

# 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

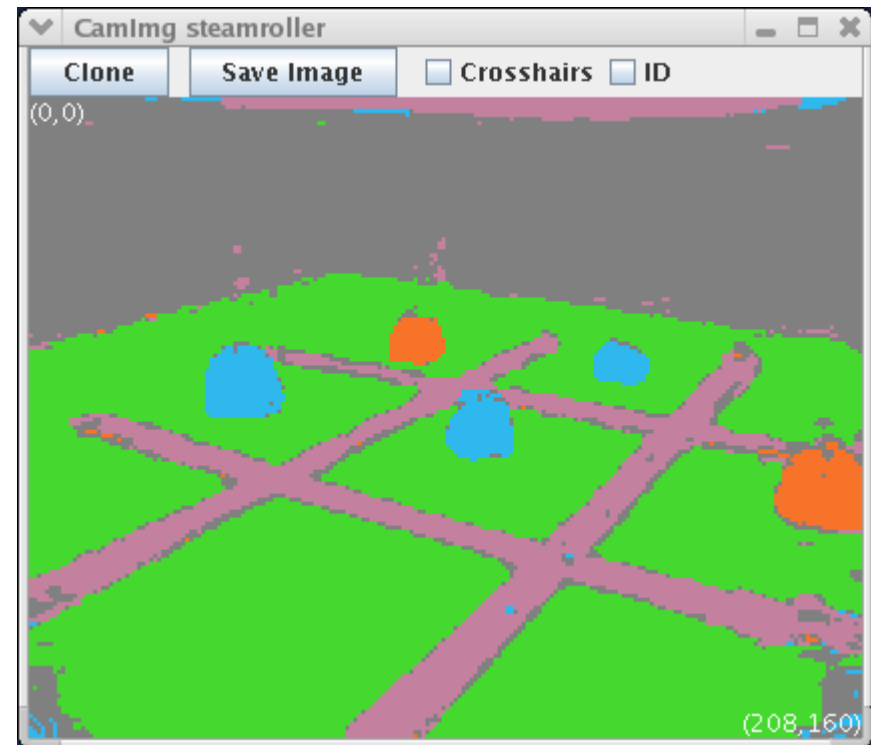
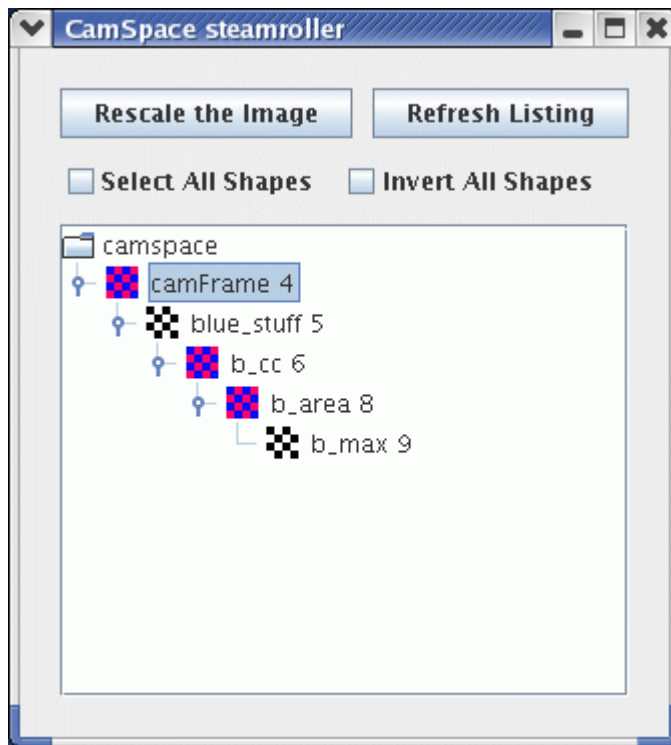
- Find the largest blue region in the image:



