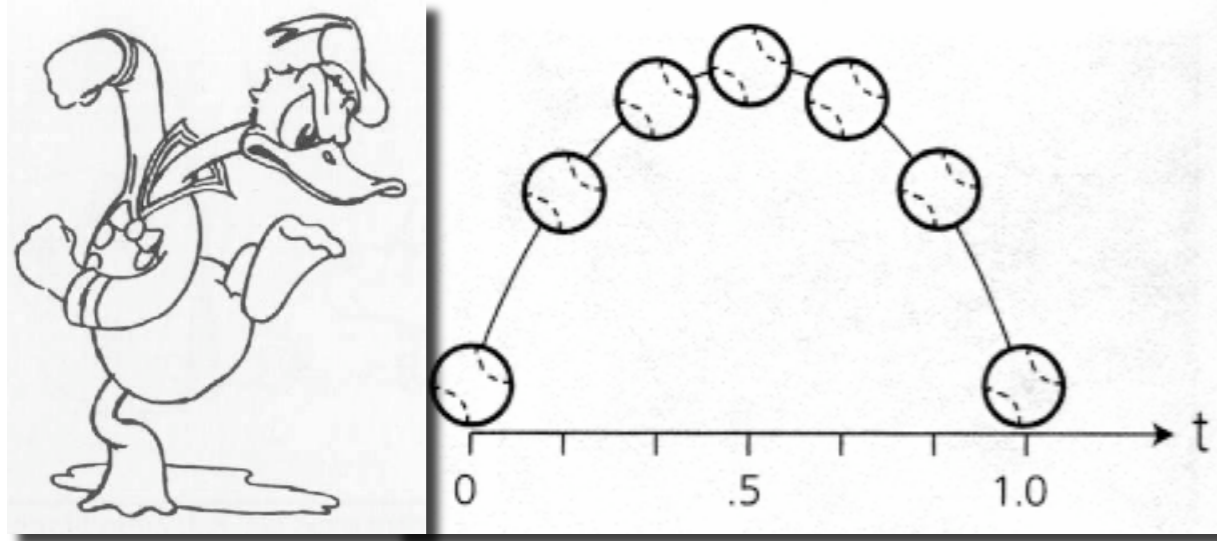


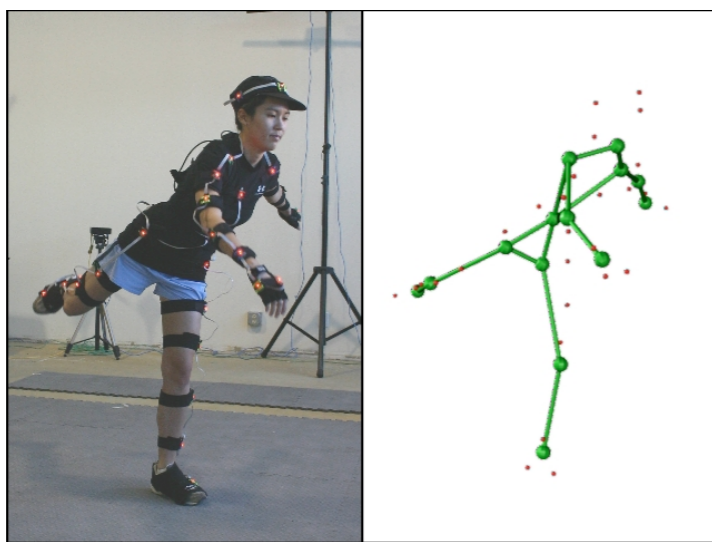
Techniques for Creating Animation



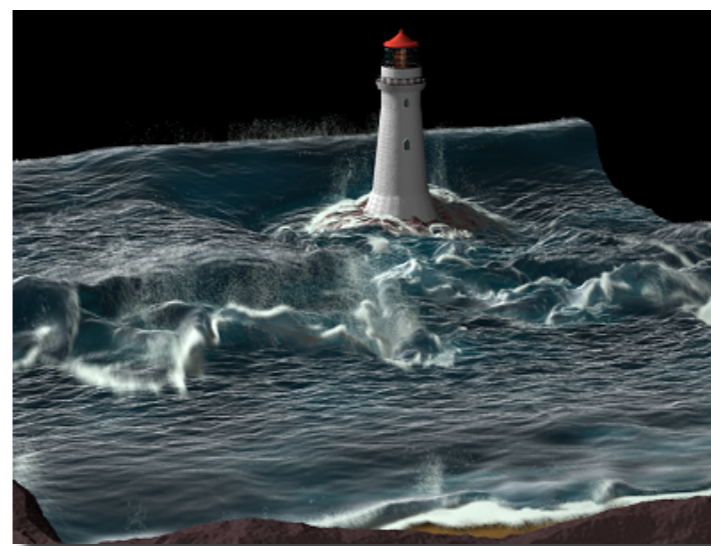
Keyframing



Procedural Animation

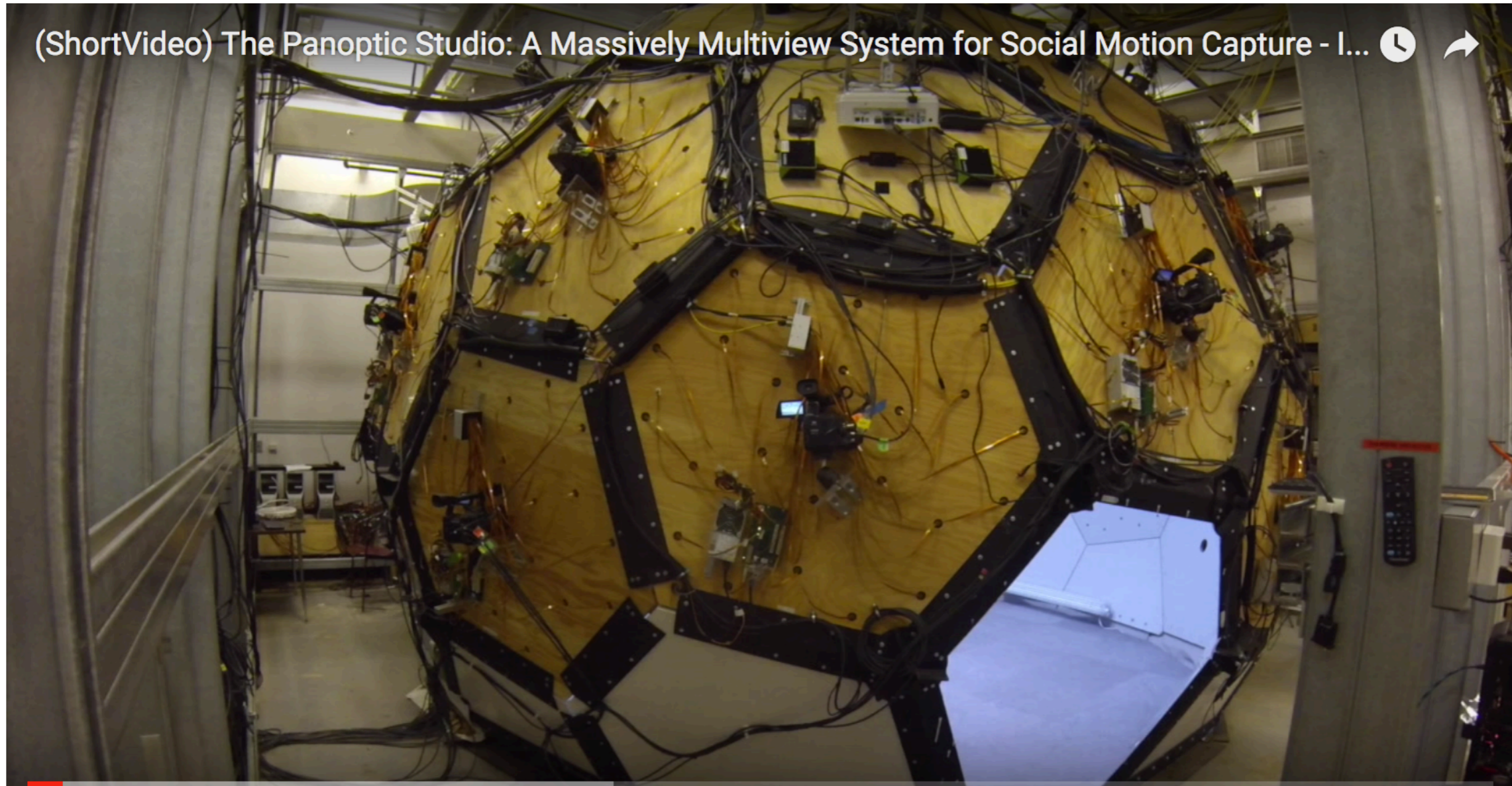


Data-driven Animation



Physical Simulation

Panoptic Studio (CMU)



<https://www.cs.cmu.edu/~hanbyulj/panoptic-studio/>

<https://www.youtube.com/watch?v=yzAtedDYLrc>

Performance Capture from Video

DeepCap: Monocular Human Performance Capture Using Weak Supervision

