

Sketch Representations

15-494 Cognitive Robotics
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Sketches in Tekkotsu

- A sketch is a 2-D iconic (pixel) representation.
- Templated class:
 - Sketch<uchar> *unsigned char*: can hold a color index
 - Sketch<bool> true if a property holds at image loc.
 - Sketch<uint> *unsigned int*: pixel index; distance; area
 - Sketch<usint> *unsigned short int*
 - Sketch<float> single precision *float*
- Sketches are smart pointers.
- Sketches live in a SketchSpace: fixed width and height.
- A built-in sketch space: camSkS.

Sketch Example

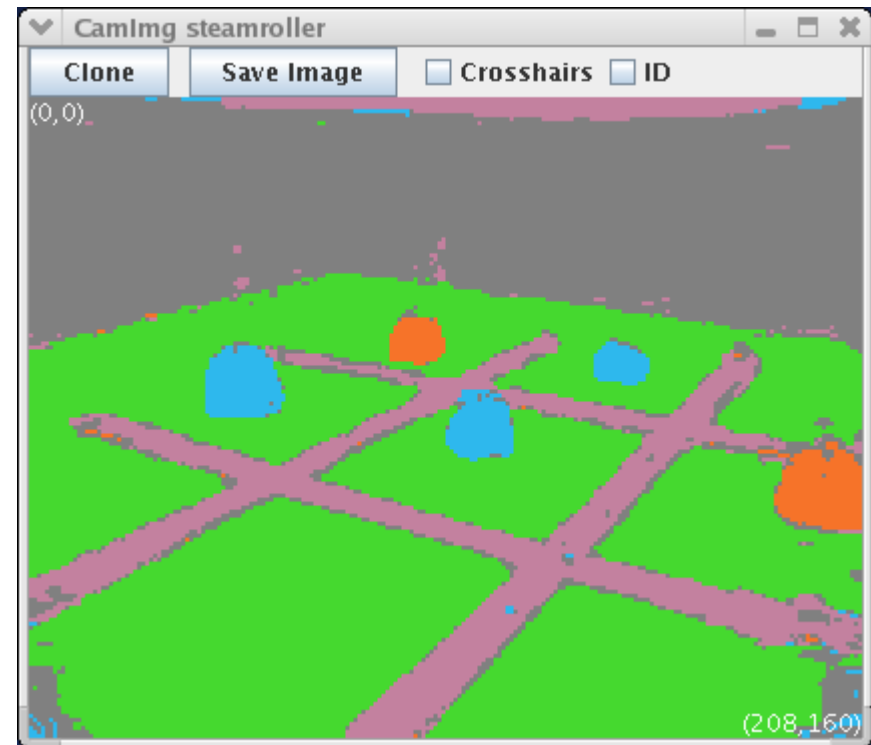
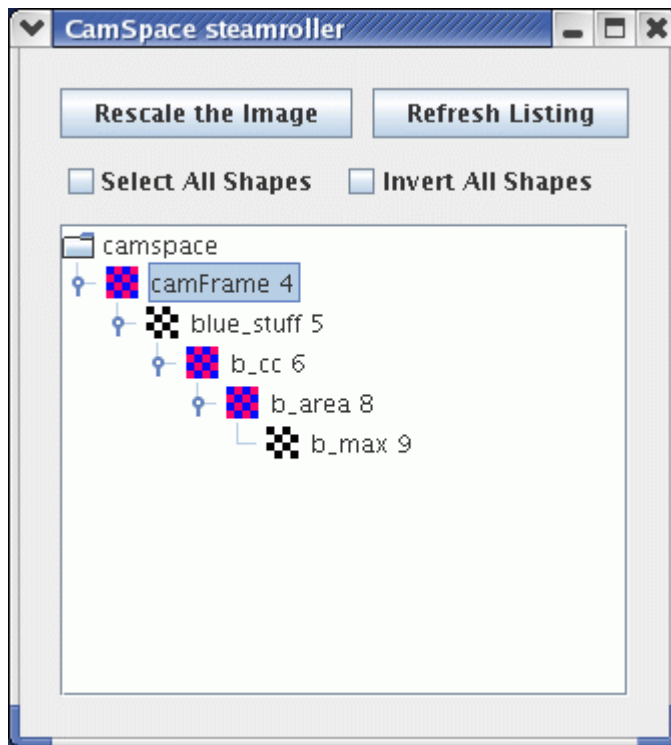
- Find the largest blue region in the image:



