Latent Steps: Generative Bodily Animations From a Collection of Human Drawings and Physiological Data Interaction

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Overview

Latent Step is a somatic data visualisation system that re-appropriates contemporary machine learning techniques to incorporate the choreographic principles of the **Prime Mover**. The intention here is to expose the internal physical sensations of the dancer as they revisit a sequence of movements in real-time.

Visual Training Data

The image generation model is trained on a collection of **100 bodily map illustrations** (shown in Fig. 1) provided by 10 dancers, who were asked to colour areas of muscular activation and balance during movement. Each drawing correlates to a physical gesture assigned to one of the following semantic descriptors: *Difficult*, *Aesthetic Form*, *Indifferent*, *Open*, and *Closed.*

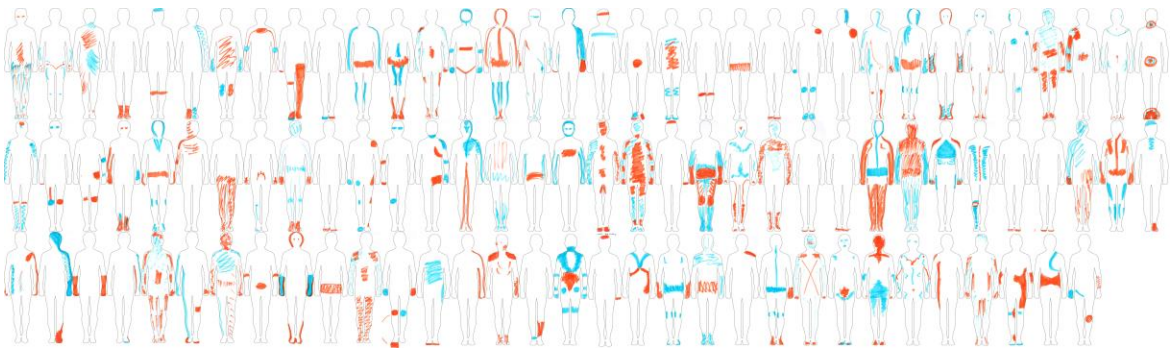

Fig 1. Training Dataset of Drawings

Latent Space Interpolation

With a trained model, the system is capable of morphing between a set of drawings by predicting the interpolated frames. This is achieved by encoding the dataset into a compressed vector representation, known as the **latent space,** which depicts the visual features learned by the model.

Fig 2.1 Pixel Space Interpolation

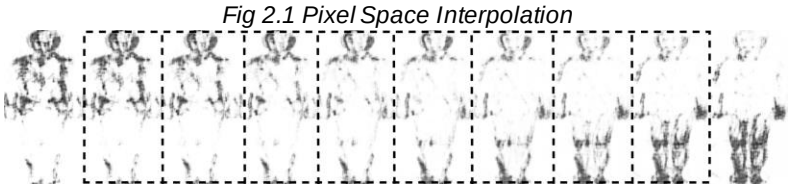

Fig 2.2 Latent Space Interpolation

In addition to the interpolation method described above, we can also apply computational noise to generate plausible variations of the original drawings.