Marc Habermann^{1,2} Weipeng Xu^{1,2} Michael Zollhoefer³ Gerard Pons-Moll^{1,2} Christian Theobalt^{1,2}

¹Max Planck Institute for Informatics, ²Saarland Informatics Campus, ³Stanford University

Abstract

Human performance capture is a highly important computer vision problem with many applications in movie production and virtual/augmented reality. Many previous performance capture approaches either required expensive multi-view setups or did not recover dense space-time coherent geometry with frame-to-frame correspondences. We propose a novel deep learning approach for monocular dense human performance capture. Our method is trained in a weakly supervised manner based on multi-view supervision completely removing the need for training data with 3D ground truth annotations. The network architecture is based on two separate networks that disentangle the task

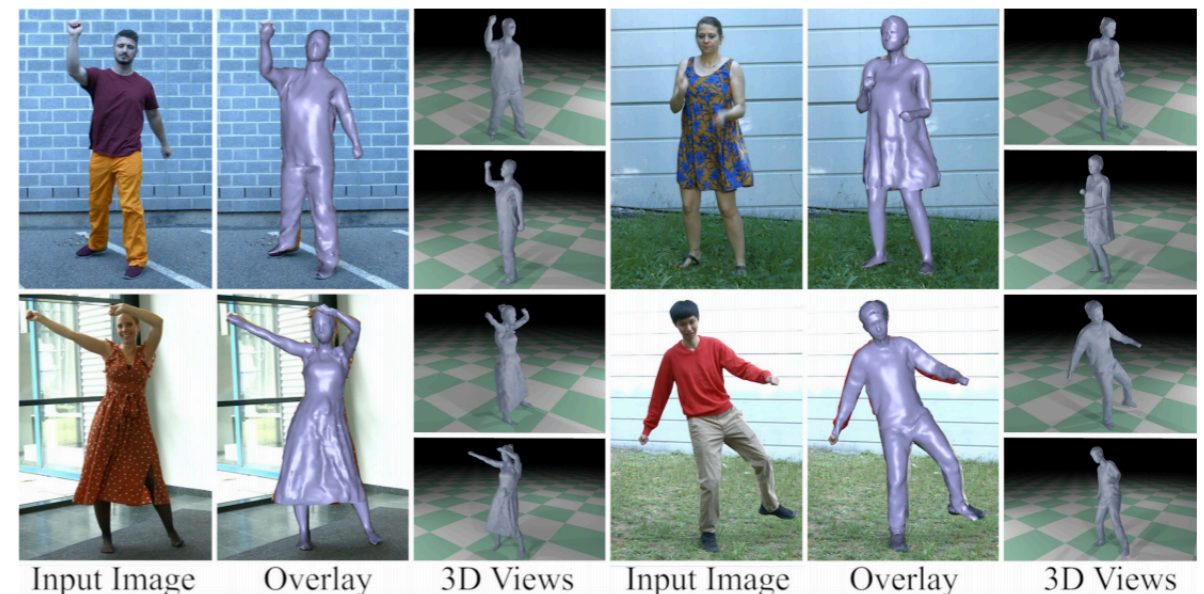


Figure 1. We present the first learning-based approach for dense monocular human performance capture using weak multi-view supervision that not only predicts the pose but also the space-time coherent non-rigid deformations of the model surface.