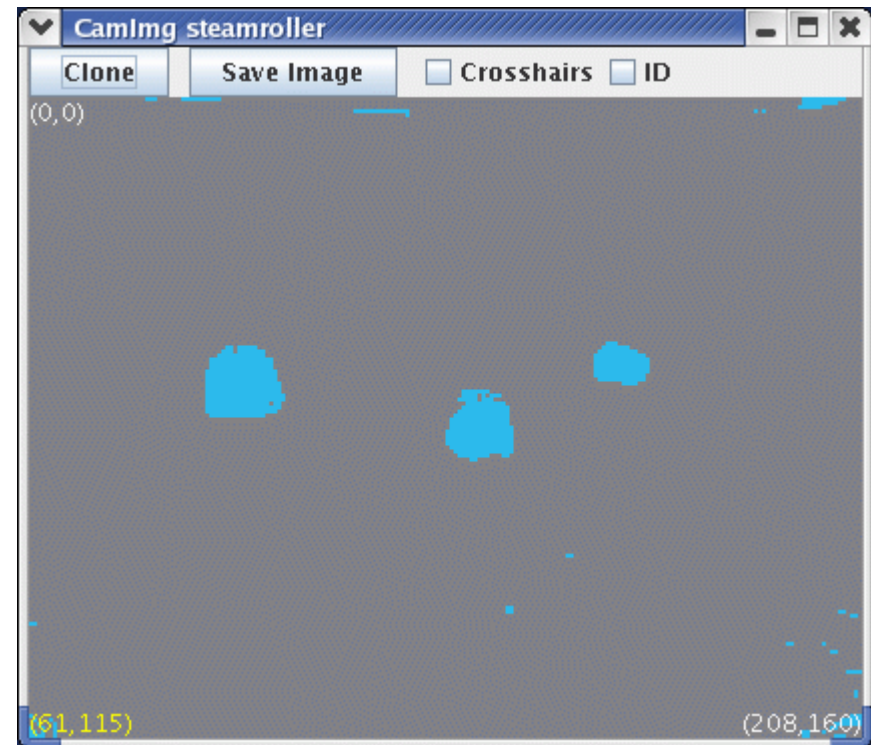
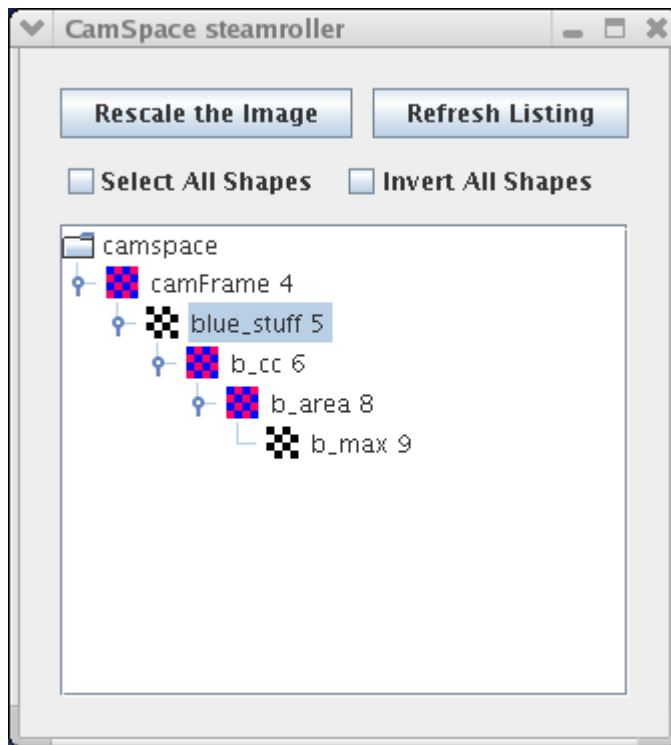
Sketch Example

```
$nodeclass DstBehavior : VisualRoutinesStateNode : doStart {  
  
    camSkS.clear();  
    NEW_SKETCH(camFrame, uchar, sketchFromSeg());  
  
    NEW_SKETCH(blue_stuff, bool,  
               visops::colormask(camFrame, "blue"));  
  
    NEW_SKETCH(b_cc, uint, visops::labelcc(blue_stuff));  
  
    NEW_SKETCH(b_area, uint, visops::areacc(b_cc));  
  
    int const max_area = b_area->max();  
  
    NEW_SKETCH(b_max, bool, b_area == max_area);  
  
}
```

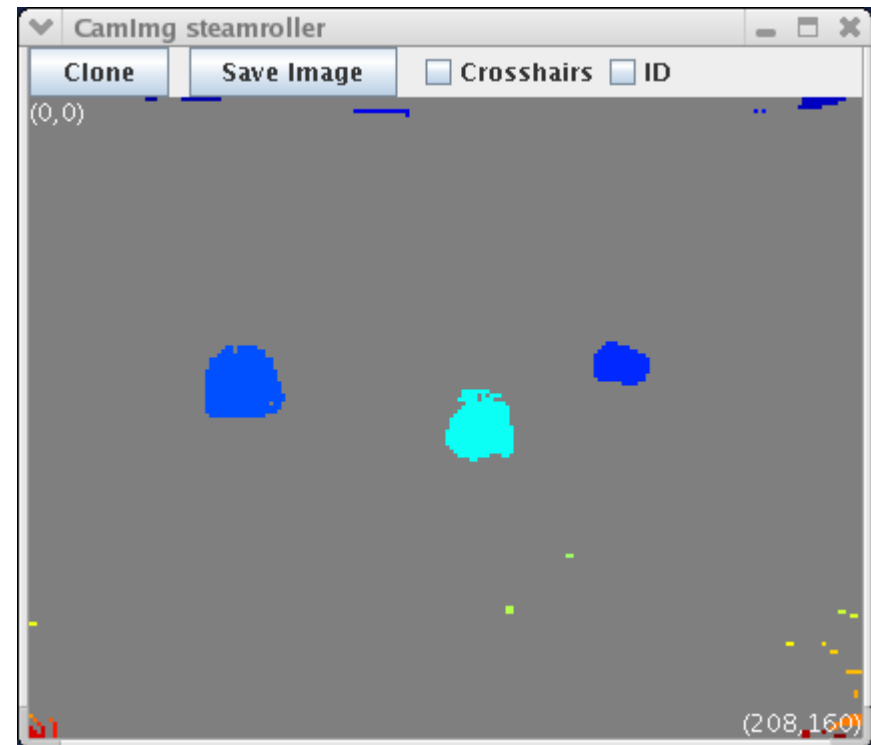
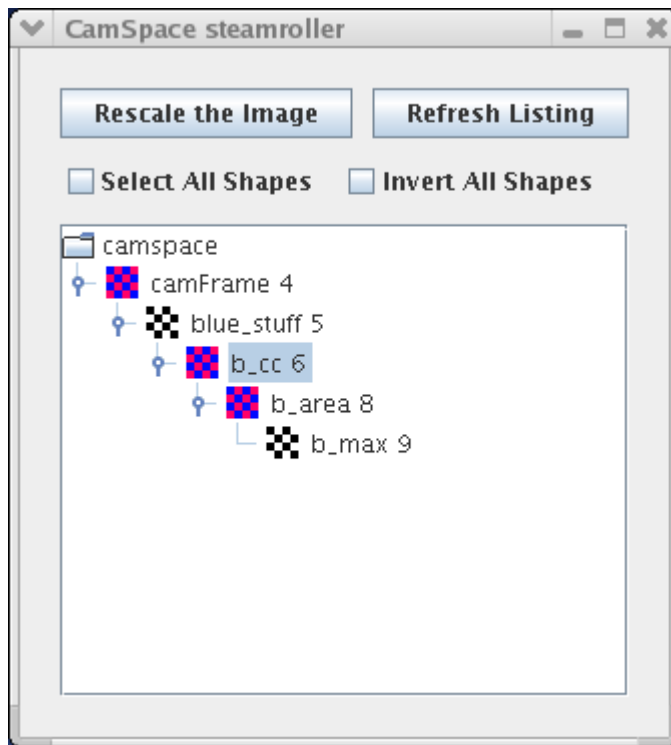
camFrame



