

An interactive software tool for analyzing multimodal data over dance video

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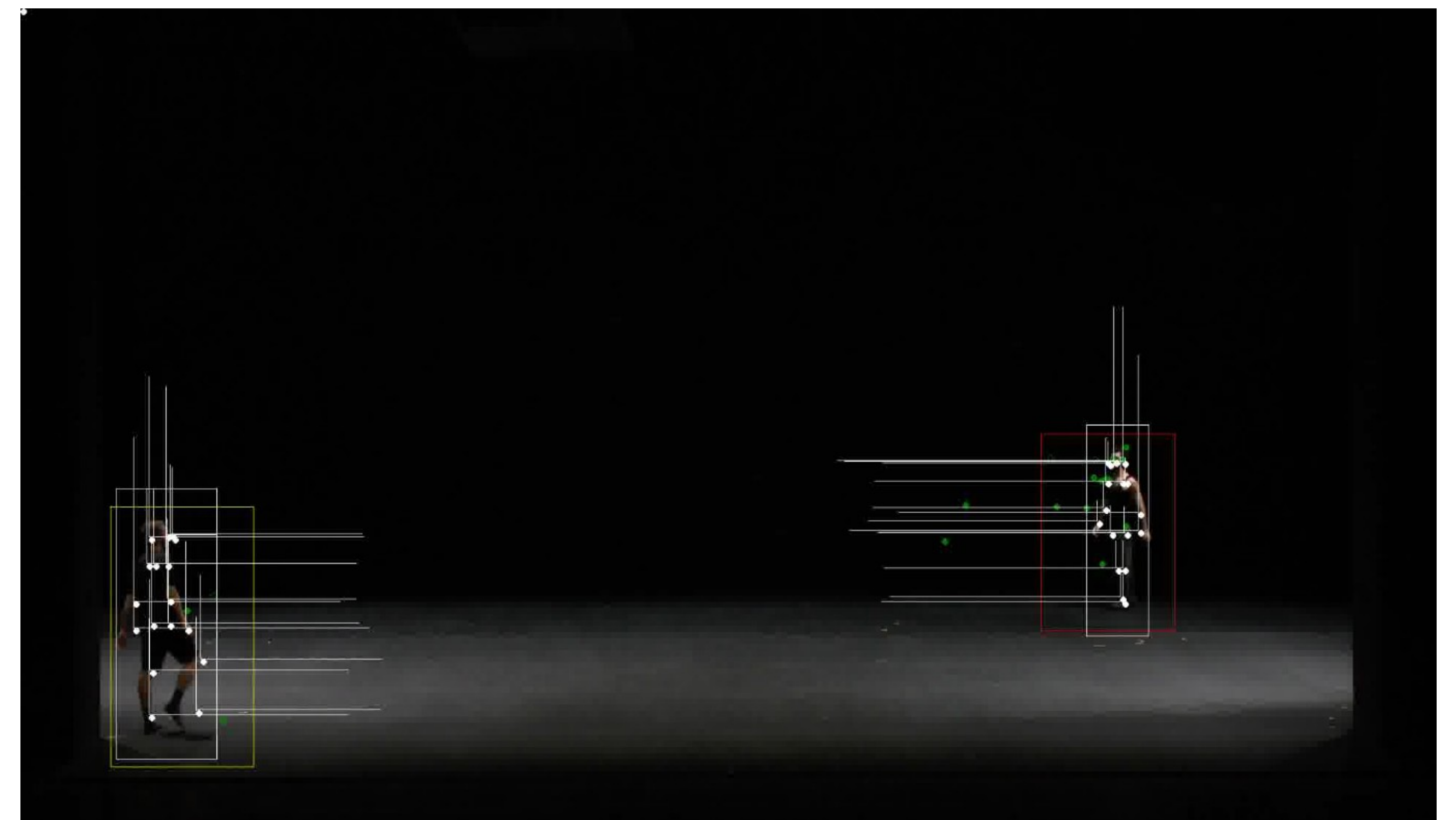
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Motivation

