

Video Puppeteering

We suggest a QS project that consists of reimplementing a simplified version of the system [1] using available off-the-shelf MATLAB toolboxes. The idea of video puppeteering is to synthesize a real-looking video of famous person ('target'), mimicking the facial expressions of other famous person or the user of the system ('source'), as illustrated in the video:

<http://vimeo.com/13856519>

Thus, after implementing the system the participants should be able to puppeteer another person (e.g. a celebrity of their choice or just another participant in their team), all in real-time or near real-time. The enabling factor is that almost all building blocks are available in excellent free-for-non-commercial-use MATLAB toolboxes [2,3,4,5].



Demonstration of the data-driven approach from [1]. Source image with located facial landmarks on the left. Normalized source and target images on the top. Magnified source image and selected target image on the bottom right.

To build the system, the participants will need:

- 1) To obtain a dataset of photos or video frames of a person they want to puppeteer. Some datasets will be provided. One or two people on the team might, especially those who are less familiar with programming, might work on obtaining data.

- 2) To obtain video stream from the laptop camera.

3) To find faces and facial features in the incoming video stream and in the data (IntraFace library)

4) To match facial expressions and poses between the source stream and the target data (IntraFace+VLFeat+MATLAB). This is the place where most engineering will go to (some obvious solutions are available, but there is a certain space for exploration here).

5) To warping and to show the matched photos as the puppet stream (image processing toolbox).

During the QS session students will therefore learn how to use advanced MATLAB libraries to assemble and fine-tune a complex computer vision system.

Requirements:

1. PC with Windows for each participation person
2. Webcam (at least one for each team)
3. Matlab on each computer
4. IntraFace, VLFeat libraries installed (list may be extended)

Team organization proposal:

It will be better if each team will include at least 1 person already acquainted with Matlab, who will help guide other members of the team.

References:

1. Ira Kemelmacher-Shlizerman, Aditya Sankar, Eli Shechtman, and Steven M. Seitz [Being John Malkovich](http://grail.cs.washington.edu/malkovich/),. ECCV 2010 (<http://grail.cs.washington.edu/malkovich/>)
2. IntraFace library. <http://www.humansensing.cs.cmu.edu/intraface/>
3. MATLAB image processing toolbox
4. VLFeat library. <http://www.vlfeat.org/>
5. MATLAB image acquisition toolbox