visops::colormask



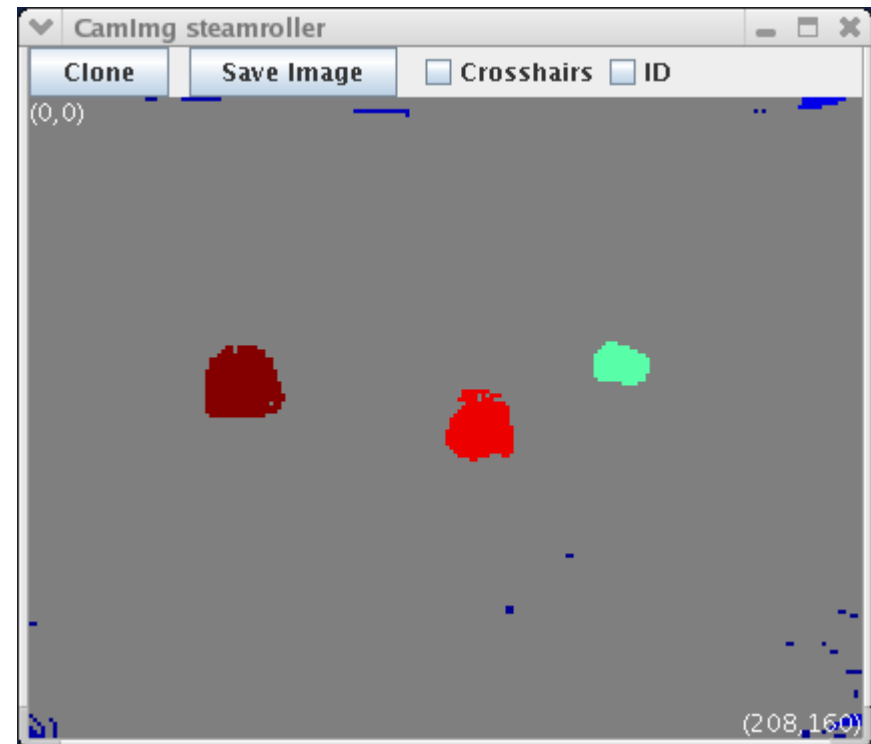
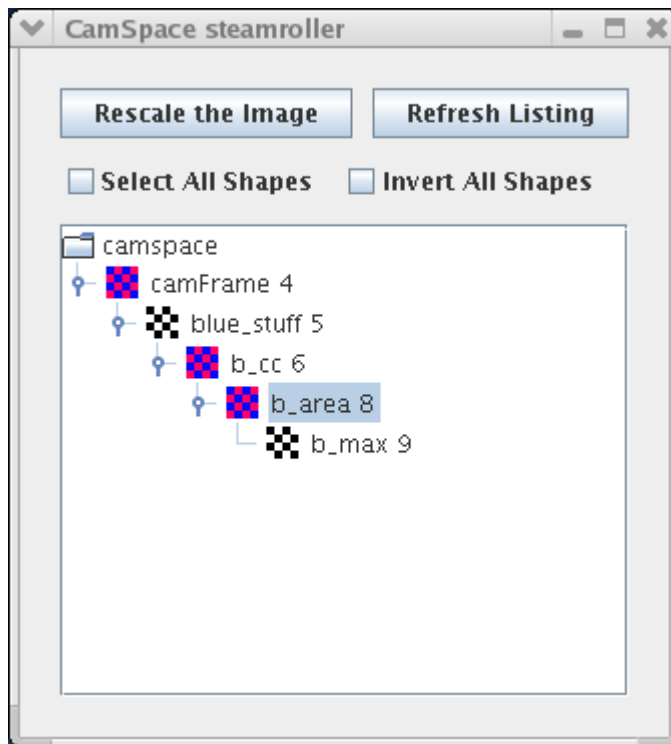
visops::labelcc



