An approach towards artistic visualizations of human motion in static media inspired by the visual arts

Anastasia Rigaki, Nikolaos Partarakis, Xenophon Zabulis, Constantine Stephanidis

Presenter: Anastasia Rigaki (rigaki@ics.forth.gr)

Institute of Computer Science - Hellas (FORTH)
Foundation for Research and Technology (ICS) - GREECE
Anastasia Rigaki

Short resume

- Currently **Master Student** – Research Assistant in Institute of Computer Science, FORTH, **Greece**

- Bachelor at Computer Science Department, University of Crete

- This work
  - Conducted in the context of my Master’s Thesis
  - Mingei Project (EC H2020 Innovation Action)
Introduction

- In the visual arts, human motion and activity are often conveyed through still depictions or sculptures.

- Over the years, artists have depicted both motion and lack of motion as a way to stimulate interest.

For example:

- **Superimposed** forms are employed in the visual arts to summarize motion.

- **Juxtaposed** illustrations are used in comics and illustrated instructions to convey motion.
Problem statement

- The representation of motion and activity is often used in manuals in order to direct readers
  - this used to be a manual task for illustrators

- Today, graphic designers and illustrators use image processing software to simplify authoring and enhance visualization
  - Unfortunately the available software requires insight art skills and experience from the user side
Our approach is... MotiVo (Motion Visualization)

- an interactive motion visualization editor
  - simplifies the process of motion visualization
  - offers a number of artistic visualization tools
  - provides insightful and visually pleasant results
  - requires minimum expertise and knowledge from the user side
Motivo editor

- The UI was built on top of DevZest WPF Docking library
- New components are added as new visualization tools arise
- Supports the creation of project files (.hmav) and the assignment of assets to these projects (images, videos, BVH files, motion trajectory files, etc.)
Motivo editor tools

1. Motion Blender

2. Motion Annotator

3. Image filters

4. Manual Motion Enhancer
1. Motion Blender
Motion Blender

- creates a directional motion effect by overlapping key poses into a united content
  - it takes as an input multiple key poses of an action
- the combination of all the frames summarizes the overall action
- the contrast intensity of each key pose is user-determined
Motion Blender tool

Averaged motion visualization

1. Users drag and drop multiple images in image holder

2. For averaged motion visualization
   - all intensity values are **evenly** set

For weighted motion visualization

- intensity values are **irregularly** set

3. On runtime the result is shown is the left panel

4. Users can save the resultant image in the current’s project assets
2. Motion Annotator
Motion Annotator tool

- It highlights with artistic designs the specific coordinates provided by a trajectory file containing the specific joints of the skeleton body as X, Y coordinates in 2D space

- An input it takes:
  - a motion image (e.g., the produced image from Motion Blender)
  - a trajectory file denoting the direction of the motion image – we used composite Bézier curves to smooth the trajectory
Motion Annotator tool

1. Users drag and drop the image file in the main placeholder

2. Users drag and drop a trajectory file
   - Automatically the annotated points are drawn on the top of the image frame and denote the **direction** of motion

3. Users can save the resultant image in the current’s project assets
3. Image Filters
Image filters tool

- creates artistic results to motion images
- takes as input an motion image file
- provides a list of image filters (left panel)
Image filters tool

- Examples
4. Manual Motion Enchancer
Manual Motion Enchancer tool

- exploits the techniques used to create juxtaposed illustrations in comics
- allows users to manually enhance motion images by attaching ready to use concepts and icon sets (i.e., arrows, lines, etc.)
Conclusions

- This work delivered
  - A novel approach towards motion visualization by developing MotiVo, an interactive editor that is comprised of 4 distinct tools and creates artistic motion results
    - Novelty - Requires minimum experience from user side
Future Work

- **Already completed** (not part of this paper)
  - development of new tools
  - exploration of style transfer algorithms to provide even better visualizations

- **Current** Future Work
  - integration of 3D information to the static motion frames
  - extension of motion visualization to video and VR
Acknowledgments

- This work has been supported by the EU Horizon 2020 Innovation Action under the grant agreement No.822336 – Mingei

The authors are grateful to project partner ARMINES for the acquisition of MoCap data.
Thank you
Any questions?
You can find me at:
rigaki@ics.forth.gr