<https://people.mpi-inf.mpg.de/~mhaberma/projects/2020-cvpr-deepcap/>

Keyframing vs. Motion Capture

Keyframing: setup

What is accomplished?

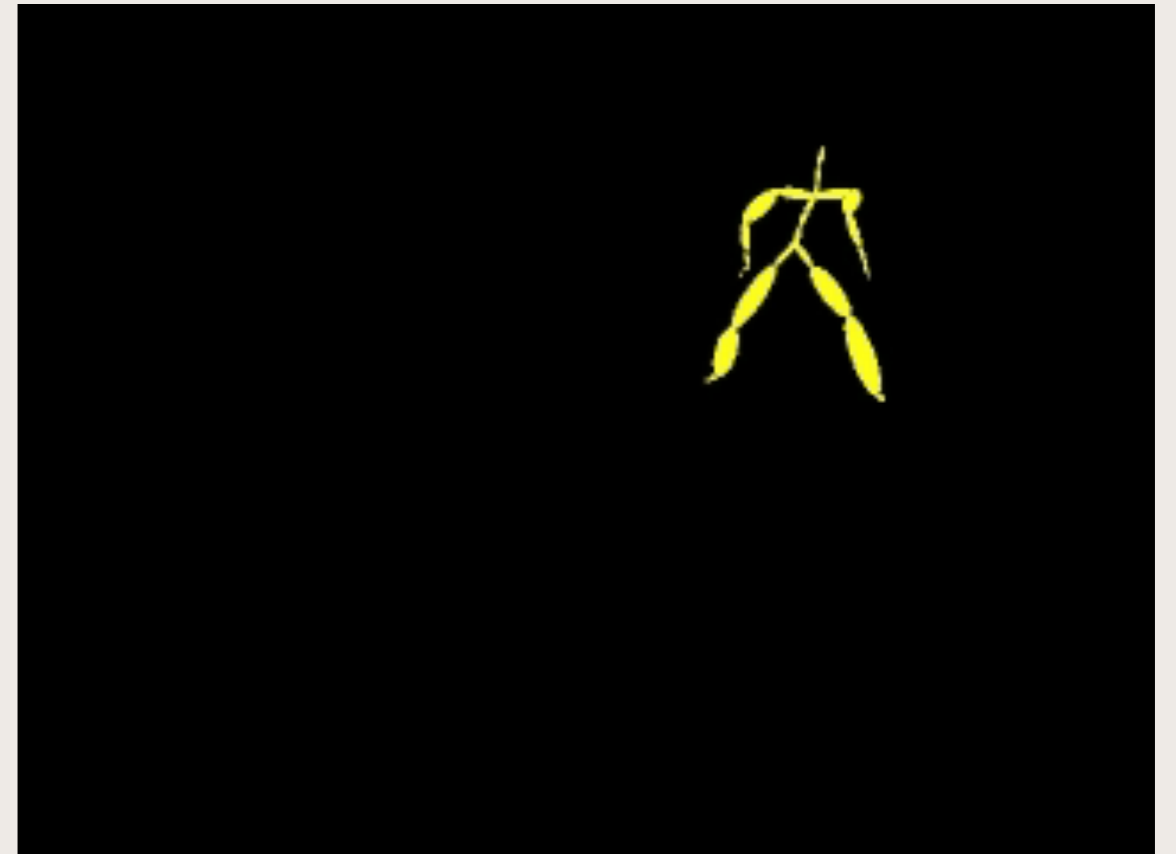
- **Define joint locations and bone heirarchy using a point and click interface**
- **Define joint limits**
- **Set up Inverse Kinematics handles (and other controls for your rig)**
- **Bind skeleton to its “skin”**

Walk Cycle Variations



<http://www.amazon.com/Animators-Survival-Kit-Richard-Williams/dp/0571202284>

Working with Motion Capture is Quite Different...