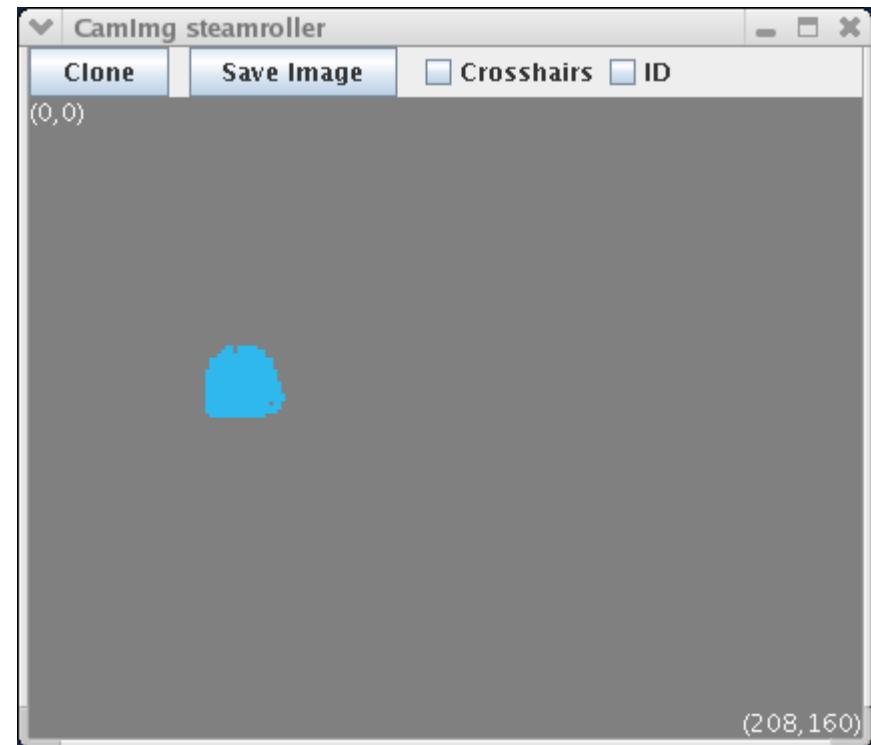
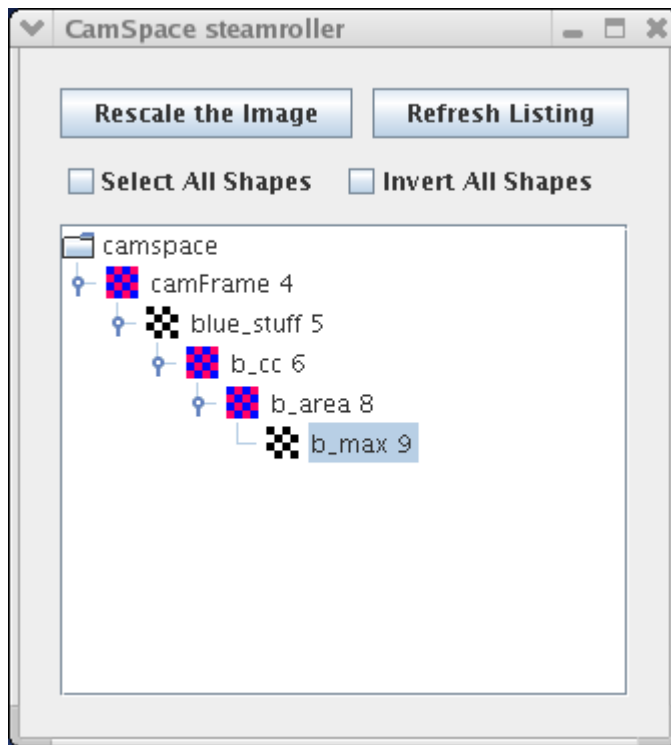
Components labeled starting from 1 in upper left; max label in lower right.



visops::areacc



b_area == max_area



Extended Example

- We've already found the largest blue blob.
- Now, find the orange region closest to the largest blue blob; ignore any orange noise (blobs smaller than 10 pixels).



