Figure 1: A participant interacting with the *LuminAI* improvisational dance installation. The participant's shadow is projected in pink next to the AI dance agent.

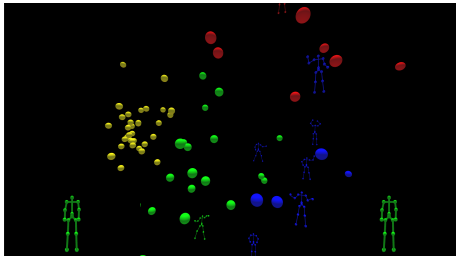

Figure 2: The *MoViz* visualization tool, which allows users to explore the agent's gesture memory in 3D space and qualitatively compare unsupervised learning algorithms used by the agent to cluster similar gestures. Gestures are represented as points in colored clusters of similar gestures. When the user pans closer to a gesture, the point transforms into an animated avatar. The user can also select gestures to compare side-by-side.

Visualizing Improvisation in *LuminAI*, an AI Partner for Co-Creative Dance

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ABSTRACT

LuminAI is an art installation in which participants can improvise movements with an AI dance partner. In this practice work, we will present the *LuminAI* installation as well as two visualization tools that interactively demonstrate how the *LuminAI* agent reasons about movement using both bottom-up learned knowledge and top-down domain knowledge. Participants will first be invited to interact with the *LuminAI* installation, where they can improvise movement with an AI agent projected onto a screen. They can then see how *LuminAI* learns relationships between gestures by interacting with *MoViz*, a visualization in which participants can explore the agent's gesture memory and qualitatively compare the efficacy of unsupervised learning algorithms at clustering gestures. Finally, participants will be invited to interact with a third tool, where they can explore how *LuminAI* applies top-down domain knowledge to gesture reasoning. Participants will be able to interactively explore how *LuminAI* uses Laban Movement Analysis's conception of Space to analyze

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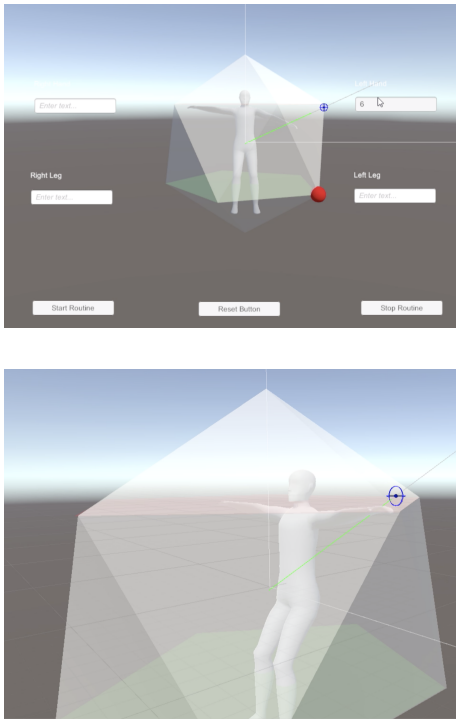

Figure 3: An interactive tool that participants can use to explore how the LuminAI agent makes sense of gestures using Laban Movement Analysis' concept of space.

learned movements in terms of the geometric properties of Laban's icosahedron and manipulate these properties to transform and generate new movements. The two visualization tools both represent novel approaches to understanding and analyzing improvisational movement in creative domains.

CCS CONCEPTS

• **Applied computing** → **Performing arts**; • **Computing methodologies** → **Cluster analysis**; • **Human-centered computing** → **Visualization systems and tools**;

KEYWORDS

gesture; movement improvisation; Laban movement analysis; artificial intelligence; motion analysis; computational creativity; unsupervised learning, visualization; explainable AI; gesture clustering

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PRACTICE WORK COMPONENTS

The first component of this practice work is *LuminAI* (Fig 1), an installation in which participants can improvise movement with an AI dance partner. The agent segments users' motion into gestures, which the agent learns and reasons about using both bottom-up learned knowledge (i.e. unsupervised learning algorithms that cluster similar gestures) and top-down domain knowledge (i.e. encodings of the Laban Movement Analysis framework). The second component of the practice work is *MoViz* (Fig 2), an interactive visualization tool that can be used to explore *LuminAI*'s gesture memory in the form of a gesture 'cloud' in 3D space. *MoViz* enables researchers to refine algorithmic pipelines as it facilitates qualitative evaluation of gesture clustering algorithms. It also enables novice users to better understand *LuminAI*. The final component of this practice work is an interactive visualization tool that allows users to explore how *LuminAI* utilizes top-down domain knowledge–i.e.an encoding of the Laban Movement Analysis framework (Fig 3). Specifically, the system is able to encode learned gestures in terms of the geometric qualities defined by Laban Movement Analysis's conception of space. Users can use the tool to explore how a gesture is encoded into the different planes and vertices of an icosahedron (the shape Laban uses to reason about movement). The practice work components can be experienced in any order.