

IEEE VR 2003 tutorial 1

Recent Methods for Image-based Modeling and Rendering

Lecture 6: Rendering

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Implementation

- Matlab for geometric modeling and prototyping
- mexVision for tracking (30Hz frame rate)
- Hardware accelerated OpenGL for rendering (2.8Hz in SW, 18Hz on GeForce 2)
- pthreads and pvm for parallel processing



Hardware rendering

- Unsigned basis

$$I_w(t) = B^+ \mathbf{y}(t) - B^- \mathbf{y}(t) + \bar{I}$$

- Scaling to 8 bit

$$\tilde{B}^+ = 255 B^+ \zeta^{-1}$$

$$\tilde{B}^- = 255 B^- \zeta^{-1}$$

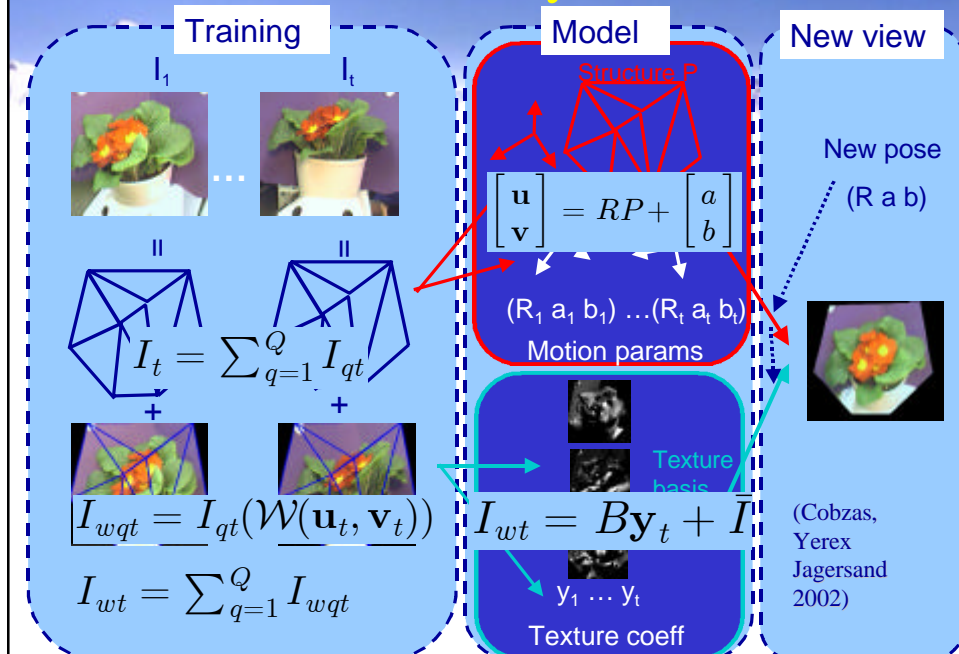
$$\tilde{\mathbf{y}} = 255^{-1} \zeta \mathbf{y}$$

- Where $\zeta = \text{diag}(\max |B|)$

OpenGL

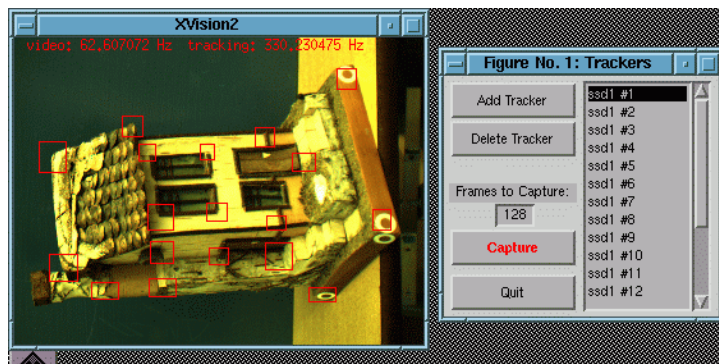
```
//draw the mean
BindTexture( $\bar{I}$ );
DrawTriangles();
//add basis textures
for(each  $i$ )
{
    SetBlendCoefficient( $|\tilde{\mathbf{y}}_i(t)|$ );
    BindTexture( $\tilde{B}_i^+$ );
    if( $\tilde{\mathbf{y}}_i(t) > 0$ ) SetBlendEquation(ADD);
    else SetBlendEquation(SUBTRACT);
    DrawTriangles();
    BindTexture( $\tilde{B}_i^-$ );
    if( $\tilde{\mathbf{y}}_i(t) > 0$ ) SetBlendEquation(SUBTRACT);
    else SetBlendEquation(ADD);
    DrawTriangles();
}
```

Geometric SFM and dynamic textures



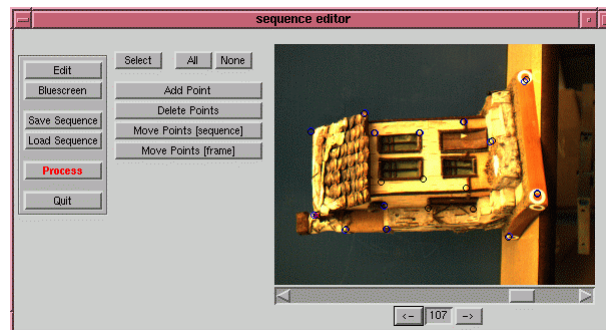
Capture system

- Video and visual tracking from and ieeel394 cam
- Based on XVision2, PVM and Capture UI



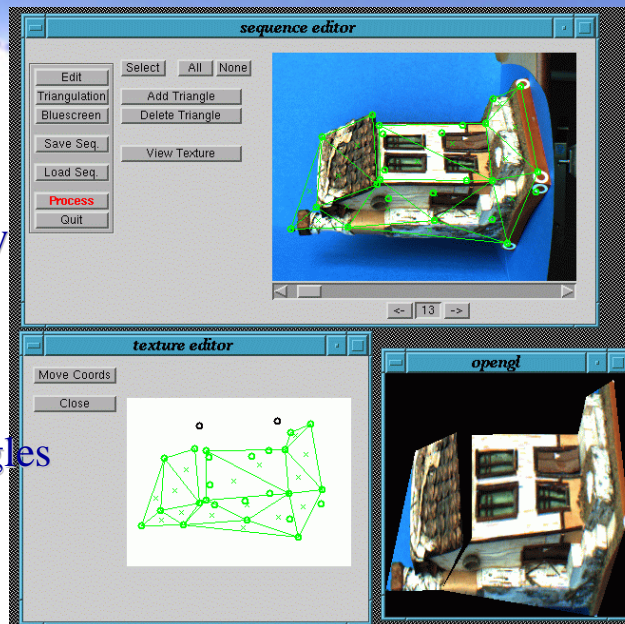
Structure editor

- Verify geometric structure reprojections
- Edit tracking errors



Triangulation and Texture Editor

- Adjust Delauney triangulation
- Adjust texture resolution for individual triangles



Real-Time Renderer

- Real-Time HW implementation of texture blending in NVIDIA register combiners