Extended Example

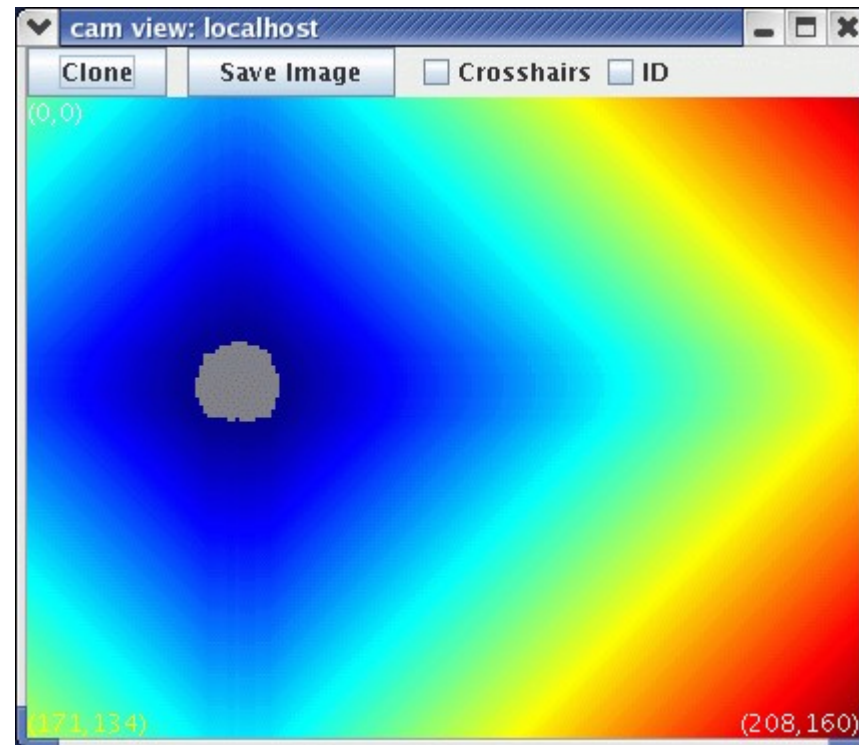
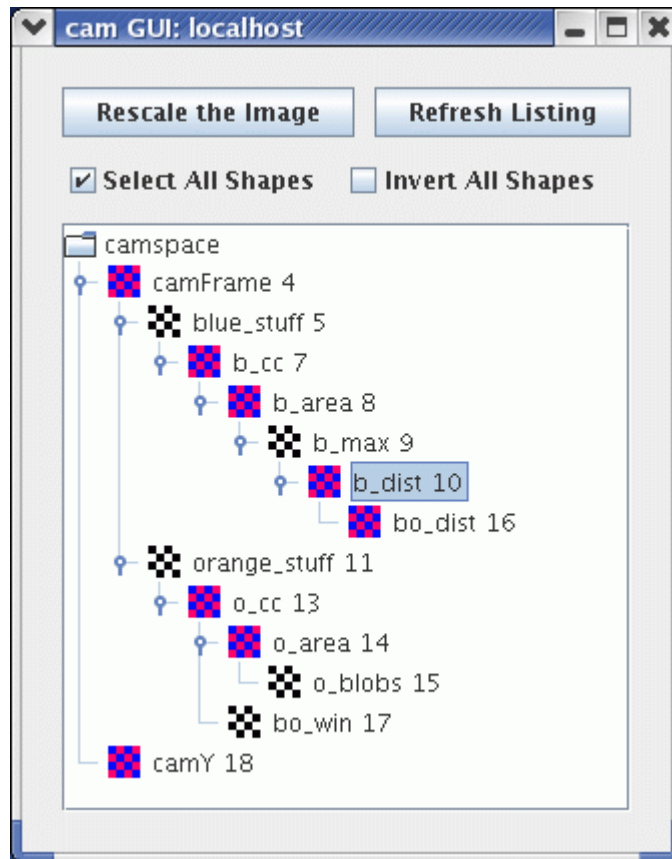
```
NEW_SKETCH(b_dist, uint, visops::edist(b_max));

NEW_SKETCH(orange_stuff, bool,
           visops::colormask(camFrame, "orange"));
NEW_SKETCH(o_cc, uint, visops::labelcc(orange_stuff));
NEW_SKETCH(o_area, uint, visops::areacc(o_cc));
NEW_SKETCH(o_blobs, bool, o_area > 10);

NEW_SKETCH(bo_dist, uint, b_dist*o_blobs);
int const min_index = bo_dist->findMinPlus();
int const min_label = o_cc[min_index];
NEW_SKETCH(bo_win, bool, o_cc == min_label);

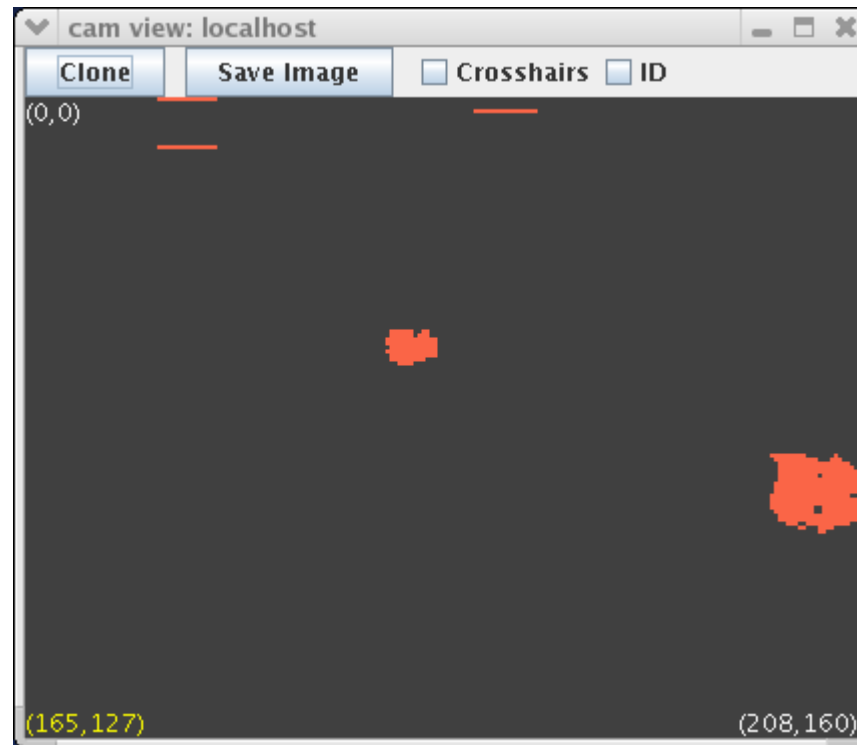
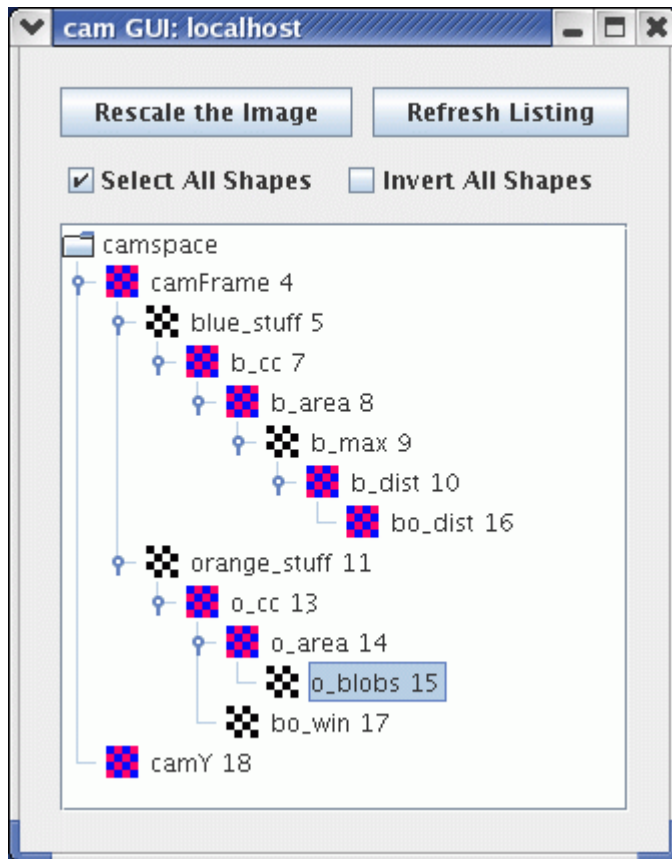
NEW_SKETCH(rawY, uchar, sketchFromRawY());
```

visops::edist(b_max)



