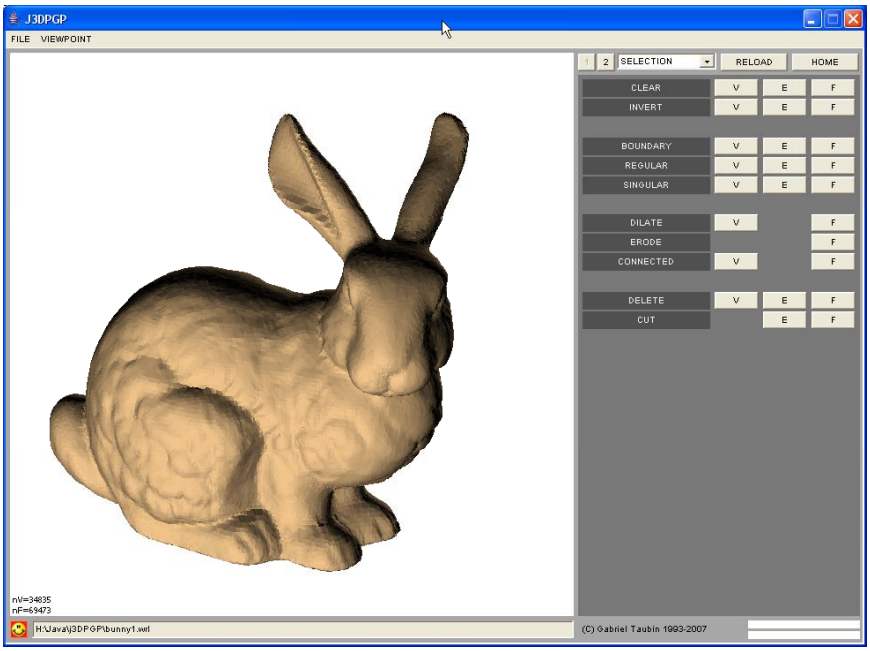
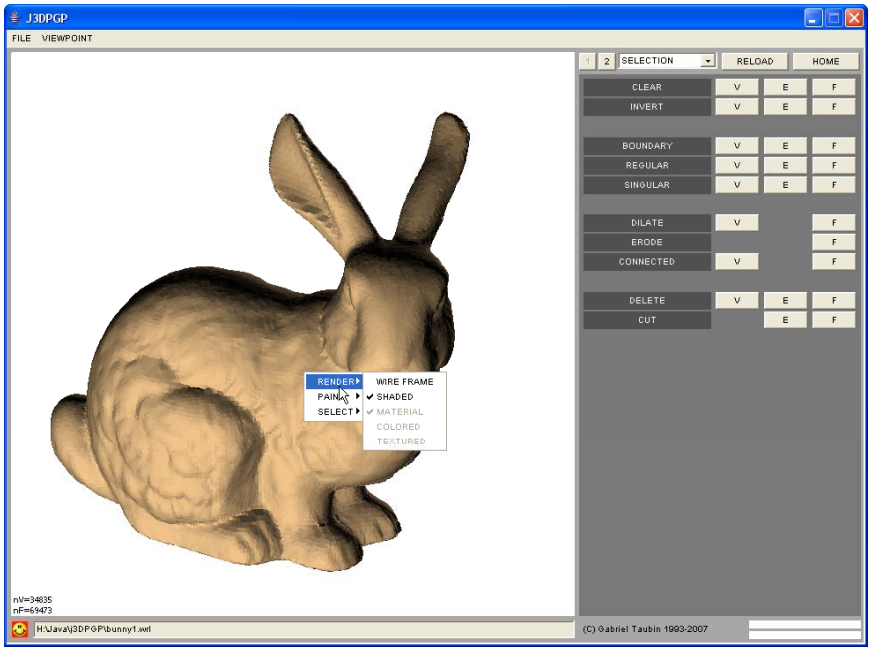
The j3DPGP Application

