SMOOTHING NOISY SKELETON TRACKING DATA IN REAL TIME

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Tracking Data obtained from affordable capture systems (such as Kinect) is often unsuitable for use due to a low capture rate as well as a lack of accuracy/verisimilitude.

As such we present a novel 2 stage method for improving noisy skeleton data, prioritised to suit use in a VR environment. Our system aims to provide higher framerate animation with greater verisimilitude and accuracy than raw capture alone. It does this using a correction stage that changes the position of the joint depending on its previous values, followed by a filtering stage that interpolates the joints position across frames for smoother playback of the data.

STAGE ONE // CORRECTION

The first and most obvious problem is that raw data often places joints into impossible positions. The correction stage of our method aims to fix this by tweaking measured positions to fit into the model that we observe. If we have no measured data for the joint it attempts to estimate a position based on measurements taken about its relationships to its neighboring joints.
Our system prioritises verisimilitude over attempts at accuracy, this can be seen in the difference between figures 1 & 2. Figure 1 shows a more accurate position. however figure 2 shows the same pose mirrored, due to self occulsion we don't have enough data, so we revert to a rest pose.

STAGE TWO // FILTERING

The second problem our system needs to tackle is jittery and low framerate capture. For VR content especially, a higher framerate is essential. The filtering stage applies a Kalman filter to each joint individually. This removes single frame *jitters* as well as allowing the animation to interpolate over many frames, illustrated in figure 3. It is known that the filtering process can smooth out some details. However as stated before our system prioritises use in a VR environment and as such this is a worthwhile tradeoff in our case. It is worth mentioning that the stages are completely seperate and if the details are more important the filtering stage can be ignored.

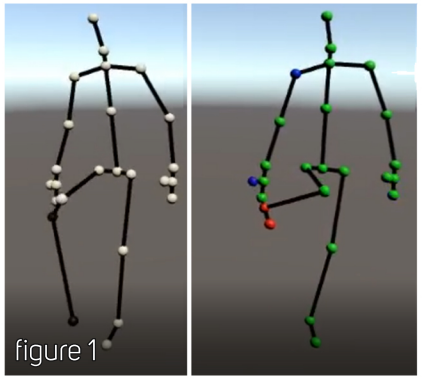
figure 1

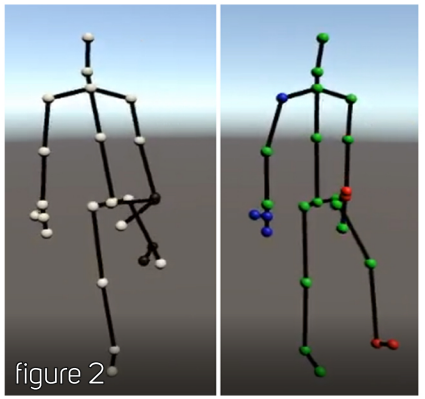
figure 2

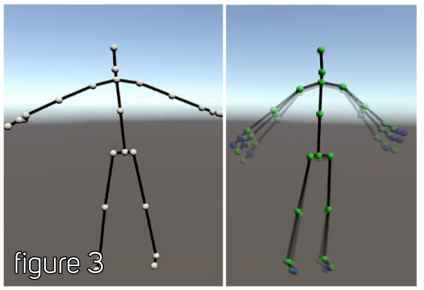
figure 3