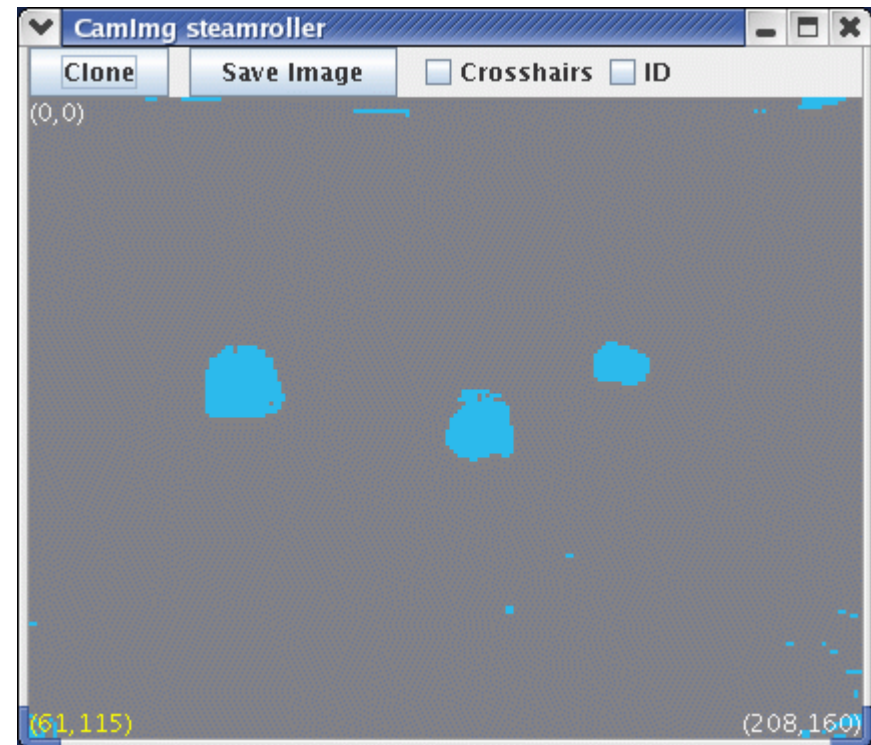
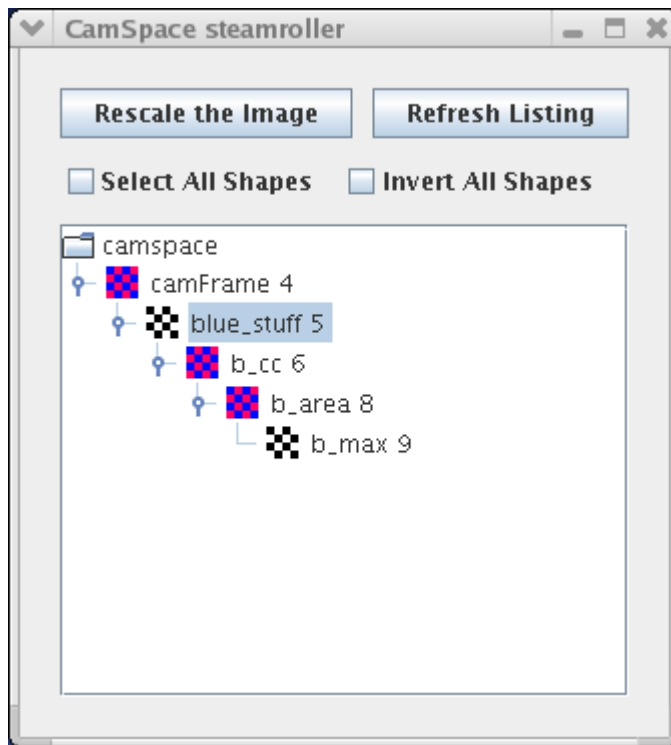
# Sketch Example

```
$nodeclass DstBehavior : 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);  
  
}
```

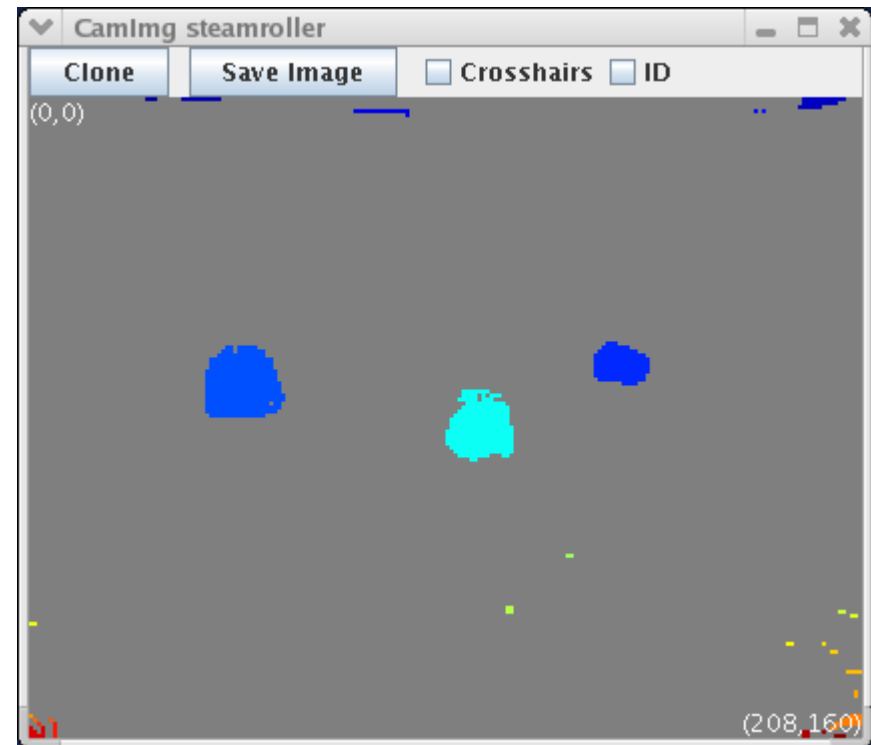
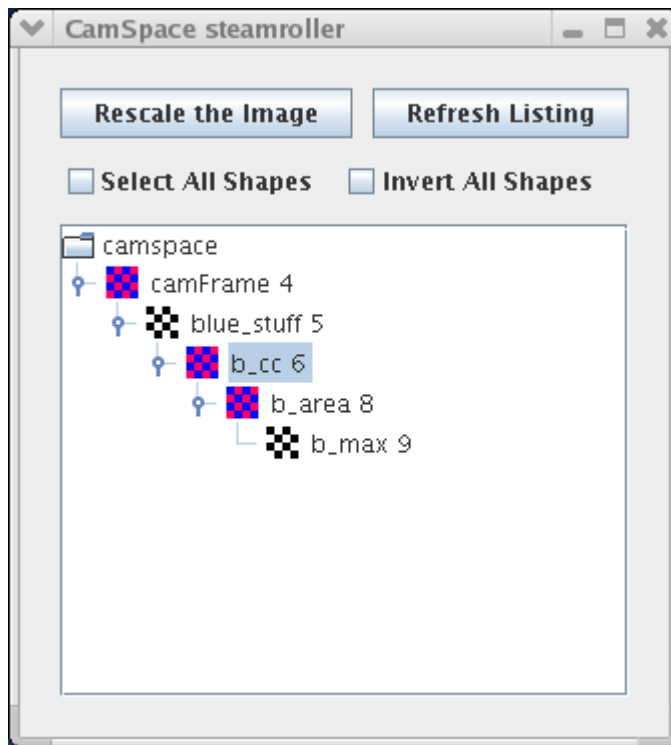
# camFrame