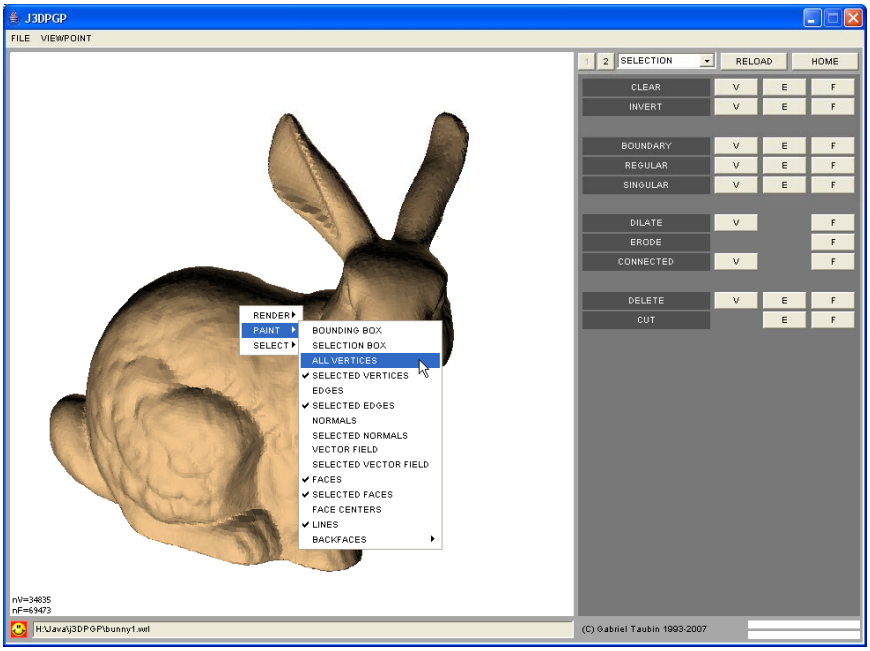
3D Photography and Geometry Processing

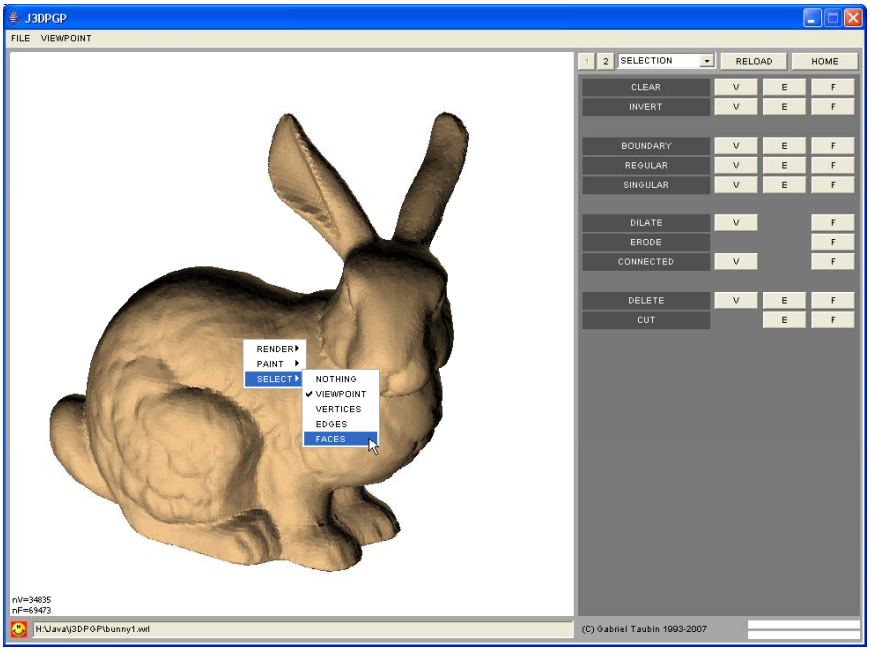
Brown Spring 2008

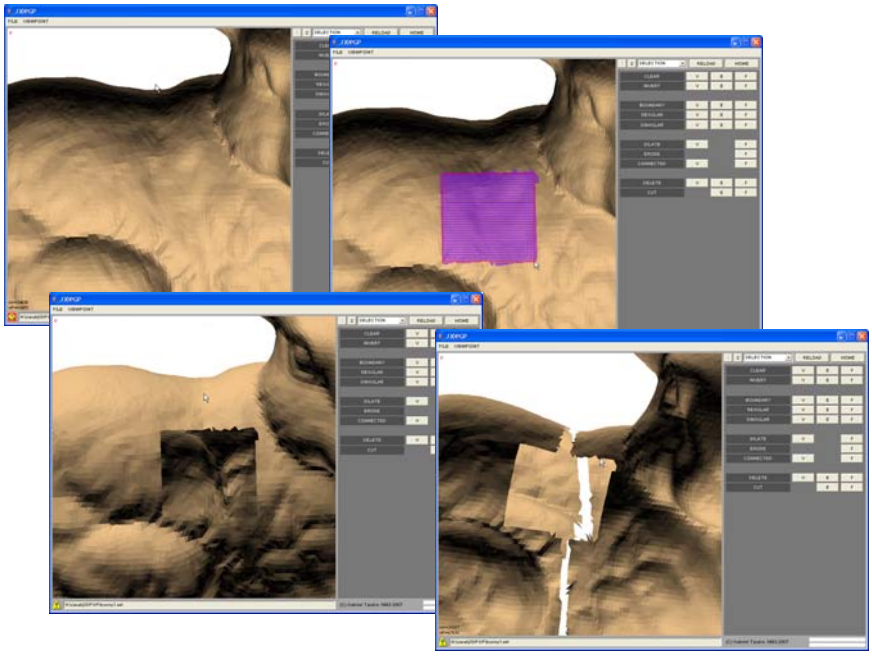
Gabriel Taubin




J3DPGP
FILE VIEWPOINT
1 2 SELECTION RELOAD HOME
CLEAR V E F
INVERT V E F
BOUNDARY V E F
REGULAR V E F
SINGULAR V E F
DILATE V F
ERODE F
CONNECTED V F
DELETE V E F
CUT E F
RENDER
PAINT
SELECT
WIRE FRAME
SHADED
MATERIAL
COLORED
TEXTURED
nV=34835
nF=69473
H:\Java\J3DPGP\bunny1.wrl
(C) Gabriel Taubin 1993-2007


J3DPGP
FILE VIEWPOINT
1 2 SELECTION RELOAD HOME
CLEAR V E F
INVERT V E F
BOUNDARY V E F
REGULAR V E F
SINGULAR V E F
DILATE V F
ERODE F
CONNECTED V F
DELETE V E F
CUT E F
RENDER
PAINT
SELECT
BOUNDING BOX
SELECTION BOX
ALL VERTICES
SELECTED VERTICES
EDGES
SELECTED EDGES
NORMALS
SELECTED NORMALS
VECTOR FIELD
SELECTED VECTOR FIELD
FACES
SELECTED FACES
FACE CENTERS
LINES
BACKFACES
nV=34835
nF=69473
H:\Java\J3DPGP\bunny1.wrl
(C) Gabriel Taubin 1993-2007


J3DPGP
FILE VIEWPOINT
1 2 SELECTION RELOAD HOME
CLEAR V E F
INVERT V E F
BOUNDARY V E F
REGULAR V E F
SINGULAR V E F
DILATE V F
ERODE F
CONNECTED V F
DELETE V E F
CUT E F
RENDER
PAINT
SELECT
NOTHING
VIEWPOINT
VERTICES
EDGES
FACES
nV=34835
nF=69473
H:\Java\J3DPGP\bunny1.wrl
(C) Gabriel Taubin 1993-2007



j3DPGP Data Structures

- VecInt
- VecFloat
- WrlSceneGraph
- WrlAppearance
- WrlIndexedFaceSet
- WrlIndexedLineSet
- WrlPointSet
- Ifs = VRML'97 file with a Shape node

VecInt - VecFloat

- Variable length arrays

- capacity(), size()
- pushBack(value)
- popBack(), popBack(n)
- get(index), getFront(), getBack()
- set(index, value)

Img

- 2D array of ARGB pixels
- 0xffaabbcc

- getWidth(), getHeight()