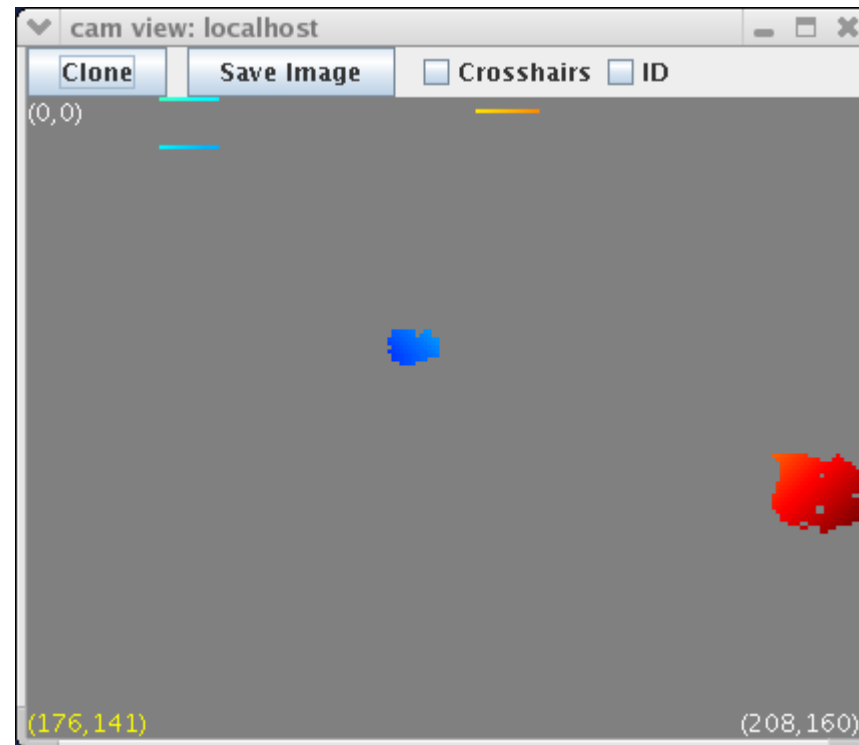
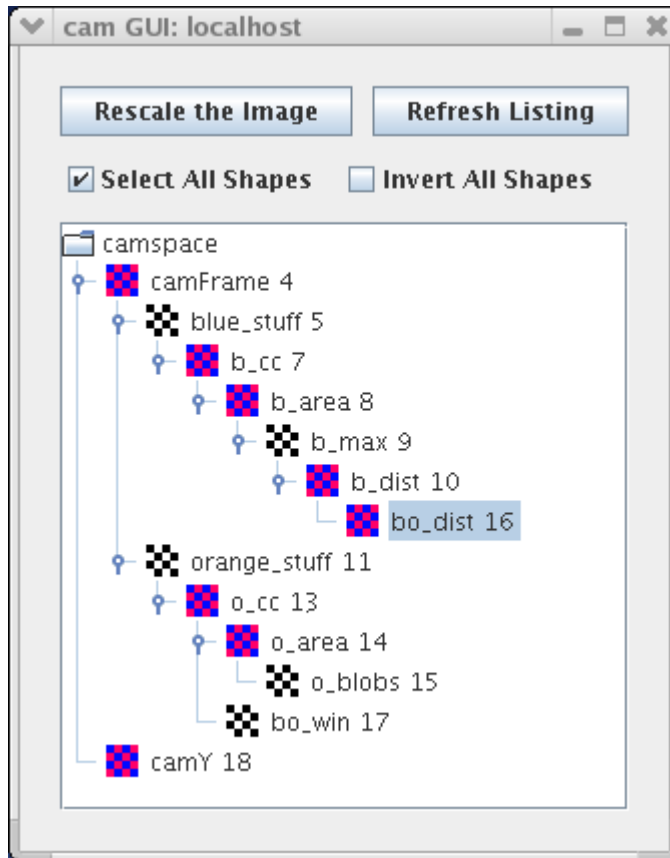
o_area > 10

```
NEW_SKETCH(o_blobs, bool, o_area > 10);
```