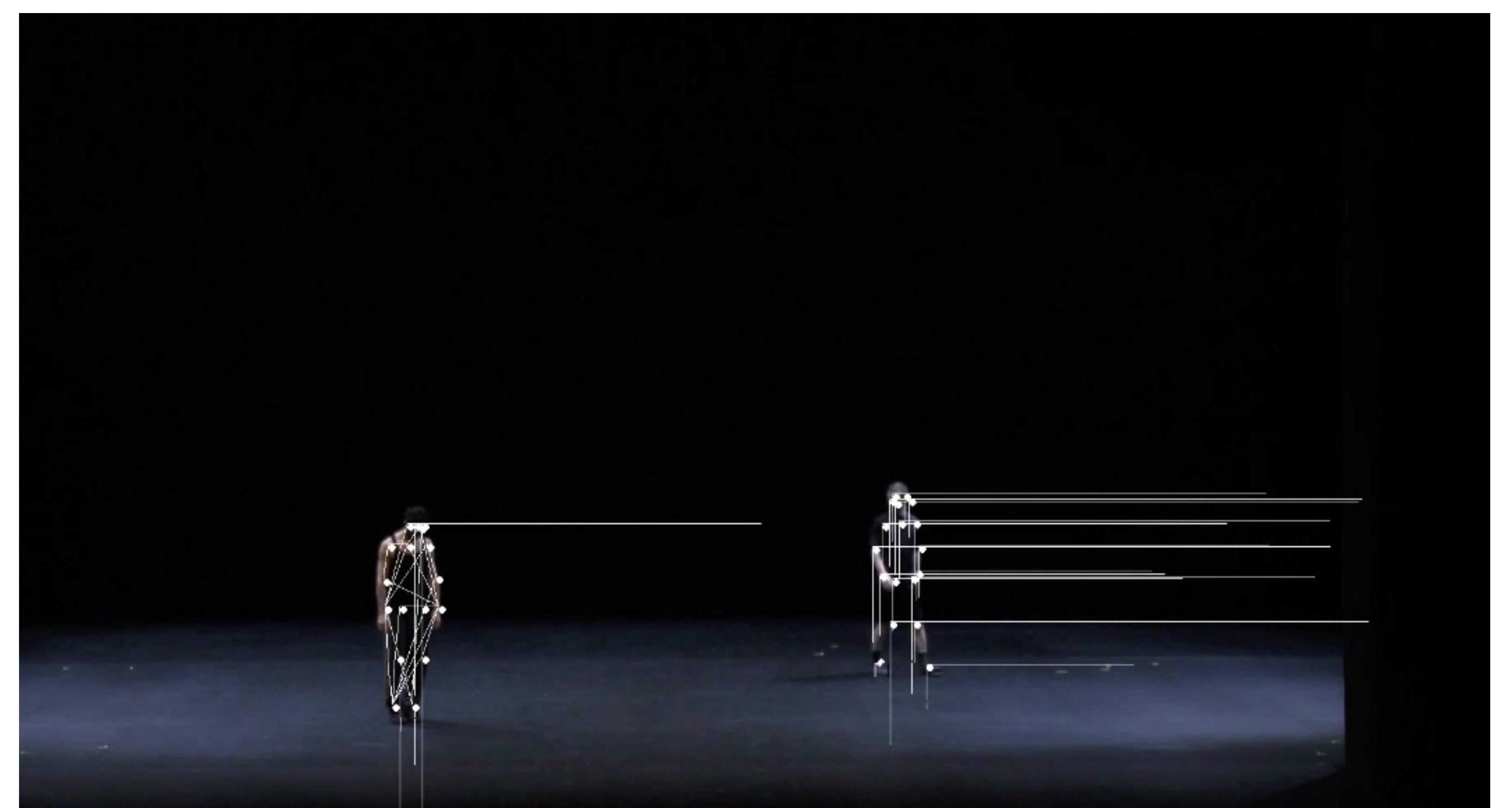
Human Movement can be studied from multiple perspectives, including psychology, motor control, dance science, and art (e.g. Rosenbaum, 2010; Waterhouse, Watts & Bläsing, 2014). The goal of the software project presented here is to provide a tool that allows users from different disciplines and backgrounds to generate videos of dance scenarios with various relevant annotations representing multi-modal information. The software reads project-specific data and overlays it on dance-related video material, with various drawing options.

Data analysis

Accumulating detected joint data from last 'n' frames to quantize the movement and direction of movement. Outermost data points used to automatically annotate the Region of interest (White) compared with hand annotated values (Red and Yellow).