# visops::colormask



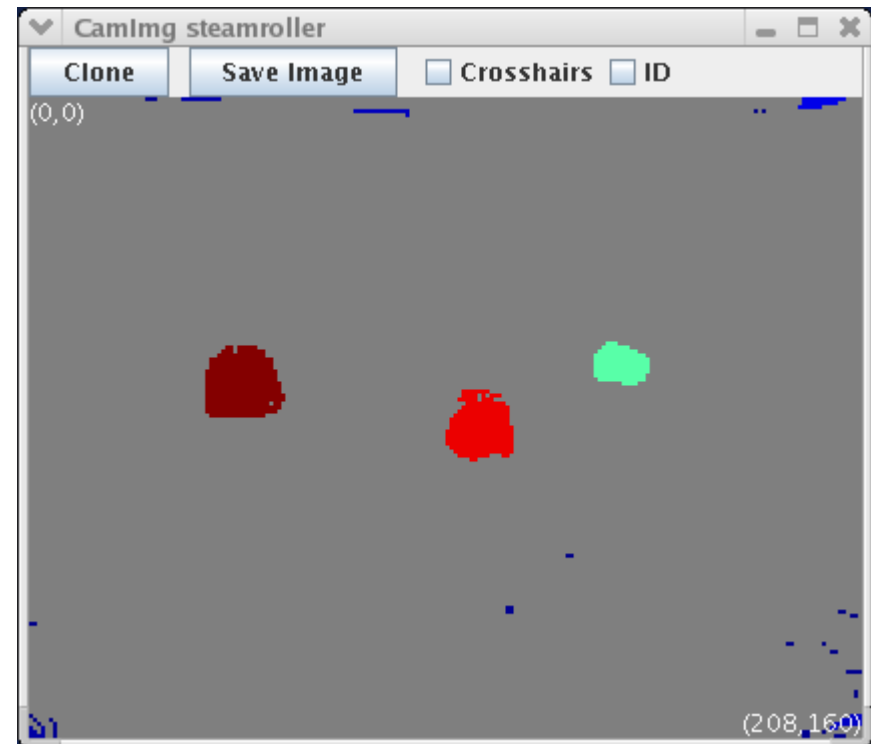
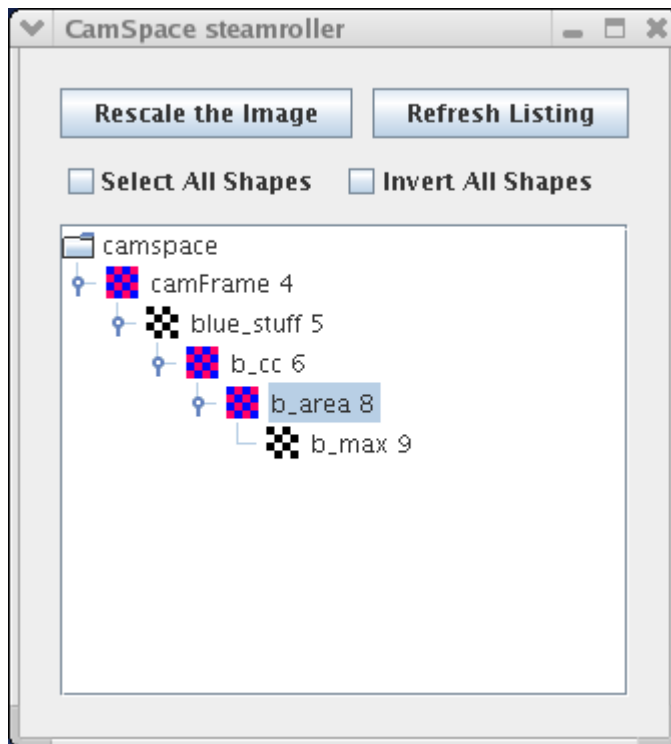
# visops::labelcc