- get(x,y), get(x,y,gray)
- getA(x,y), getR(x,y), getG(x,y) , getB(x,y)
- set(x,y,argb)

WrlMaterial

- Used for rendering
- We only use the diffuseColor field
- Don't pay much attention to it

WrlPixelTexture

- Represents an image stored within the VRML file

WrlImageTexture

- Represents an image stored externally
- The URL is stored in the file
- Extends WrlPixelTexture

Class WrlIndexedFaceSet

- connectivity
  - VecInt getCoordIndex()
- Geometry
  - VecFloat getCoordValue()
- Properties
  - Boolean getNormalPerVertex()
  - VecFloat getNormal()
  - VecInt getNormalIndex()
  - Same for colors, and texCoord

WrlIndexedFaceSet connectivity

- coordIndex is read-only

- Void makeEdges()
- Void makeFaces()

- MeshFaces getFaces()
- GraphFaces getEdges()
- WrlSelection getSelection()

Additional Data Structures

- MeshFaces
- Graph
- GraphFaces
- GraphEdge
- WrlSelection
- Partition
- HalfEdges

Graph

- Vertices are indices 0…(nV-1)
- Edges are pairs of vertices
- Can be oriented or non-oriented

- How to traverse all the edges of a graph:

```
int i,iE,iV0,iV1;
GraphEdge e;
for(i=0;i<nV;i++) {
   for(e=g.getFirstEdge(i);e!=null;e=g.getNextEdge(e)) {
      iE= e.getIndex();
      iV0 = e.getVertex(0); // iV0 should be equal to i
      iV1 = e.getVertex(1);
       …
   }
}
```

GraphEdge

- Used to return values from a Graph
- Not used internally to store data

- getVertex(i)
- getIndex()
- getNext(), setNext

GraphFaces extends Graph

- List of faces incident to each edge

MeshFaces

- Provides random access to faces in coordIndex
- [0, 1, 2, -1, 2, 1, 3, -1, 4, 1, 0, -1]
- Face 0 -> [0, 1, 2]
- Face 1 -> [2, 1, 3]
- Face 2 -> [4, 1, 0, -1]
- getFaceCoordIndex(1,2) = 3