Viewpoints AI: Demonstration

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Abstract

This article describes a technical approach to movement-based interactions between a human interactor and an intelligent agent based on the theatrical Viewpoints movement framework. The *Viewpoints AI* system features procedural gesture interpretation using shallow semantics and deep aesthetics analysis from the Viewpoints framework. The installation creates a liminal virtual / real space for the human and AI to interact by the use of digital projection for the AI visualization and shadow play to represent the human. Observations from a recent public demonstration of the system and future directions of work are also discussed.

Introduction

Building interactive narrative experiences is a highly difficult challenge from both an artistic and technical perspective that is typically tackled with techniques like drama management, story generation, and intelligent virtual actors (Riedl and Bulitko 2013). These works all tend to deal with the infamous "authoring bottleneck," which refers to the difficulty in authoring content for interactive experiences. In other words, the more agency or meaningful choices given to the user, the more difficult it is to author content (and connections between the content) that cover the myriad narrative paths the user may experience and so procedural content generation affords higher user agency.

Our work presented here addresses an explicit design challenge: what kind of interactive narrative experience can be offered with a high degree of user agency and low authoring effort? Addressing this has pushed us to consider how to create interactive protonarratives (e.g. highly abstract, semantically ambiguous narratives) that are created by the collaborative movement of a human user and intelligent agent. We have worked with a local contemporary theatre group to use contemporary movement theory in storytelling as a means of inspiring a new procedural approach to creating interactive narrative / artworks, called

Viewpoints AI. We have employed the Viewpoints movement theory (see Section Viewpoints) as a formalism that is detailed enough to provide protonarratives with surface semantic reasoning while not concerning itself with being too abstract or too specific, and thus bringing up issues of deep semantic understanding.
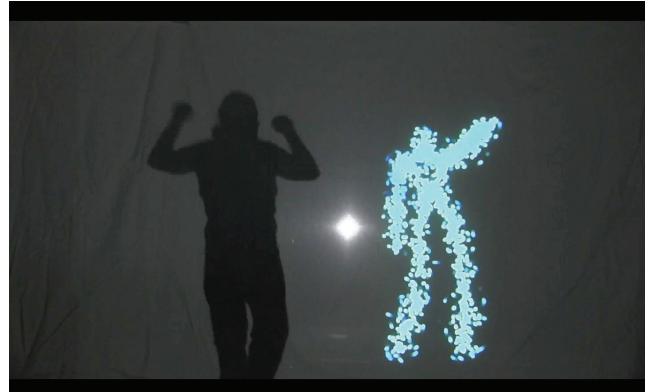
Figure 1: A human interactor and VAI co-creating a movement-based proto-narrative in a liminal virtual / real projected plane.

The *Viewpoints AI* system was created as an exploratory AI / art research platform for understanding how the aforementioned design challenge and constraints can be approached. It is an installation piece that involves a human user doing improvisational shadow play with an ephemeral intelligent agent, called *VAI*, that is projected onto the same 2D space as the user's shadow (see Figure 1). *Viewpoints AI* perceives the human's gesture, defined here as body movement between two consecutive periods of stillness; analyses it broadly through the Viewpoints perspectives of *space*, *time*, *emotion*, *shape* and *movement*; and finally responds to it generating an aesthetically appropriate response based on the human's gesture and Viewpoints technique. The resulting experience is a highly interactive, movement-based experience that does not rely on pre-authored instantial content, but instead on the pro-

cedural definition of Viewpoints theatrical movement theory and the user's own movements.

The *Viewpoints AI* system also provides the user with a liminal (i.e. in between the virtual and real) co-creational space, based on shadow play, that allows for a high degree of presence. This liminal space is created by front-projecting (from the audience's perspective) *VAI*'s virtual avatar onto a semi-opaque muslin screen. The user's shadow is rear-projected (from the audience's perspective) onto the same screen in order to allow a human user to interact with *VAI* through shadow play. The two dimensional plane of interaction serves as a creative equalizer for *VAI* and the human. The human's shadow serves as a particularly crisp digital avatar, retaining analog fidelity, while being able to interact with a digitally projected virtual interactor.

Viewpoints

Viewpoints is a compositional technique for dancers to communicate through movement and gesture, building a vocabulary based on motions and allowing dancers to improvise in a defined environment. It was developed in the 1970s by Mary Overlie (2006) and was later adapted for stage acting by Anne Bogart and Tina Landau (2005). It is a tool for developing spontaneous interactions between actors and is also used to train certain senses and enhance performances within an ensemble. We collaborated on *Viewpoints AI* with a local experimental theater company, Out of Hand Theater, which employs Viewpoints as a system for exploring scene work and improvisation. There are five Viewpoints categories (Bogart and Landau, 2005). *Space* perceptions are about seeing and feeling physical relationships; the actor can communicate using the empathy of the audience for *space*. The *shape* category concerns the view of physical forms shaped by bodies and the understanding of these forms in relation to other bodies or to the surroundings. *Time* perceptions are about time and its regulation. The fourth category is *emotion*, which is experiencing states of being and communicate them to the audience. Finally, the *movement* category concerns kinetic sensations as well as the manner of performing these motions: jerky/smooth, fast/slow and how the different parts of the body of the actor interact.

Computational Architecture

The *Viewpoints AI* system is composed of three conceptual parts (see Figure 2), namely the *perception*, *reasoning* and *action* modules. The *perception* module senses the user's body using a Kinect sensor. It then derives Viewpoints information from the user's gestural input using computational definitions of the Viewpoints framework. The *reasoning* module models the decision-making involved in

choosing a response to a perceived gestural input using Soar (Laird 2012). It also stores previously seen gestures in a Gesture Library in order to recognize repeated inputs and learn more gestures to perform / transform. Transforming the Viewpoints information (eg. *high tempo* to *low tempo*) associated with a past gesture or adding functional transformations (eg. Switching the motion of two limbs) to that input gesture generates responses. Finally, the *action* module procedurally visualizes *VAI*, the virtual interactor, and displays the gestural response after applying the requisite transformations and Viewpoints information changes to that response.
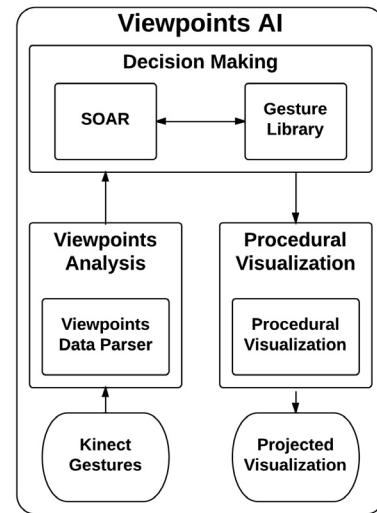
Figure 2: Architecture of the Viewpoints AI System

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