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

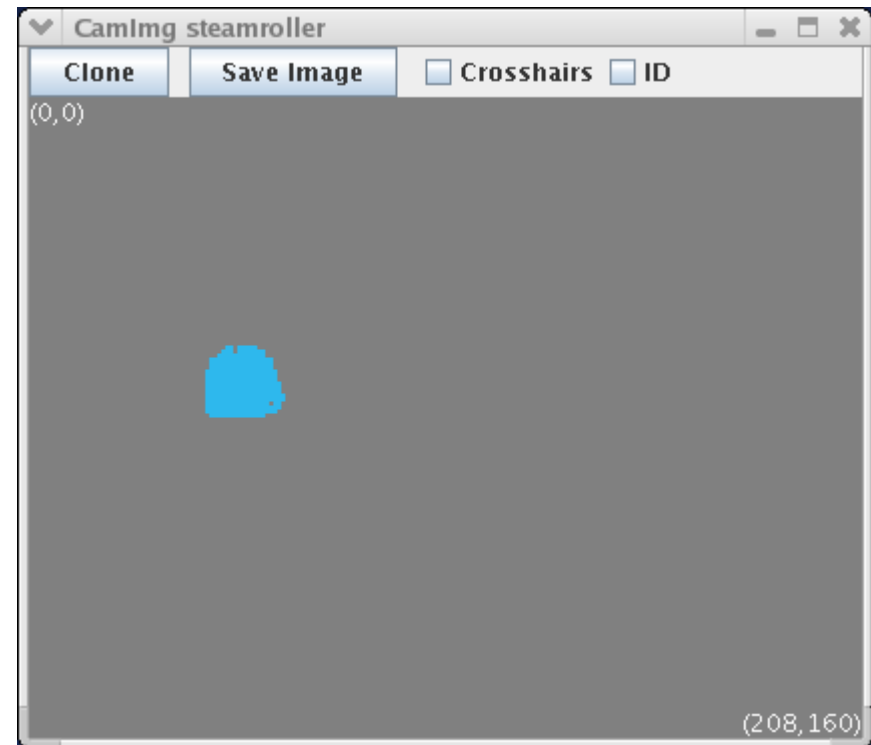
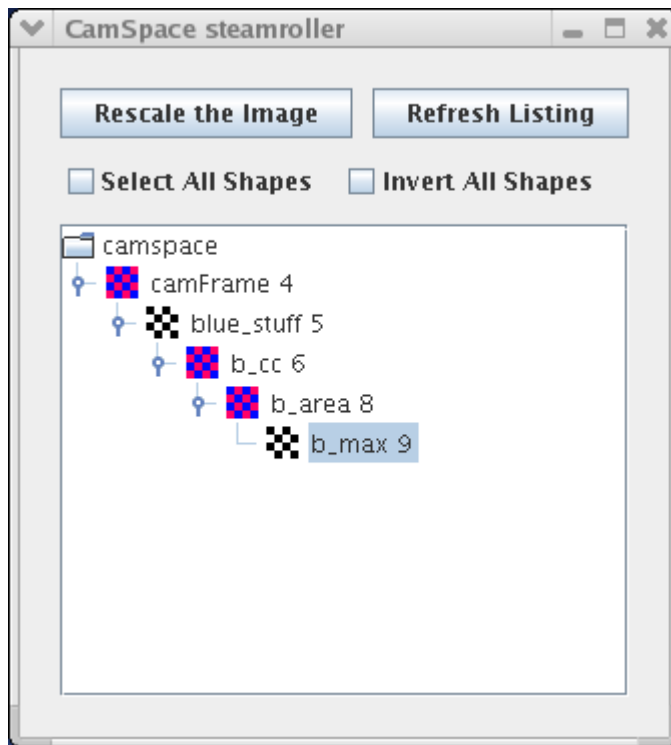