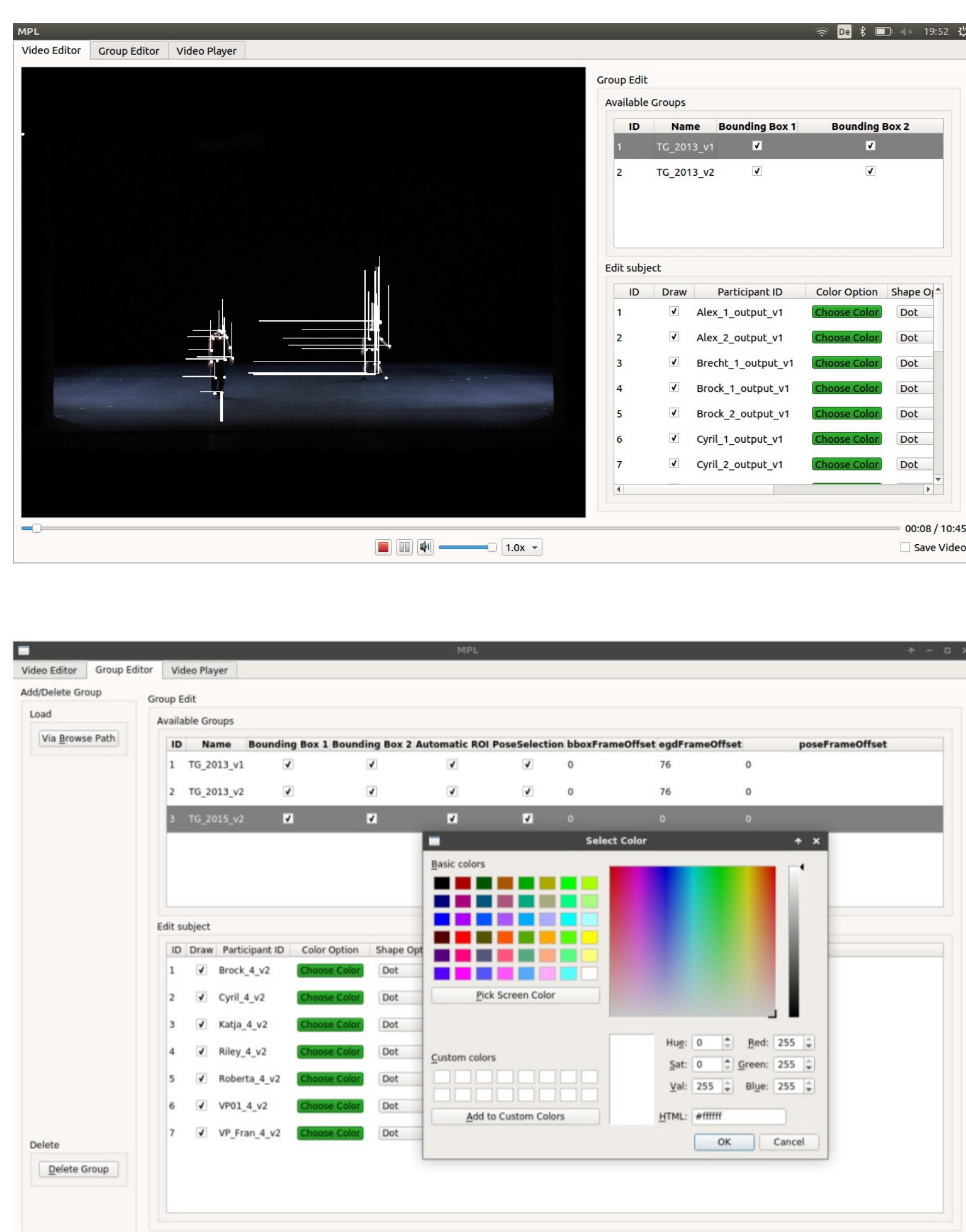


Below the points are used to generate subregions (left actor) to divide actor body into sub-regions for detailed automatic and visual analysis of experiment data.



