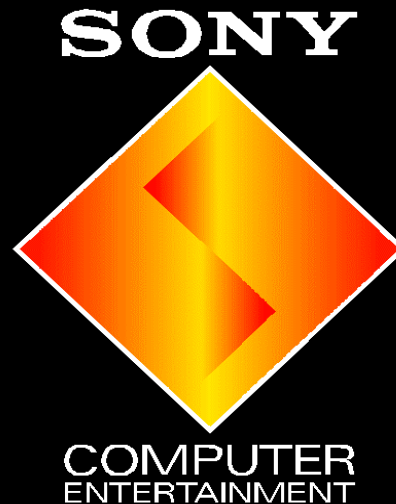


Procedural Techniques for Interactive CG

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What do I mean by a “procedural technique?”

- Any description that is not explicit
 - triangle meshes are explicit
 - motion capture animation is explicit
- Procedural techniques
 - modify a description via an algorithm
 - change with the state of the simulation
 - are calculated on the fly

PROS of Procedural Techniques

- Interactivity
- Scalability
- Variety
- Cost
- Storage and bandwidth

CONS of Procedural Techniques

- Not suited to everything
- Not as good as Art and Capture
 - (in a fixed situation)
- Can use lots of processor power
- Can be complex and unpredictable

Modeling with Procedural Techniques

- Generally Good For
 - Plants
 - Terrain
 - Biological forms
- Generally Bad For
 - man made objects
 - precise representation

Animation with Procedural Techniques

- The goal is interaction
- Simulating the Physical World
 - dynamics, cloth, fluids, smoke, fire, fracture
- Modified Animation
 - I.K. , motion blending etc.
- Behavior and Autonomous Characters
- Controllers

Modified Animation

- Using key frame artist generated or motion capture data as basis
 - interactivity requires procedural modification of the animation
 - motion blending
 - inverse kinematics
 - physical modeling

Physical Simulation

- Makes interaction look real
- Computationally very intensive
- Difficult to make robust
- Can be inconsistent in performance
- Lots of research still to be done!

Autonomous Characters

- The goal is life like character behavior
- Simple scripting and FSM
- Cognitive modeling
- Steering behaviors and path finding
- Learning algorithms
 - neural nets, genetic algorithms
 - off line vs. real time learning

Controllers

- Where behavior meets physics
 - How an ‘action’ becomes a ‘motion’
 - “Walk Forward” through an arbitrary environment
 - Avoid obstacles, balance
 - Look natural

Examples

- Lifeforms :- Latham and Todd
 - an example of procedural modeling
- Bird-Fish-Mouse
 - autonomous characters
 - modified animation
 - procedural water