# visops::areacc





# 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

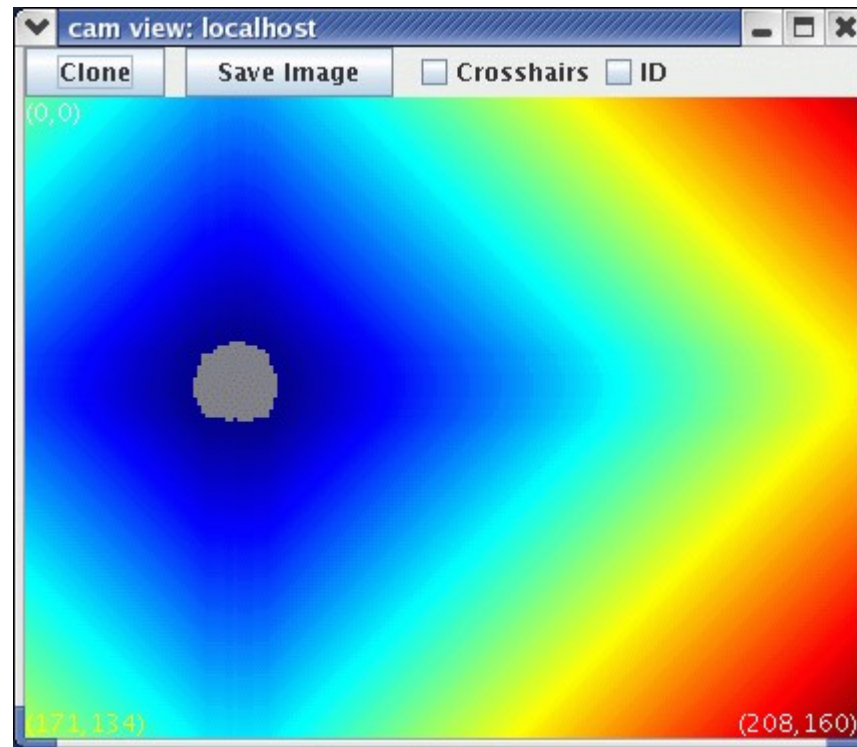
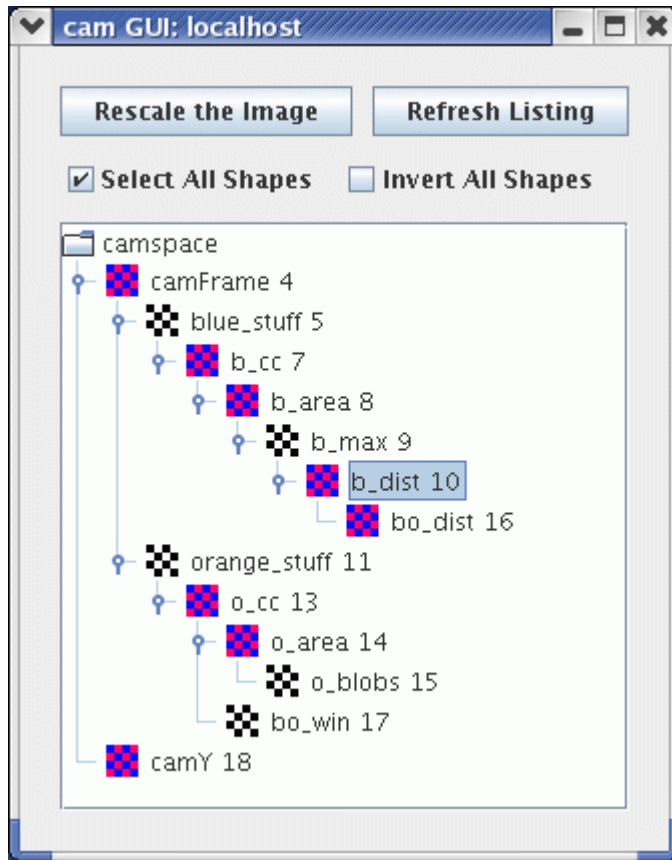
```
NEW_SKETCH(b_dist, uint, visops::edist(b_max));

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);

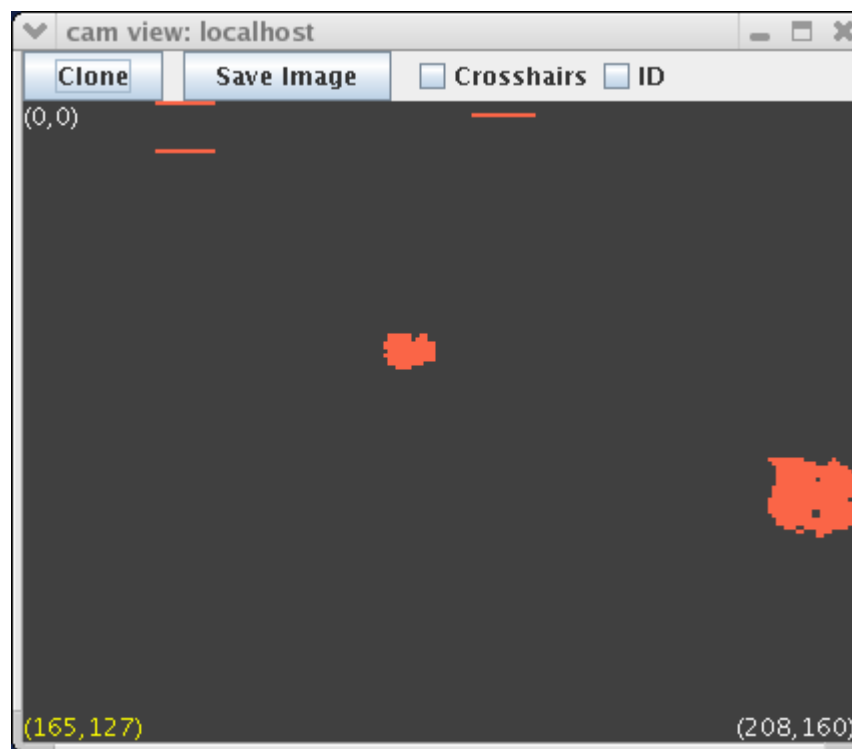
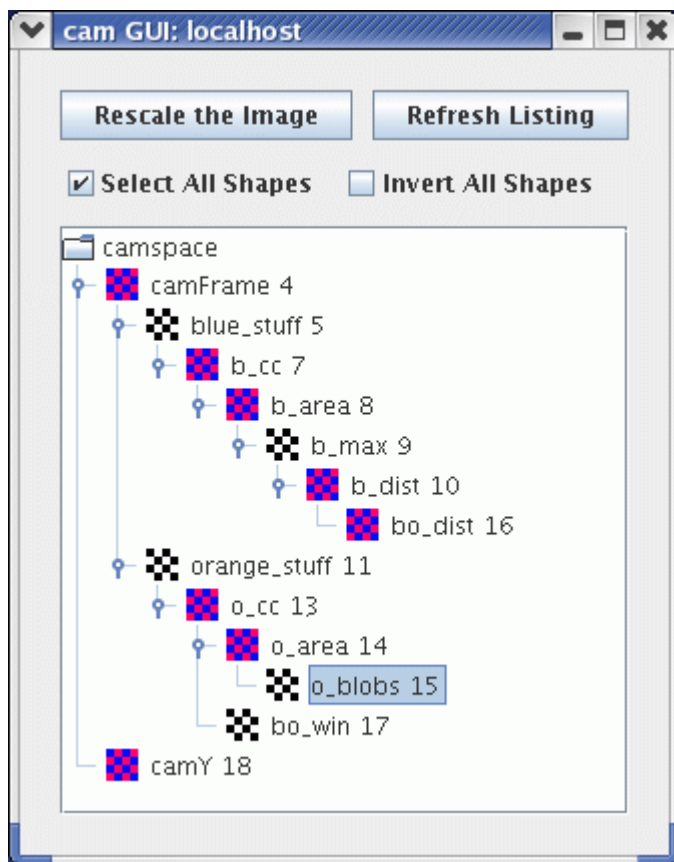
NEW_SKETCH(rawY, uchar, sketchFromRawY());
```