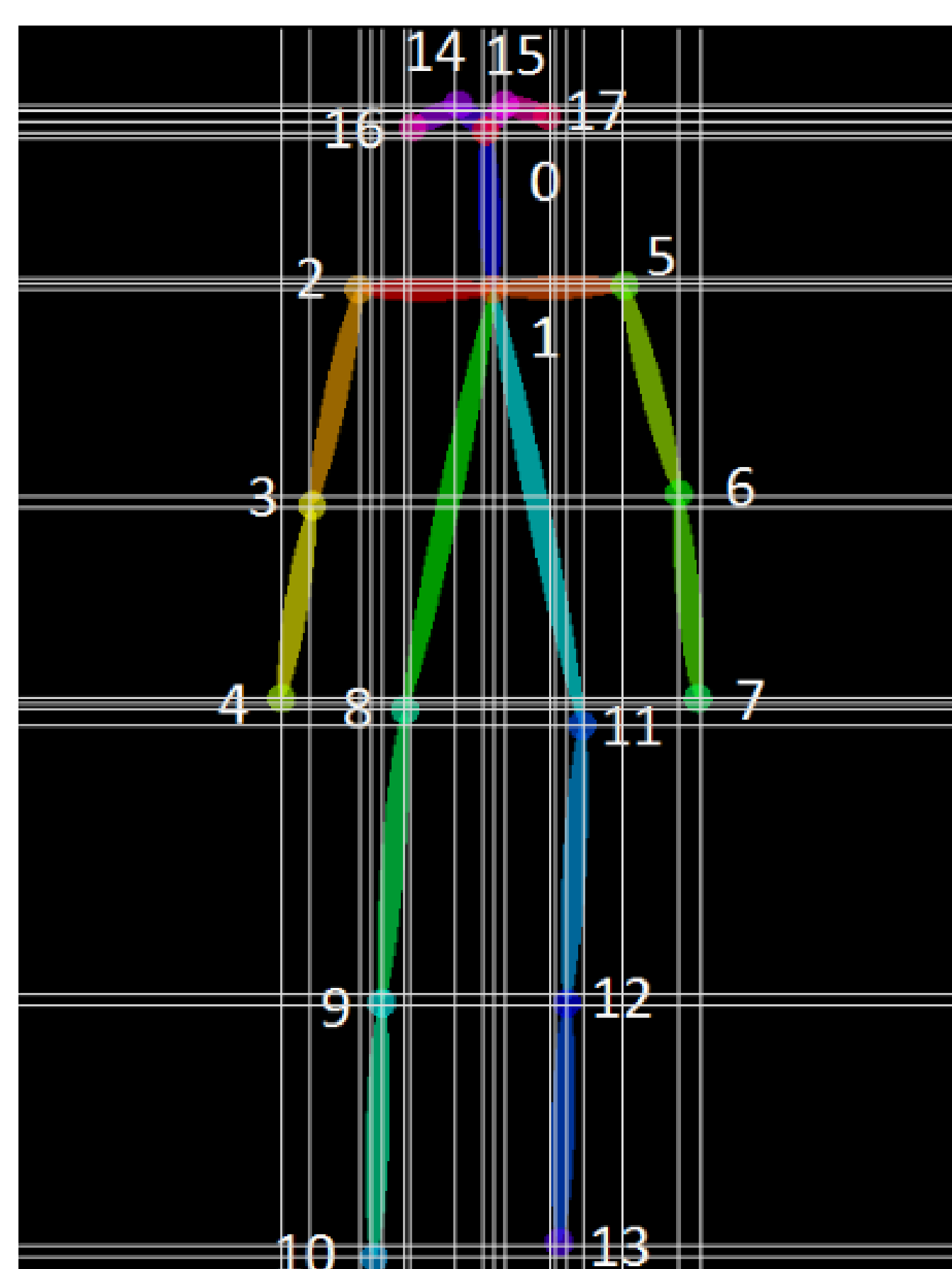
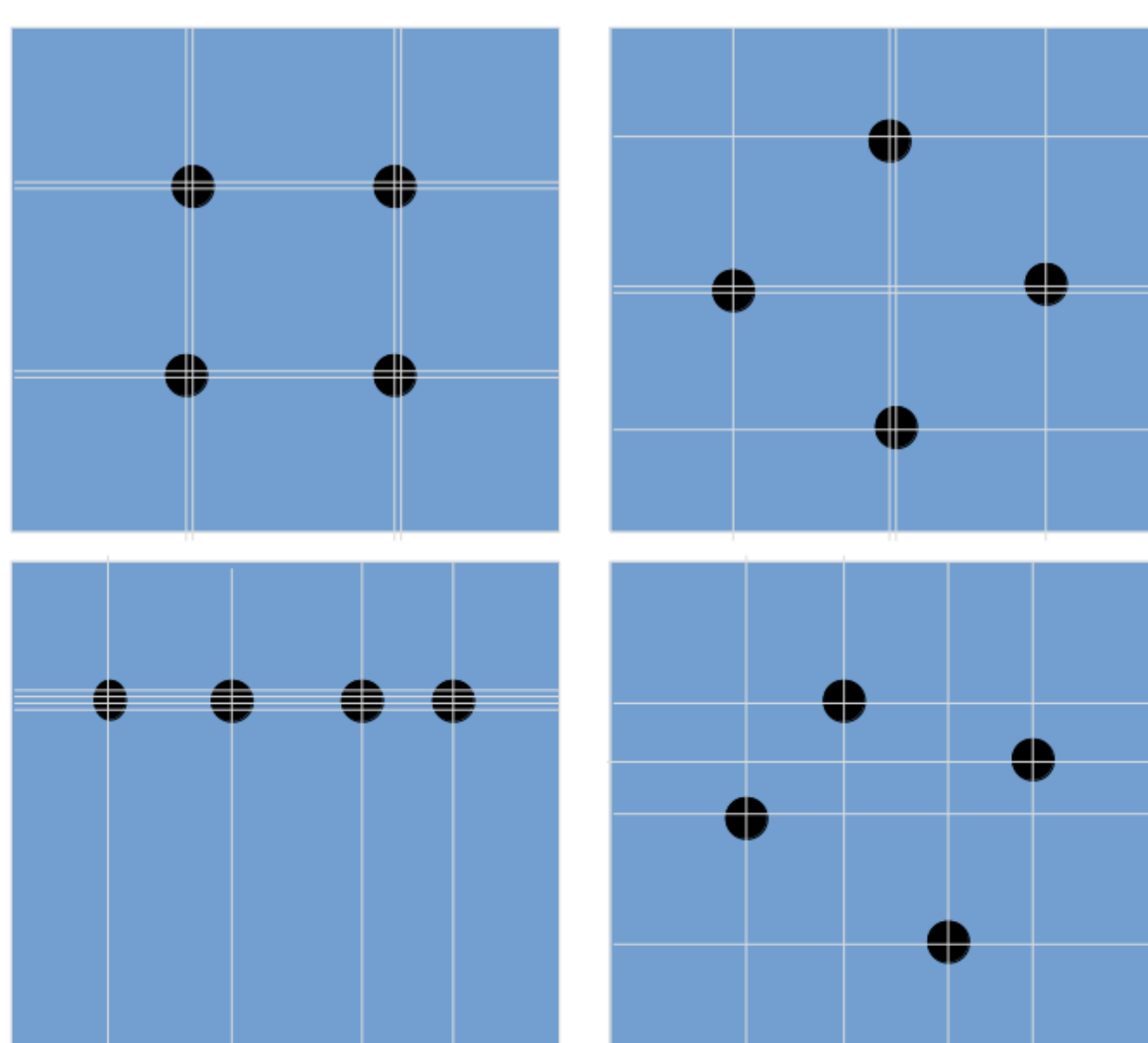
Interface