<http://mocap.cs.cmu.edu/>
<https://www.mixamo.com/>

CMU Mocap Database

To define a motion, we need:

The skeleton file: ASF format

The motion file: AMC format

Let's look at these...

Editing Motion Capture Data

How might you edit motions in such a format?

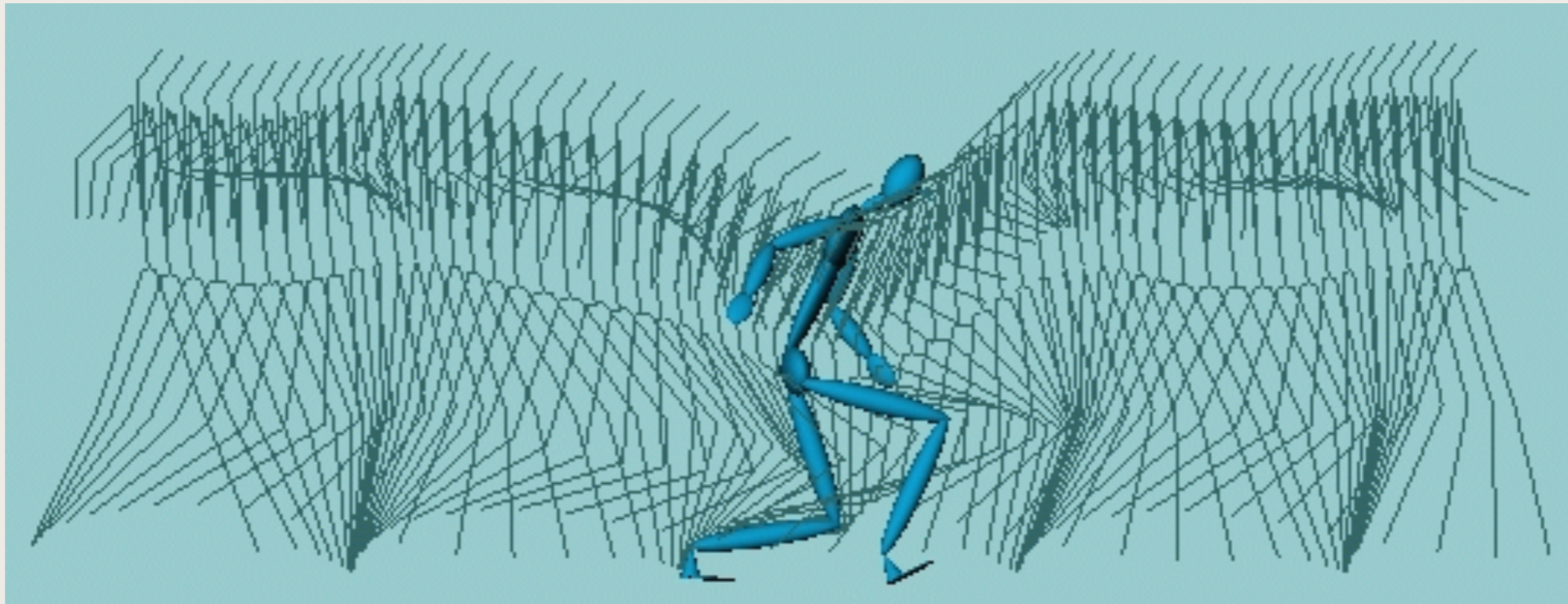
Retiming

Displacement curves

Motion “filtering”