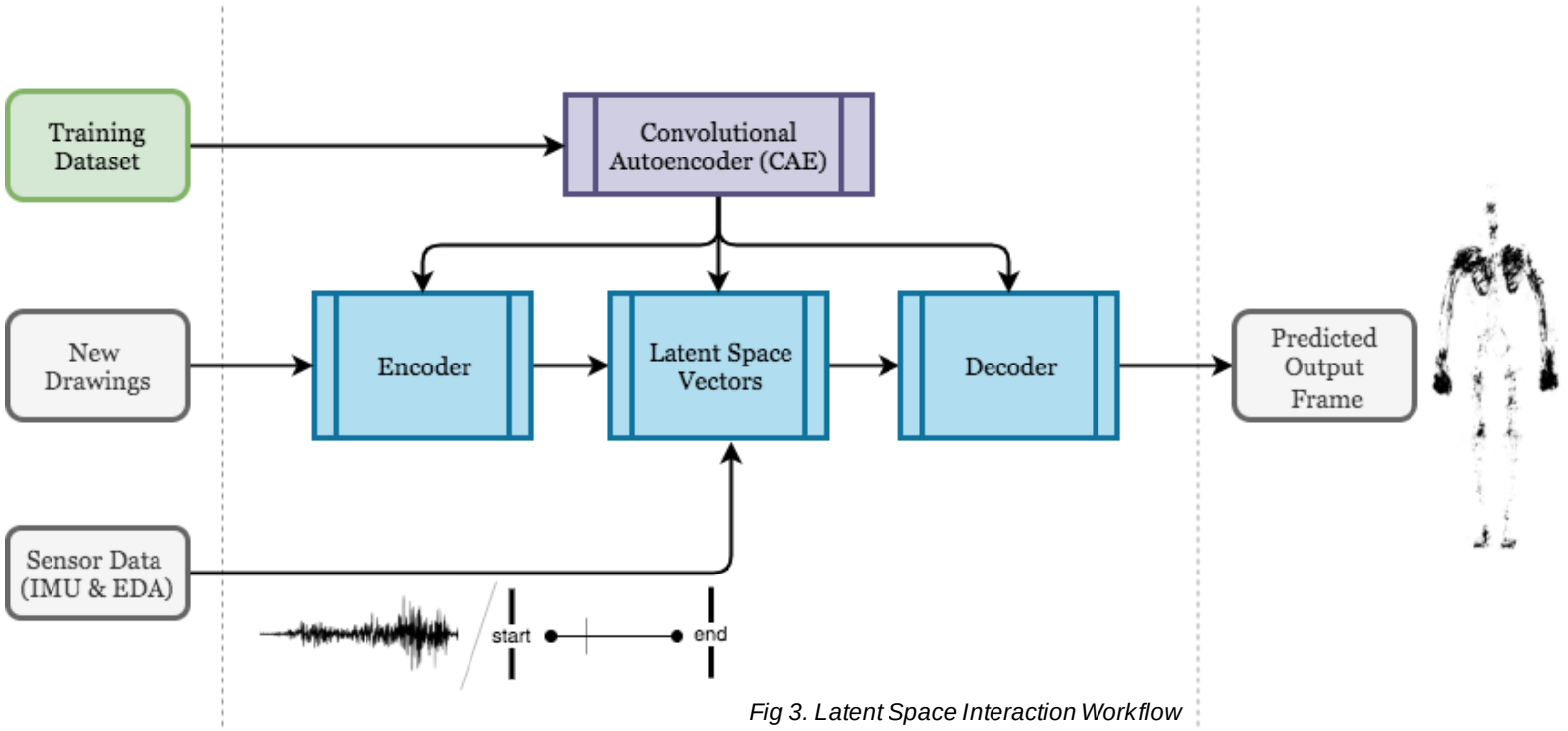

Fig 3. Latent Space Interaction Workflow

Handling "Unseen" Data

In principle, the complete interactive system should be capable of receiving and processing new visual data 'on-the-fly'. During an artistic residency at Sõltumatu Tantsu Lava (August, 2019), the system was adapted to visualise *Sylvia Rijmer's* Prime Movers, defined by her as a particular place (locus/loci) in the body from which movement initiates. We collected an additional set of hand-drawn illustrations from two dancers during rehearsals according to Rijmer's Prime Movers. To test the system, we present the model with this subset of new drawings to complement the choreography. The data used in our demonstration depicts the series of *Hanna Junti* and *Liis Vares'* bodily map illustrations to visualise the Prime Mover shifting around the body as they transition between different performative states.

Physiological Interaction

To complete the interaction loop, we map the latent dimensions to an incoming stream of biosignals. This enables the user to manipulate the style and time-dynamics of the animation during a performance.
We use a 9-axis IMU combined with an EDA sensor to acquire **inertial** data whilst measuring **electrodermal** activity (also known as galvanic skin response). The latter measures the electrical properties of the skin, linked to the activation of the autonomic nervous system. This can be used to detect periods of escalating arousal or stress, which was programmed to increase the amount of noise added to the system. This modality was selected with a desire to communicate expressive traits of the dance associated with emotional triggers that are not so easily perceived by an external audience.

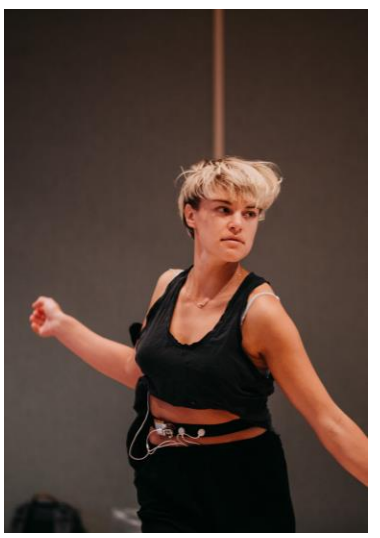

Fig 4. Wearable sensor strap placed on abdomen

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