[arra]stre – A Data-driven Ballet

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1. INTRODUCTION

[arra]stre is a data-driven ballet performance that makes extensive use of visualisation with data generated from the choreography and dancers. Whilst visualisations of this kind are not uncommon in performance dance, what marks this work out is that the visualisation and choreography were treated as equal actors in the exploration of the theme rather than the visualisation either becoming the dominant character in the performance (with the dancers simply providing a trigger) or being completely passive - an echo of the movement.

2. CREATING THE BALLET

[arra]stre aims to increase understanding and engagement with the subject of computer science through five key themes. In our consideration of the interaction between the visualisation and choreography we found two distinct modalities particularly effective, both contextually in the exploration of theme and artistically.

Modality 1: The visualisation as a dancer

With motion-capture it is easy to create an additional, virtual performer. This dancer can either be choreographed as part of the ensemble or given its own unique role. In “Debugging”, the dancers repeatedly perform a piece, making corrections until it is “bug-free”. The visualisation repeats the correct dance each time but starts as an unrecognisable shape that slowly morphs into a dancer – a powerful visual analogy for the “cleaning” of the performance (Figure 1).

This can be contrasted with the virtual dancer in the “Algorithms” section, the focus of which was repeating / evolving patterns. The virtual performer functions as an additional dancer, however through use of limb colour and size we highlighted the key elements of the motifs (Figure 2). This strongly helped the audience identify these patterns in the physical performers.

Modality 2: The visualisation of dancers’ data

The motion-captured data can be displayed in any form that supports the performance. The choreography for “Big Data” was based on weather patterns, using the dancers’ physical locations and movements to represent this data. The visualisation plots the dancers’ positions in real-time and the created pattern builds up into the actual weather patterns that were used (Figure 3). This allows for a deeper understanding of the choreography.

Conceptually similar was the use of visualisation of limb positional data within the “Binary” section. This section is performed in darkness, lit only by torches representing each dancer’s Boolean state (Figure 4, above). The poses and movements of the dancers, also keyed to these states, are deliberately hard to make out. Representing these poses as 1’s / 0’s in space allowed the audience to make a clear mapping between the physical scene and the visualisation (Figure 4, below).

Combined modalities

Both modalities can be combined to great effect: “Computational thinking” contained a geometric progression hidden within the dancers’ movements. The visualisation represented a virtual performer but in highly abstracted way. As the geometric progression built, so the virtual dancer’s movements are overlaid to show this progression (Figure 5).

3. EVALUATION

An evaluation of the effectiveness of the work (to be published shortly) indicated that 40% of the audience incorporated images from the performance into their mental models of these topics. This was found to be independent of visualisation modality used. It seems plausible that our coherent approach towards the integration of visualisation and choreography could have contributed to this high level of image adoption.

Figure 1: *"Debugging" shows a dance containing "errors" which the performers slowly discover and correct; the visualisation represents the same, correct, dance but performed initially by an unrecognisable shape that slowly evolves into a dancer to represent visually the "cleaning" process*

Figure 2: *A virtual performer in "Algorithms"; the limb colour / point size was adapted to illustrate evolving patterns in the dancers' movements*

Figure 3: *In the "Big Data" duet the visualisation traces the x-positions of the performers; the generated pattern eventually builds up into the actual weather patterns that were used to create the choreography*

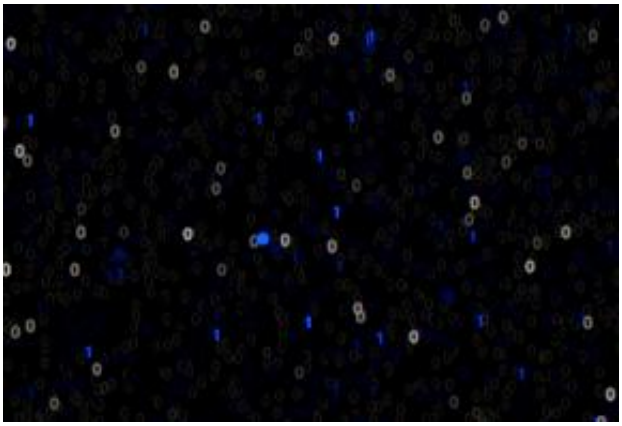

Figure 4: *The "Binary" section represents each dancer as a "bit", in which their torch state, poses and movements are keyed to their binary state (above); the visualisation represents these poses as binary data (1's, 0's) in space (below)*

Figure 5: *The evolving abstract visualisation of the virtual dancer within "Computational Thinking" highlights the geometric progression within the piece*