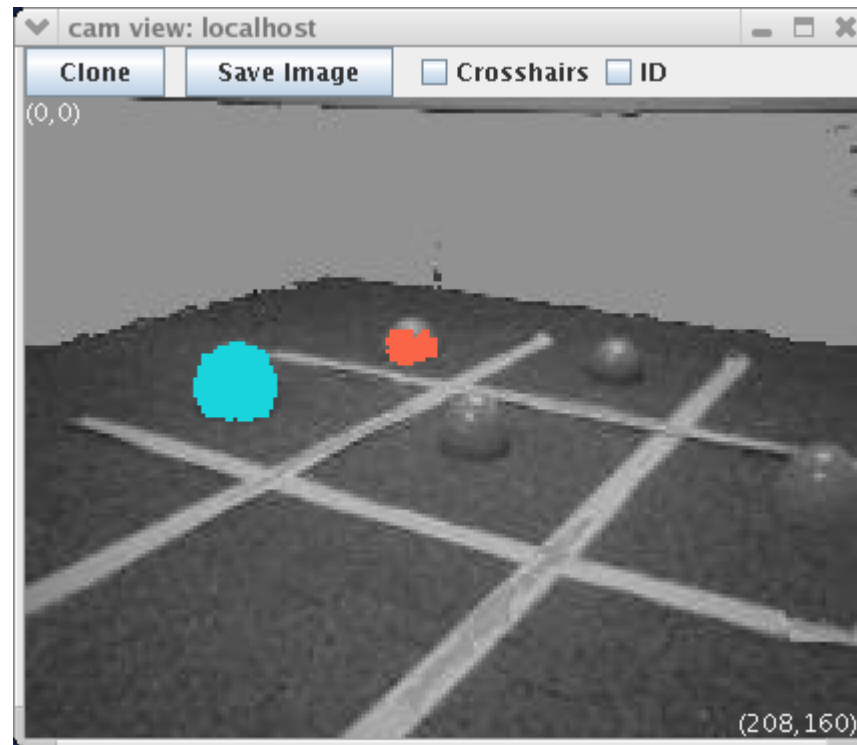
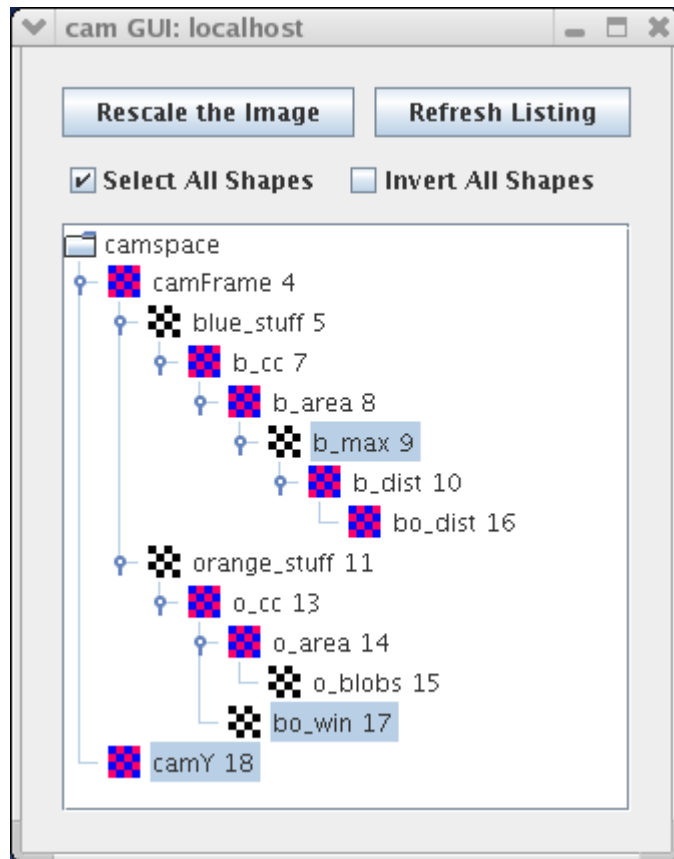
bo_dist

```
NEW_SKETCH(bo_dist, uint, b_dist*o_blobs);
```



bo_win

```
NEW_SKETCH(bo_win, bool, o_cc == min_label);
```



Sketch Properties

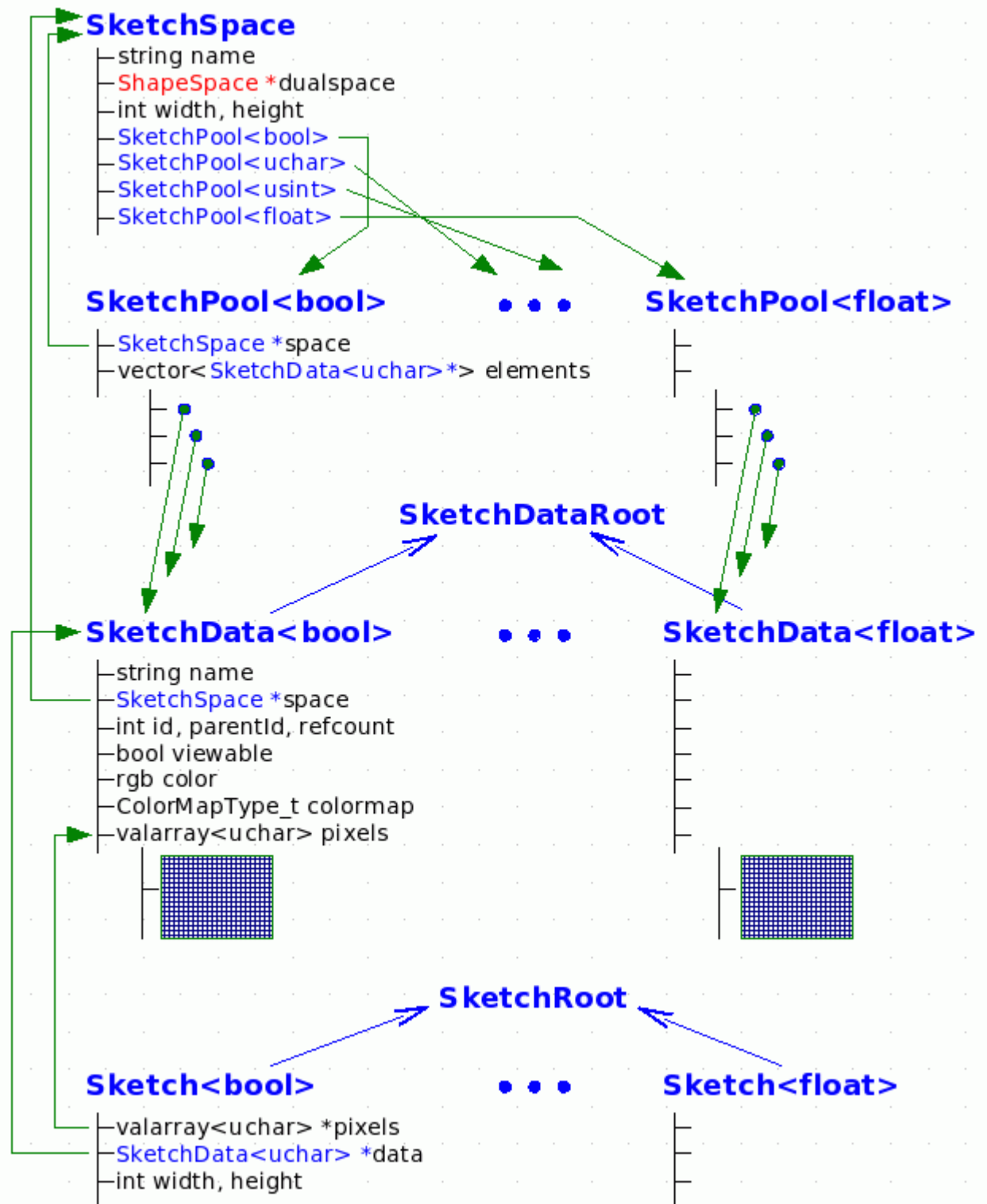
- Every sketch has a color, and a colormap.
- Sketch<bool> is rendered in that color.
- Sketch properties are inherited from the *first* argument of any visual routine or sketch operator.
- Example:

```
NEW_SKETCH(result, bool, blue_stuff | orange_stuff);
```

