50%, we ensure multiple events cannot identify a single detection as well as ensure the detection is not significantly larger or different from the event. A detection within an event is permissible.

By identifying detections with events, we remove the possibility of falsely inflating the true positive (TP) by only considering if an event has at least one detection identified with it. The false positive (FP) is the count of detections which are not identified with any event. We want to keep the number of false positives as small as possible which drives the detection intervals to be larger, but is kept from becoming too large by the overlap requirement. Lastly, we define false negatives (FN) which is the number of events which have no detection identified with them.

With these definitions, we can define:

$$Precision = \frac{TP}{TP + FP}$$

$$Recall = \frac{TP}{TP + FN}$$

$$F1 = 2 \cdot \frac{Precision + Recall}{Precision \cdot Recall}$$