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

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

o Bachelor at Computer Science Department, University of Crete

o This work
  o Conducted in the context of my Master's Thesis
  o 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
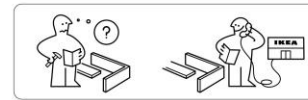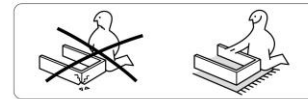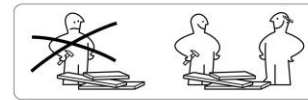
Our approach is... MotiVo (Motion Visualization)

- 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 build 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.)
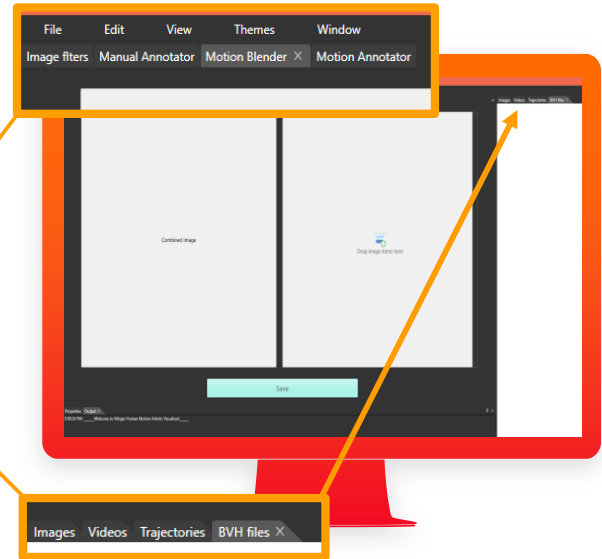
MotiVo editor **tools**

1. Motion Blender

2. Motion Annotator

3. Image filters

4. Manual Motion Enhancer
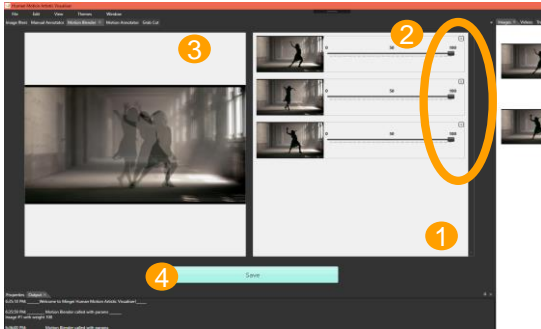
1. Motion Blender

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

Weighted motion visualization
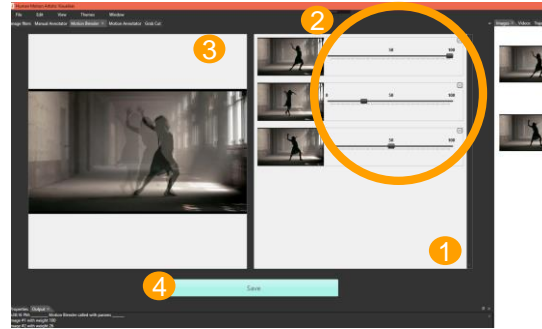
1. Users drag and drop multiple images in image holder

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

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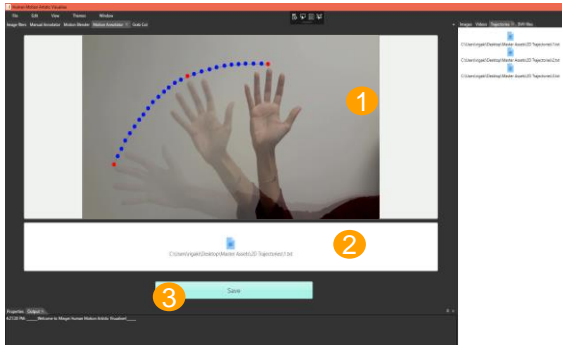
1. Users drag and drop the image file in the main placeholder