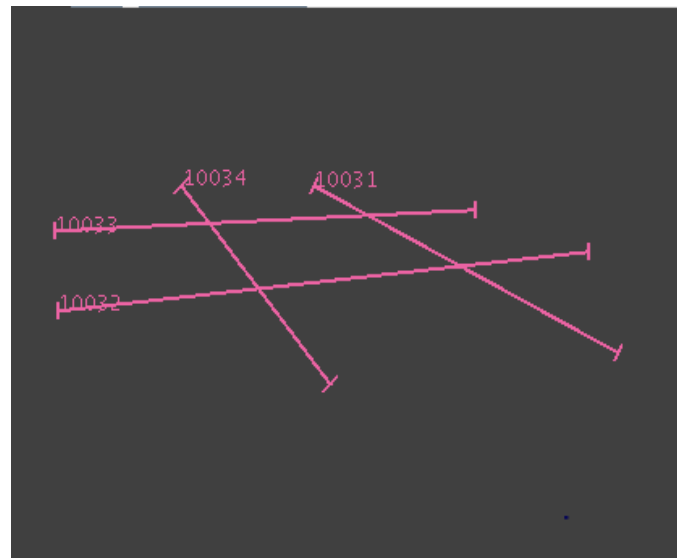
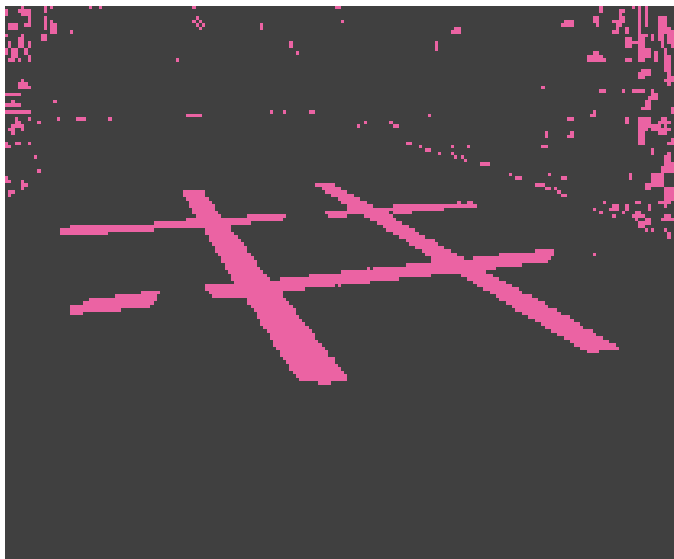
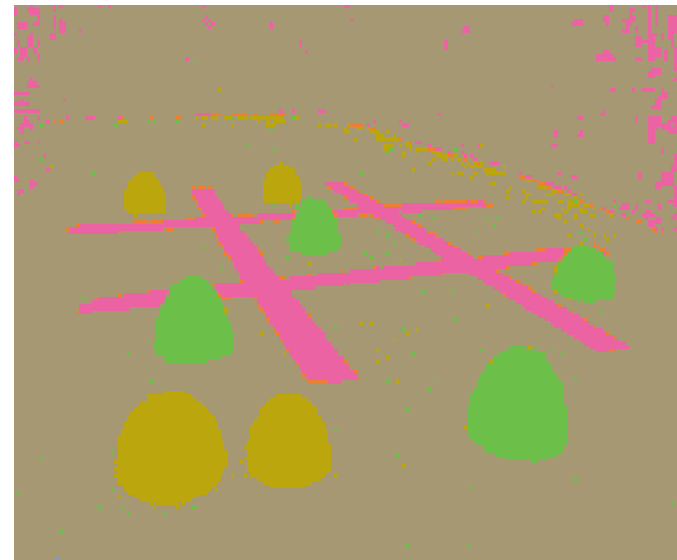
The result will have color blue.

- Colormaps: segMap, grayMap, jetMap, jetMapScaled

SketchSpaces: A Look Under the Hood



From Sketches to Shapes



Sketch + Shape Operations

