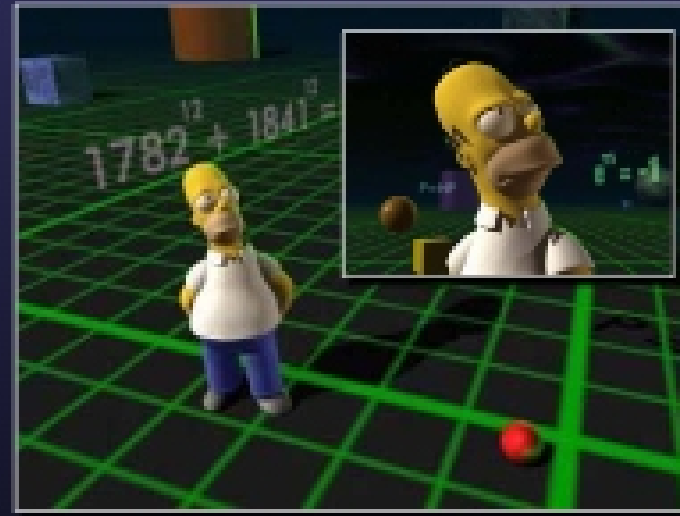


Applications of Computer Graphics in Cel Animation



Adam Finkelstein
Princeton University
COS 426 Spring 2003

3-D and 2-D animation



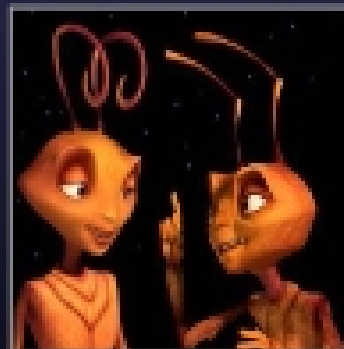
Homer 3-D



Homer 2-D

Advantages of 3-D

- Complex lighting and shading
- Reuse from scene to scene
- Automatic in-betweening
- Ease of camera motion
- Realism
- Texture mapping



Advantages of 2-D

- Easier for traditional animators
- Simple gestures convey emotion
- Art form refined for 80 years



Key idea

Use 3-D methods in 2-D animation!

- Expressiveness of 2-D
- Technical benefits of 3-D

Related work

Automating cel animation pipeline

[Fekete 95, Robertson 94,
Shantzis 94, Wallace 81]

Hybrid 2D/3D for cel animation

[Rademacher 99, Williams 91]

Two forms of art work



Overview

- Introduction
- **Multiperspective panoramas**
- Texture mapping
- Shadows

Multiperspective Panoramas for Cel Animation

Daniel Wood  University of Washington
Adam Finkelstein  Princeton University
John Hughes  Brown University
Craig Thayer  Disney Feature Animation
David Salesin 

[SIGGRAPH '98]

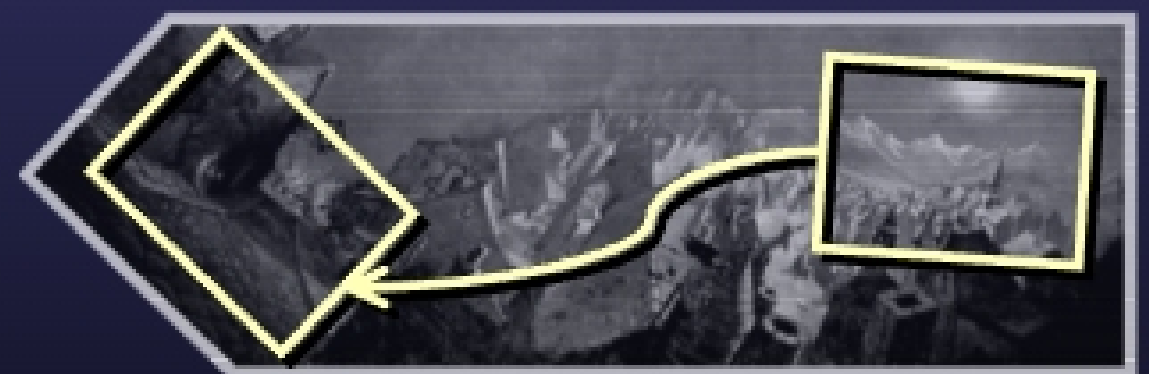


[*Pinocchio*, 1940]

Suggesting a moving camera

A multiperspective panorama incorporates many perspectives into a single locally coherent image.

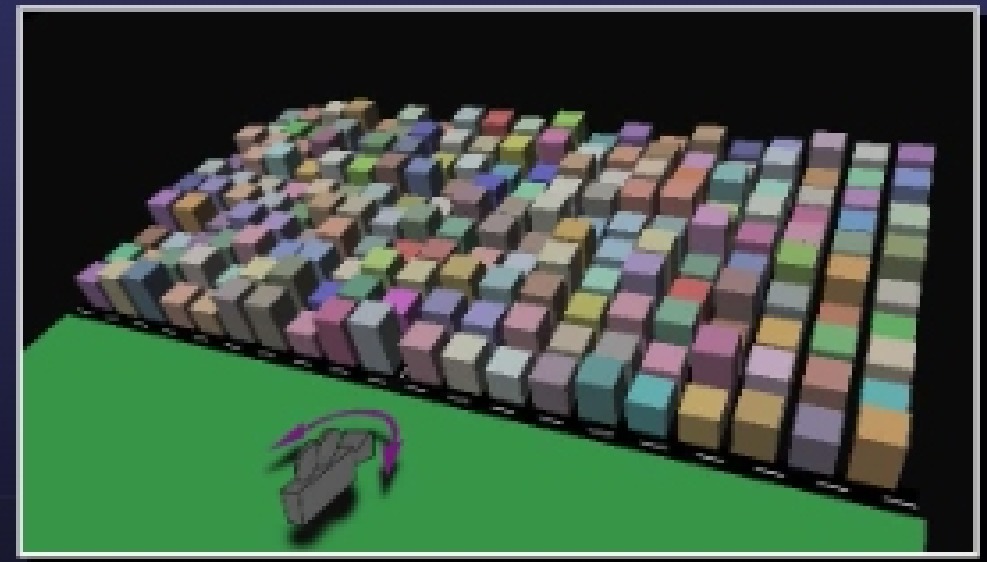
A moving window slides across the panorama, selecting frames for the animation.



Objective

Given: 3D model and camera path

Create: Panorama and moving window such that the 2D animation resembles the 3D animation



1. 3-D scene and camera path



2. Panorama and moving window



3. Illustrated panorama



4. Extracted frames



5. CG Elements