

Motion Synthesis By Example

A Tutorial in 3 and 3/2 parts

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Thanks

- The students/collaborators who did the work
 - Lucas Kovar, Rachel Heck, Mankyu Sung, ...
- The rest of our group
- The people who gave us data and challenges
 - House of Moves / Vicon (Taylor Wilson), EA, Demian Gordon, Rockstar Vienna, (and a whole lot of others)
- The people who supported us financially
 - Original research supported by NSF, UW Grad School
- For inviting me
- You – for listening

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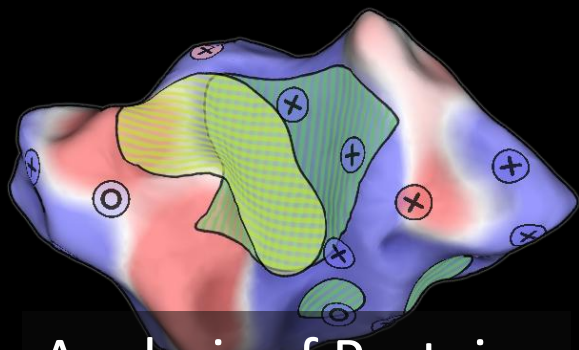
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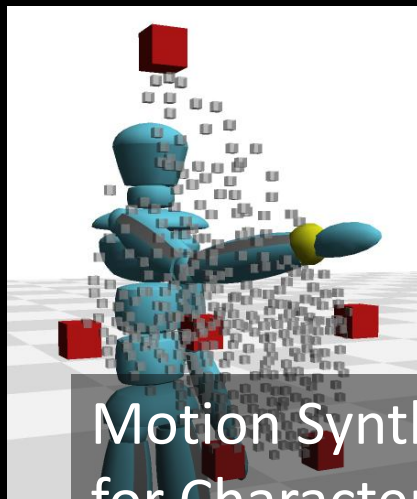
Madison, Wisconsin



Kinds of Stuff I Do?



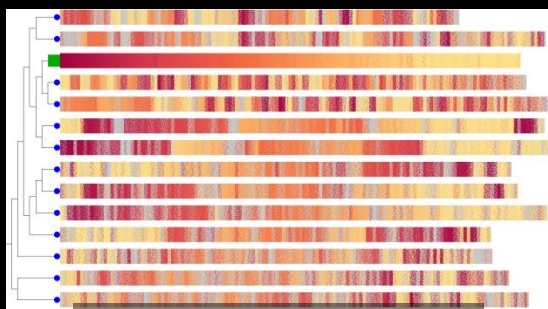
Analysis of Proteins



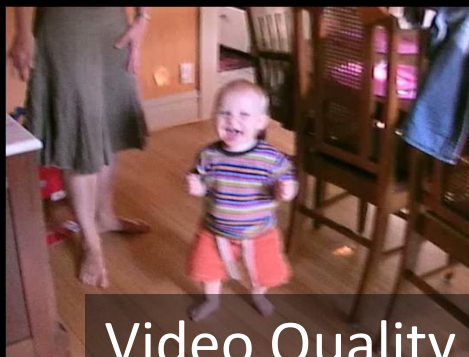
Motion Synthesis
for Characters



Multimedia Database
Information Extraction



Scientific Data
Display



Video Quality
Improvement



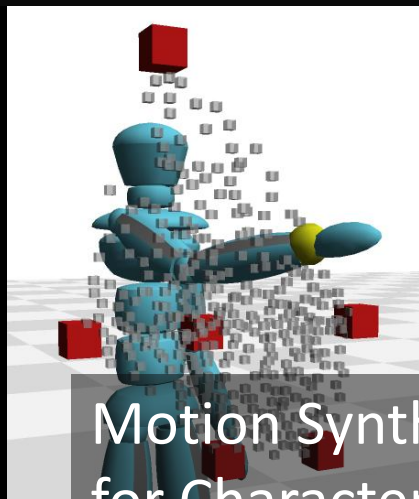
Image and Video
Retargeting

How can we use our understanding of
human perception and **artistic traditions**
to improve our tools for communicating
and data understanding?

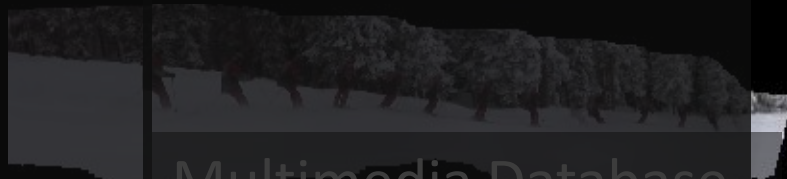
Kinds of Stuff I Do?



