Character Animation
• Keyframe animation
• Data-driven methods
• Dynamic controllers
• Physics-based optimization
• Hybrid methods
Motion space
Keyframe animation
Data-driven methods
Dynamics controllers

highly dynamic motion
Physics-based optimization
• Data-driven

• Dynamic controllers

• Physics-based optimization

• Hybrid methods
Goal and approach

- Use large amount of motion capture data to create realistic, controllable character motion
- Given a corpus of motion capture data, construct a directed graph that encapsulates the connections between motion clips
- Once the motion graph is built, the system will automatically find a graph walk that meets the user’s specification
Motion Patches: Building Blocks for Virtual Environments Annotated with Motion Data

Kang Hoon Lee
Myung Geol Choi
Jehee Lee

Seoul National University
• Data-driven

• Dynamic controllers

• Physics-based optimization

• Hybrid methods
Goal

- Use control algorithms to simulate realistic maneuver for virtual human models
Human model

- 17 rigid bodies
- 30 controlled dofs
- body segment and density from biomechanical data
- mass and inertia calculated from polygonal model
Faloutsos et al. 2000  
Yin et al. 2007
Multiobjective Control with Frictional Contacts

Yeuhi Abe
Marco da Silva
Jovan Popovic

SCA '07 Demo Reel
• Data-driven
• Dynamic controllers
• Physics-based optimization
• Hybrid methods
Goal

- Cast the motion synthesis into an optimization problem
- Physics can be formulated into constraints
- User preferences and “naturalness” of the motion can be formulated as an objective function
input grasping pose

1. input object motion
2. 3.
open a bottle

half speed
• Data-driven
• Dynamic controllers
• Physics-based optimization
• Hybrid methods
Goal

• Combine the power of motion capture and physics

• Simulate the motion when the character behaves passively

• Use mocap data when the character’s motion requires sophisticated control
Dynamic Response for Motion Capture Animation
Data-driven vs. physics

- Use data-driven methods when
  - data acquisition is easy
  - new motion is similar to existing data
  - physical response is not important
  - stable, long motion sequences are required
  - mocap experts are accessible
Data-driven vs. physics

- Use physics methods when
  - dynamical properties are important
  - simulating interaction with the environment
  - multiple characters are in the scene
Evaluation

• Looks good?
• Side-by-side comparison
• Perception studies