**Mapping Gait Phases and Events to Frame Labels**

The HS and TO events have been marked from the clusters by applying some heuristics that we ascertain from literature. The frames in the stance phase in any gait cycle will always outnumber the frames in swing phase, owing to the generally accepted ~60/40 percentage split. Given that our data is collected over time and must have repetitive patterns (i.e., gait cycles), we concluded that by extracting each gait cycle and trying to map the cluster labels to stance and swing by judging which cluster label (0 or 1) outnumbers the other, we can derive the gait phases from our data. Initially, the entire data was clustered into two groups. We noted the cluster labels for each frame, and once having every frame labeled, we applied our heuristic.

We know that HS occurs when the stance phase begins and swing ends, and TO occurs when the swing phase commences and stance ends. Hence, in our dataset where we have each frame labeled to be either in stance or swing, we adjudged that the transtition from one cluster label to another over the sequence of frames would denote either HS or TO. Consequently, to judge which label from 0 or 1 denoted stance and swing, we calculated the percentage of the frames marked as either 0 or 1 from our clustering algorithm. This gave us an idea of which label represents stance and swing, since, as established before, the stance phase outweighs swing in terms of percentage in a gait cycle and the entire data was collected for subjects over several gait cycles. Once we knew which label denoted which phase, the transition points from one label to another was labeled as HS and TO.

For perspective, we provide an example: if we derived from our calculations that the label 1 represented stance, then the frame where we encounter the first 0 after a sequence of 1’s would be the TO gait event, as the stance phase terminates and devolves into the swing phase over the next few frames at this point. Similarly, the first frame where we encounter a 1 after a sequence of 0’s would denote the HS gait event, because the subject’s gait transitions into stance phase at this point for the next few frames and HS event is the beginning of every stance phase, as is TO the beginning of every swing phase.