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From human motion capture to biological motion visualization: a new methodology

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Introduction

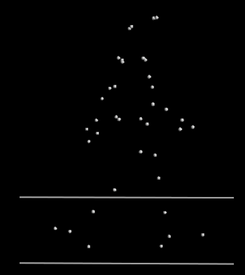
Classical biological motion stimuli are built with a small number of light dots representing the major joints of a moving person. Point-light walkers (PLW) contain all the information required for an efficient detection and recognition of dynamical biological beings. Several techniques have been proposed to create walking PLW, ranging from the early photographs or video recordings of markers attached to a human body to the more recent artificial synthesis algorithms and motion-capture based models. Almost all of these methods remove the common component of translation, which leads to the perception of a less natural PLW, as if walking on a treadmill.

Method

1. Participants have 39 reflective markers placed in strategic anatomical locations, according to the Helen-Hayes protocol.
2. Prior to the data collection several anthropometric measures are taken.
3. Using Vicon's motion capture system, the individual's gait is captured at various speeds.

Figure 1. Markers placement and motion capture session

Figure 2. Markers visualization



Results

Afterwards, the number of markers is labeled and then reduced in order to create a PLW, which usually has between 10-13 points.

Routines in LabView allowed to manipulate components of the motion such as:
-Re-orientation of the coordinated axis
-Removal of the translational component
-Temporal re-sampling

Figure 3. Labeled markers

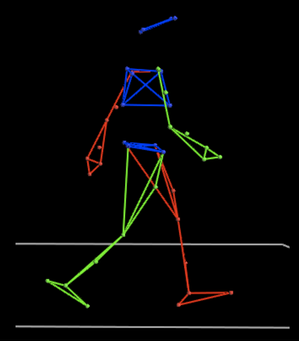


Figure 4. Point-light walker

Discussion

1. It is possible to maintain all the original components of the captured motion and/or manipulate each of these components.
2. It is perceived as a more natural walking motion, instead of a treadmill-like gait.
3. Spatiotemporal processes can be analyzed in the presence of translational patterns in tasks involving velocity perception or collision estimations.

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