# visops::edist(b\_max)



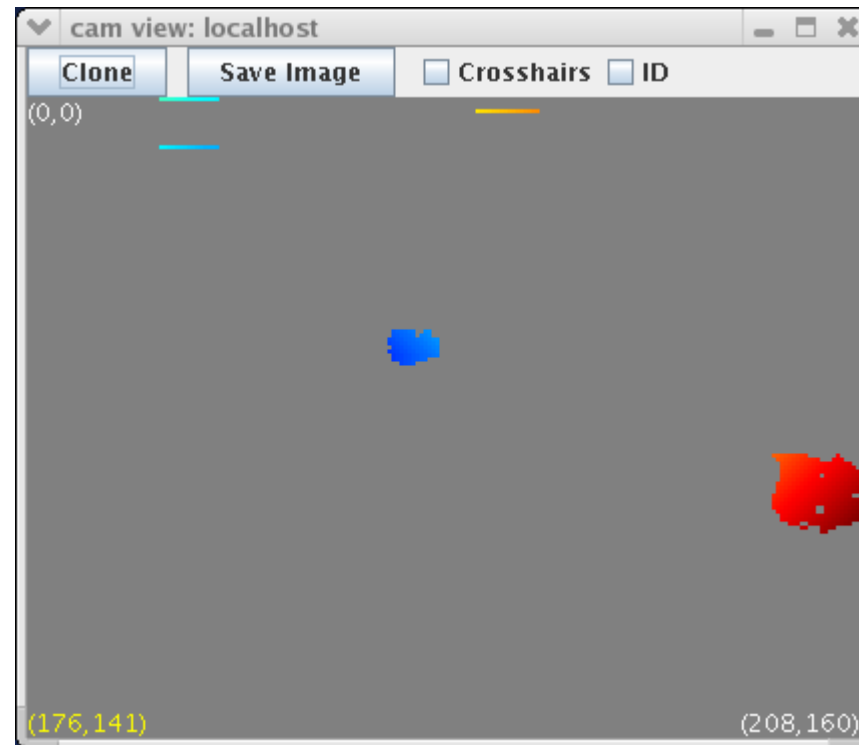
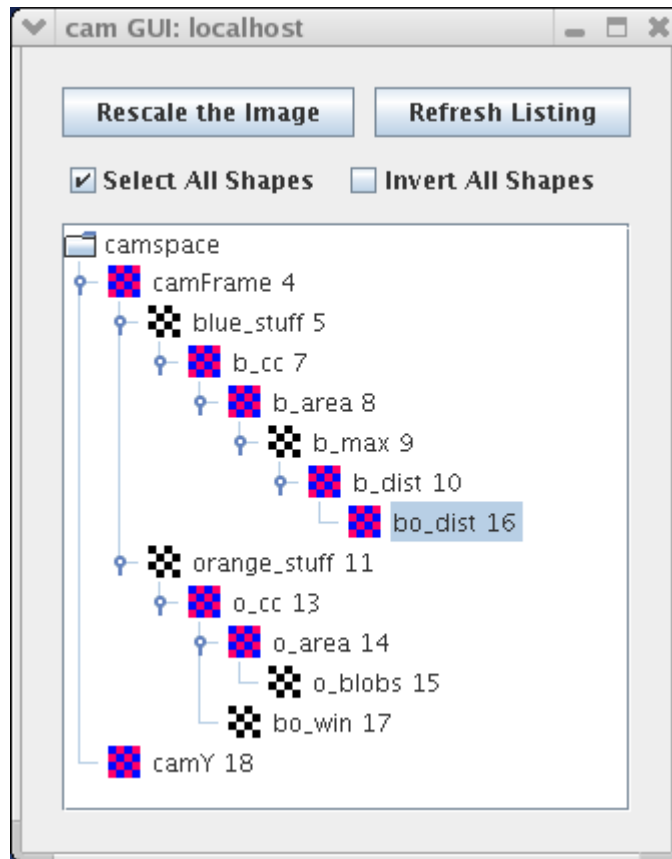
# o\_area > 10

