

Stroke Geometry

CSE 490ra

Overview

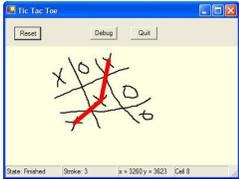
- Today
 - HW3
 - Student Presentations
 - Stroke Geometry
- Thursday – NO CLASS
 - Student group meetings
 - Plan for early prototype

Prototype

- Aim to have some working in two weeks
- Pen based application that does something from your main scenario
- Use Thursday class period for group meetings to plan this out
- Each group submit a plan by email to instructor by Friday night

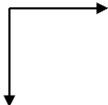
Homework 3

- Tic-tac-toe
- Challenges
 - Simple Reco
 - Geometry
 - Harder than HW1 or HW2

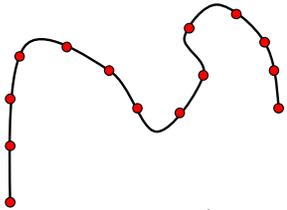


Stroke Representation

- Sequence of packets
 - Coordinates in HIMETRIC Units
 - Sampled ~150 points / sec
 - Fourth quadrant coordinates



Interpolation



What is Points[6.4]?

Interpolation

Points[6.4]

Points[6.4] = 0.6*Points[6] + 0.4*Points[7]

Basic geometry

- Line segment
 - (p_1, p_2)
- Basic Test
 - Left of
 - CCW(p_1, p_2, p_3)

Counter Clockwise Test

- CCW(p_1, p_2, p_3)

```

public static bool CcwTest(Point p1, Point p2, Point p3){
    int q1 = (p1.Y - p2.Y)*(p3.X - p1.X);
    int q2 = (p2.X - p1.X)*(p3.Y - p1.Y);
    return q1 + q2 < 0;
}
  
```

CCW Test Derivation

- Translate p_1 to the origin
- Rotate p_2 to x axis
- Check the y-coordinate of p_3

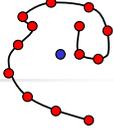
Line intersection

- Find intersection of (p_1, p_2) and (p_3, p_4)
 - $Q = \alpha p_1 + (1-\alpha)p_2$
 - $Q = \beta p_3 + (1-\beta)p_4$
- Solve for α, β
 - Two equations, two unknowns
- Derived points
 - In general, try to avoid computing derived points in geometric algorithms

Distance

- Dist(p_1, p_2)
- $\text{Sqrt}((p_2.x - p_1.x)^2 + (p_2.y - p_1.y)^2)$
- Distance comparisons can be done without sqrt
- Dist(p, s) = min (Dist(p, q) for q in s)

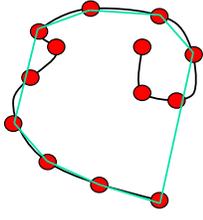
Center of Mass



- $C_m = \sum_i p_i / n$
- Easy to compute "approximate" center
- Diameter – maximum distance between pair of points
- Radius – distance to center of smallest enclosing circle

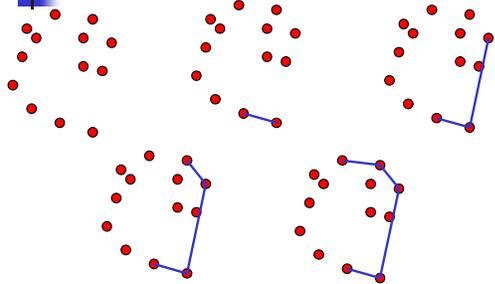
Convex hull

- Smallest enclosing convex figure
- Rubber band "algorithm"



Convex Hull Algorithms

Gift wrapping



Divide and Conquer