Keyframe extraction / edit keyframes

Displacement Curves

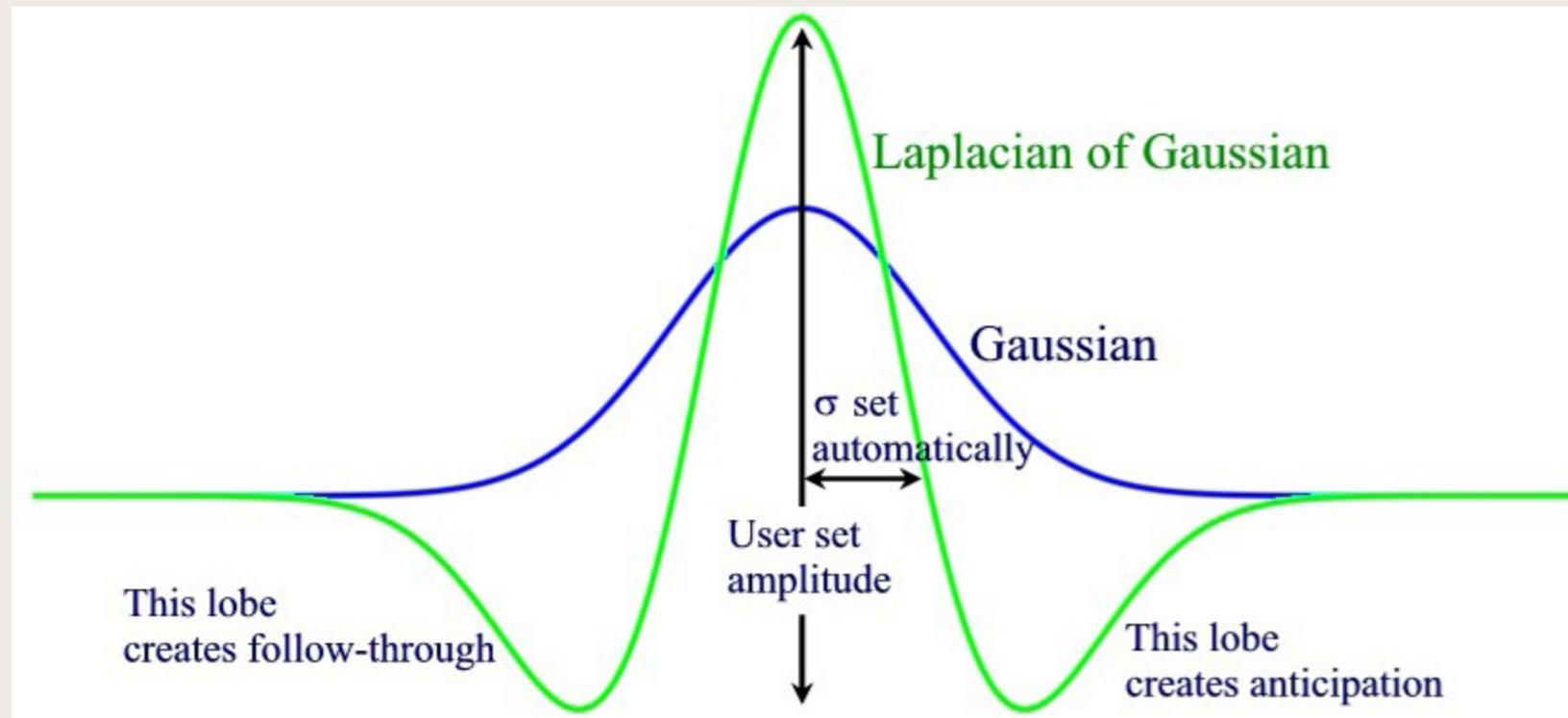


Main ideas:

- **User edits → displacements to the original motion**
- **Displacements can be made at different resolutions in a hierarchical scheme**

Jehee Lee and Sung Yong Shin, A Hierarchical Approach to Interactive Motion Editing for Human-like Characters, SIGGRAPH 99, 39-48, August 1999.

Motion Filtering



Main idea:

- **A simple filter applied to a motion sequence can create squash and stretch effects and cartoon like exaggeration**

The Cartoon Animation Filter

Jue Wang, Steve Drucker, Maneesh Agrawala, Michael Cohen
SIGGRAPH 2006, July 2006. pp. 1169-1173.

Keyframe Extraction



Main idea:

- **Keyframes are local extrema of an embedding of the motion into a low-dimensional space**

Jackie Assa, Yaron Caspi, and Daniel Cohen-Or
Action Synopsis: Pose Selection and Illustration
SIGGRAPH 2005