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



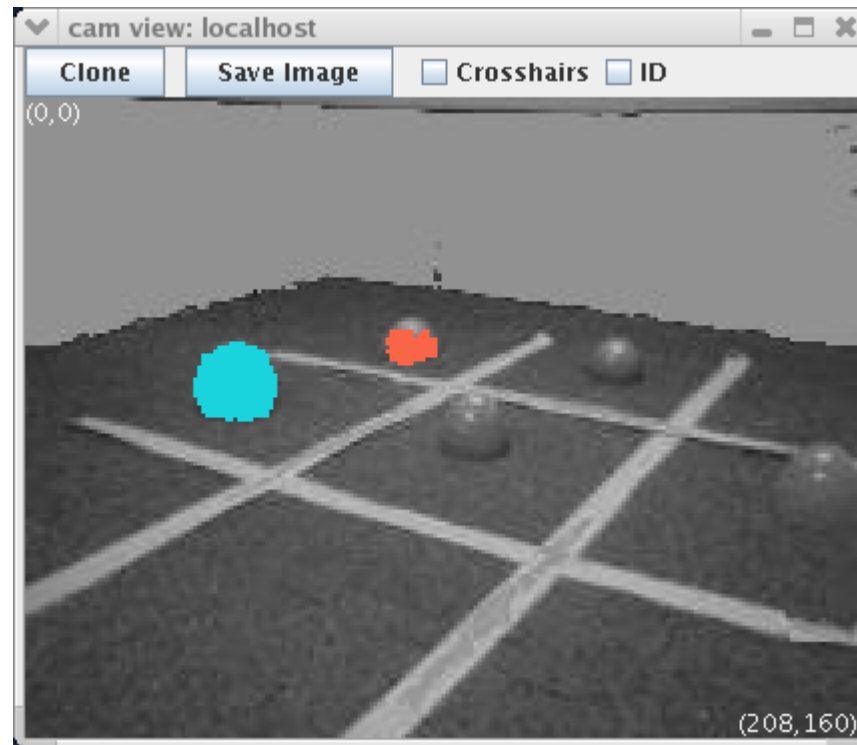
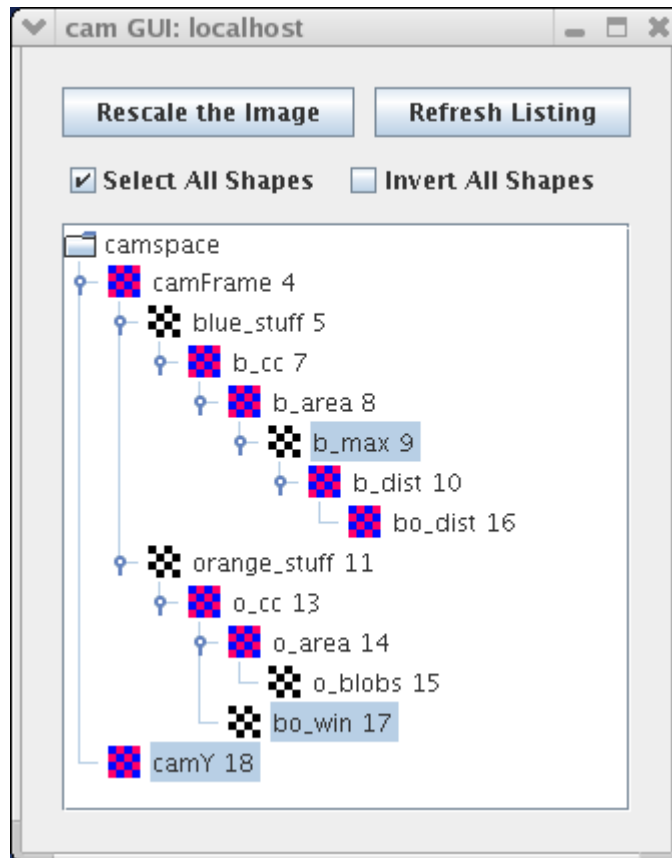
# bo\_dist

```
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:

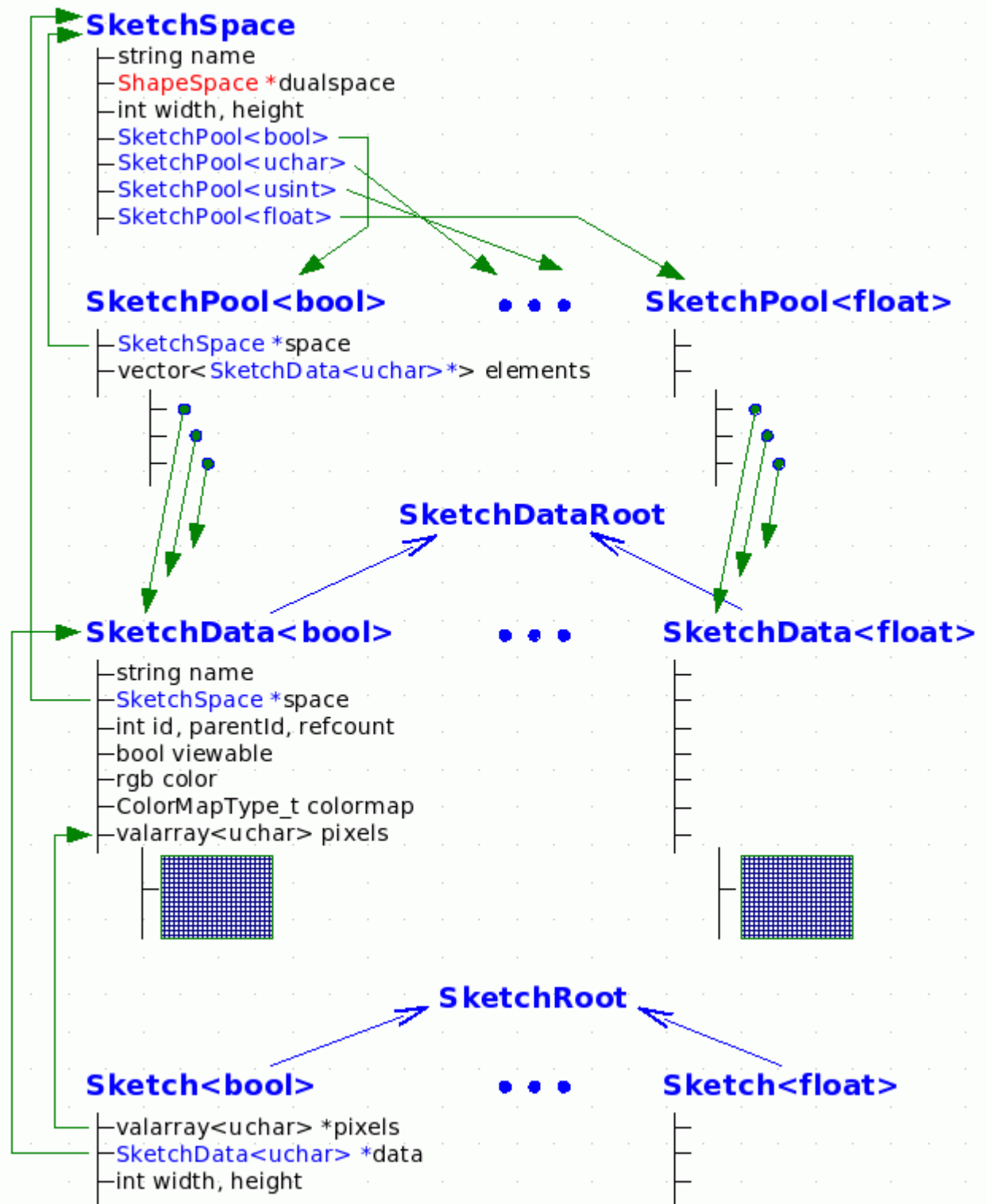
```
NEW_SKETCH(result, bool, blue_stuff | orange_stuff);
```

The result will have color blue.