An Interactive Interface for video editing. Data can come from various modes while essentially being confined to a limited number of mathematical shapes. They are treated as data types in the system while plotting different data sources. Various options are available to symbolize semantic groupings of data. A non programmatic way of generating annotations that vary in visual properties to assist visual inspection. Also various group level and data-type level options.



Human Actor

Detecting the human actor (Cao et al., 2018) in the scene in the form of fixed data points related to different parts of the body. One way of using the points to divide body into sections and do a deeper analysis.



Discussion

In dance-related research, video annotation plays a major role, and annotation tools are generally asked for, but there is only little discussion about which data structure can support a generic annotation format. For example, in the case study presented here, eye-tracking data were collected from participants of three different expertise levels (25 novices, 8 experts, 7 super-experts) watching two different video-recorded performances of William Forsythe's choreography Duo (Weimar, 2013 and UK, 2015; dancers: Riley Watts and Brigel Gjoka; see Waterhouse et al., 2014). Eye-tracking data and body key-point (KP) data generated by a pose detection library is essentially (x, y) point data on a 2-dimensional plane. From such data, dynamic regions of interest (ROI), movement analysis etc. can be defined by appropriate mathematical functions and plotted on the stimulus video together with hand annotated bounding boxes. For the given scenario, the software allows, for example, grouping of selected participants for analysis and display of their individual eye-tracking data over the video. These functions serve experts from various fields by supporting visual and numerical analysis and the generation of annotated video material for research, demonstration or archiving. Future work will involve automatic parsing of human bodies into grids that can be used to precisely determine the positions of plotted data on the scene, both visually and statistically.