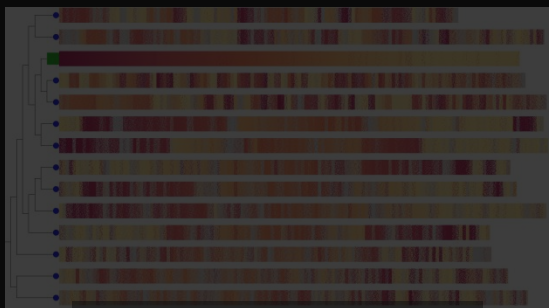
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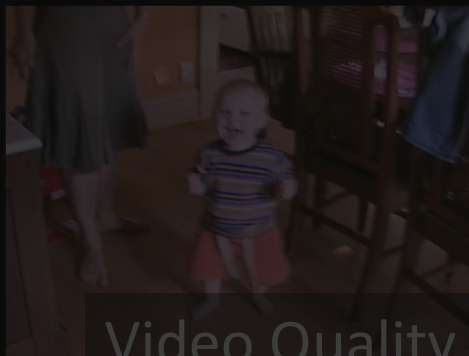
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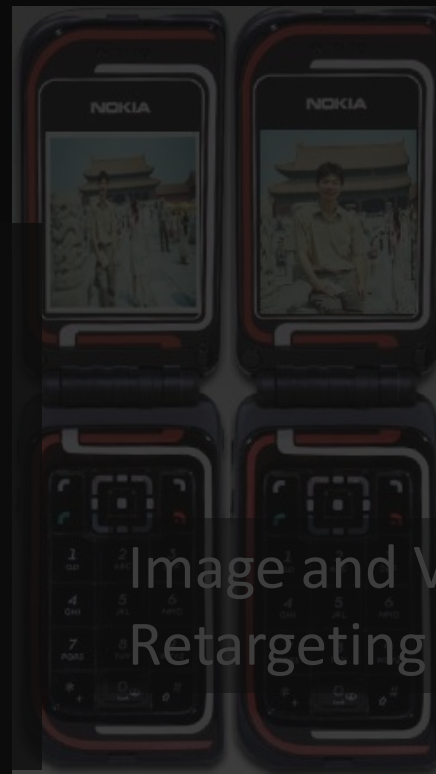


Image and Video
Retargeting

Motion Synthesis

How do we create the movements for animated characters?

Where is this going?

Example video from Heck&Gleicher '07

What did you just see?

- Interactively controllable character
- Stream of high-quality motion
- Continuous control (not discrete choices)
- How did it do it?
 - Dynamically assemble motions by putting together pre-recorded clips (lots of them)

Motion Synthesis by Example

- One Strategy for creating motion
- Dominant in practice
 - For some applications
- Widespread in research

But this is a
Summer School on Graphs in Computer
Graphics, Image and Signal Analysis

What does this have to do with
Graphs?

THUS, FOR ANY NONDETERMINISTIC TURING MACHINE M THAT RUNS IN SOME POLYNOMIAL TIME $p(n)$, WE CAN DEVISE AN ALGORITHM THAT TAKES AN INPUT w OF LENGTH n AND PRODUCES $E_{n,w}$. THE RUNNING TIME IS $O(p^2(n))$ ON A MULTITAPE DETERMINISTIC TURING MACHINE AND...

WTF, MAN. I JUST WANTED TO LEARN HOW TO PROGRAM VIDEO GAMES.

SIPSER CH7
 $y_{i,j-1,0} \wedge y_{i,j,0} \wedge y_{i,j+1,0} \wedge y_{i,j,1}$
 $y_{i,j-1,1} \wedge y_{i,j,1} \wedge y_{i,j+1,1} \wedge y_{i,j,0}$
 $N_i = (A_{i,0} \vee B_{i,0}) \wedge (A_{i,1} \vee B_{i,1}) \wedge \dots \wedge$
 $N = N_0 \wedge N$

For me at least ...

**It's the 10th anniversary of the
Motion Graph!**

Graphs in Synthesis-By-Example

- Important approach
- Common in research (since about 2002)
- Common in practice (since mid-1990s)
- Simplistic from the “Graph” point of view
- Becoming passé in research

Agenda

3 and 3/2 lectures

1. Introduction: Synthesis-By-Example
2. Motion Graphs
3. Parametric Graphs & Open Questions

- Exercises – 3 short foundation topics

- Representation/Rotations
- Blending
- Emerging Alternatives



Talk about
Other stuff
I do