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>`\(\texttt{unsigned char}\): can hold a color index
  - `Sketch<bool>`\(\text{true if a property holds at image loc.}\)
  - `Sketch<uint>`\(\texttt{unsigned int}\): pixel index; distance; area
  - `Sketch<usint>`\(\texttt{unsigned short int}\)
  - `Sketch<float>`\(\text{single precision float}\)

- 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

```c
$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
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