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
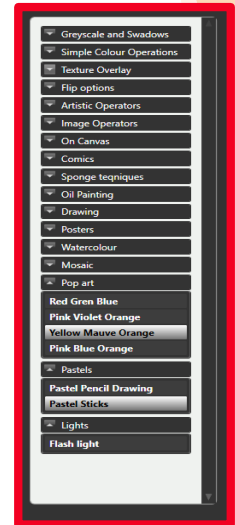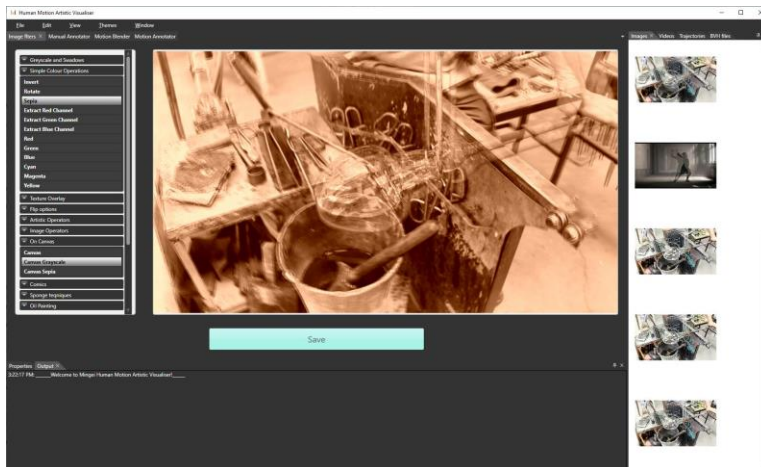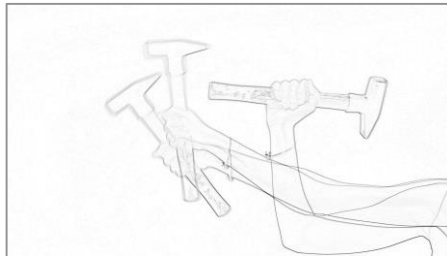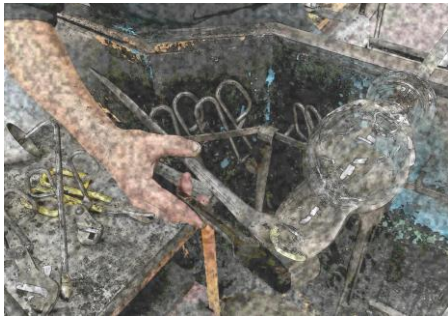- provides a list of image filters (left panel)
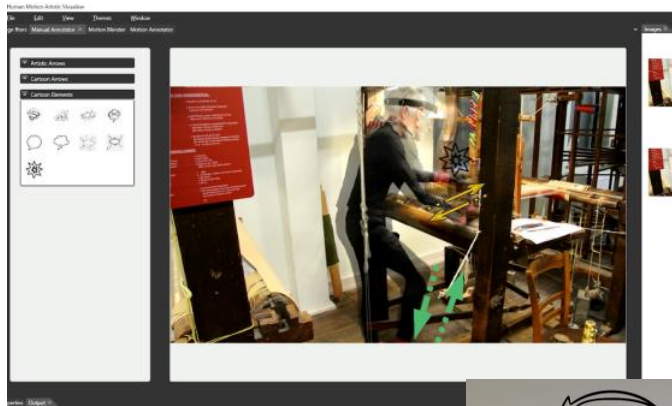
Image filters tool

- 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
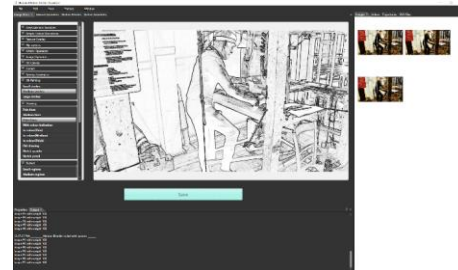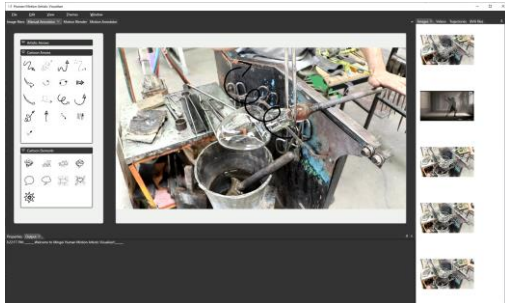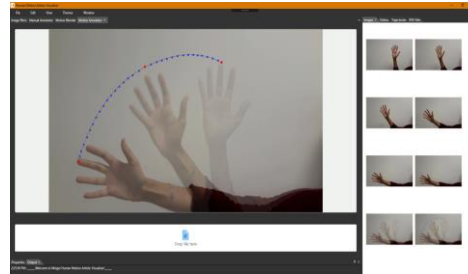
Future Work

- **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

Acknowledments

- 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