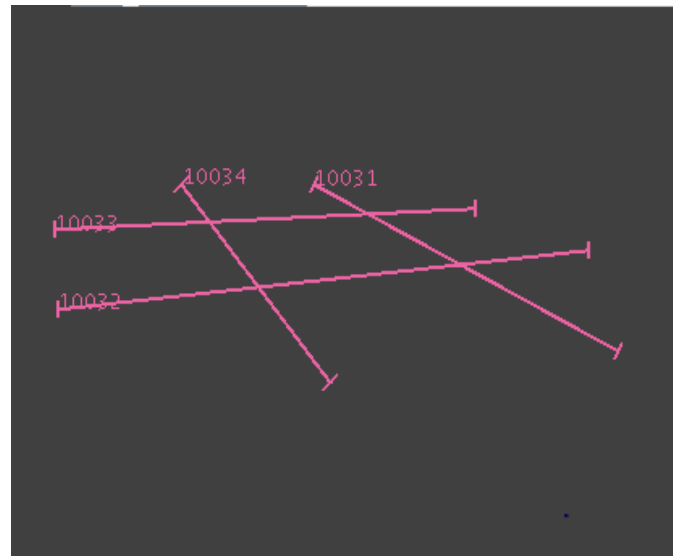
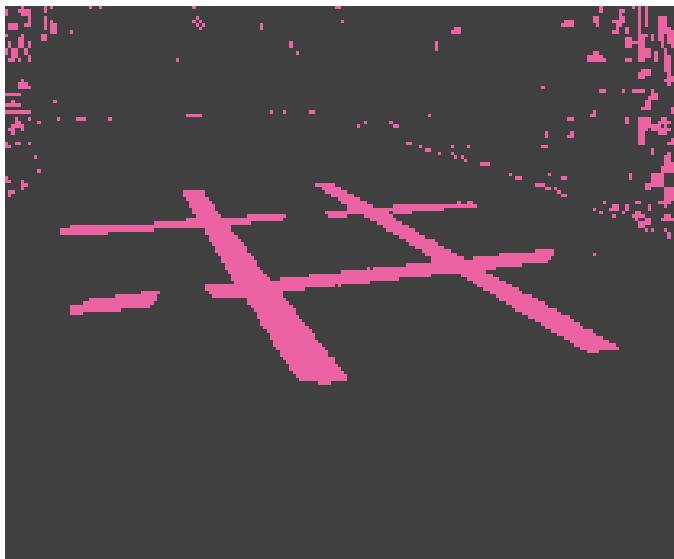
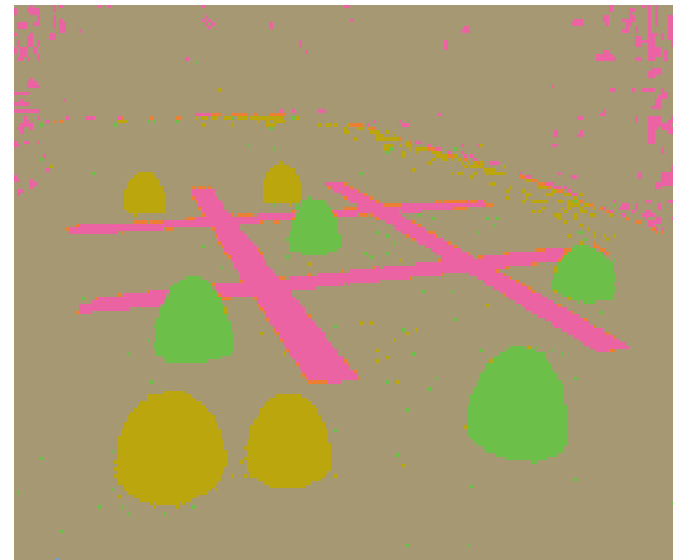
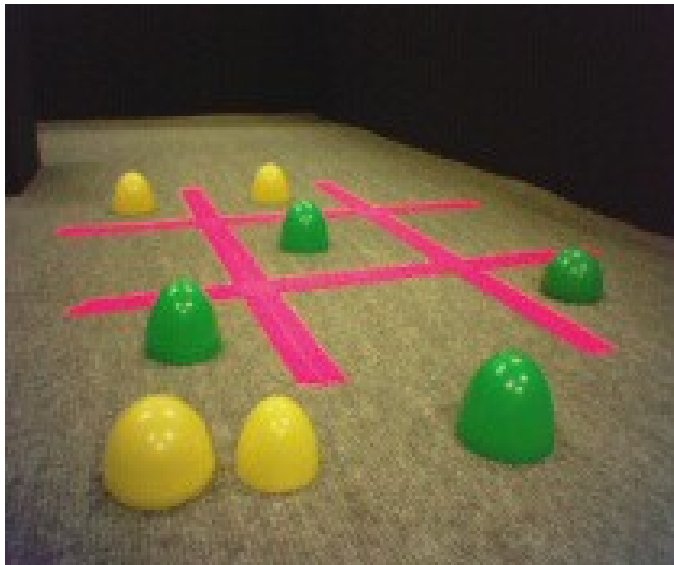
- Colormaps: segMap, grayMap, jetMap, jetMapScaled



# SketchSpaces: A Look Under the Hood



# From Sketches to Shapes



# Sketch + Shape Operations

