Changes to H&O

# In Rigid\_Motion\_Angle

Eliminated division by sum(abs(signature1(:, 2)).^beta) since scaling both the real and imaginary by some value has no effect on the arctan.

# In Assemble

Looking at eliminating outliers in return values from Rigid\_Motion\_Angle, but only at the end(s).

The test for finding consecutive high p-scores does not handle wrap-around correctly. See lines 374, 385.

# Section 5.3 of Paper

In 3rd paragraph: A BVA of a single piece could conceivably span two other pieces. The fitting stage would inactivate this arc after matching the 1st piece, leaving the arc unavailable for the 2nd piece.

# In Lock

Changed termination condition to needing \*two\* fails

# muScore

Not sure about this. H&O maps mu<0 to empty. In his notation, a score of 0 means it hasn’t yet been computed. I use -1 for this. But I still return 0 from muScore. This seems to be correct.

# Additional Lock Quality Parameter

I’ve added a new quality metric. Let This function is implemented in the OpenCV library as pointPolygonTest. We can now define as:

This implements a rough approximation of the sum of the areas of overlap between the piece and the SPB plus the gaps between the piece and the SPB. Note the constant, . This is a new, very small constant

Some Explanations

(5.2)

The “force” between any 2 points is inversely proportional to the power of their separation. The term is to avoid infinities when the separation is 0. The 2nd term evaluates to a unit vector in the direction of the force.

(5.4)

is the set of points on the SPB that are close enough to some point on the piece to interact. is the set of all points on the SPB that interact with 1 or more points on the piece. Similarly, is the set of all points on the candidate piece that interact with 1 or more points on the SPB. is represented as a simple Curve. is represented as an std::vector<Curve>, where each element of the vector is the set of points that interact with the corresponding point in .

(5.7)

The total force on the piece is the sum of the forces acting on each point in the piece. The subscript, j, indicates which iteration of the algorithm we’re on.

(5.8)

The masses are unit masses and the “gravitational constant” is 1.0. The test against is to ensure that once the points are very close together, they no longer contribute a force on the piece.

(5.9)

The torque on each point is the cross product of the force vector () and the position vector of the point relative to the center of mass .

PlacePieces Notes

Line 549-552 Loop comparing arcs in RemainingPieces against arcs in PlacedPieces, filling in PScores.

while (c2 < Fits.size) // Loops over all fits