JAVA 2D/3D Project 1

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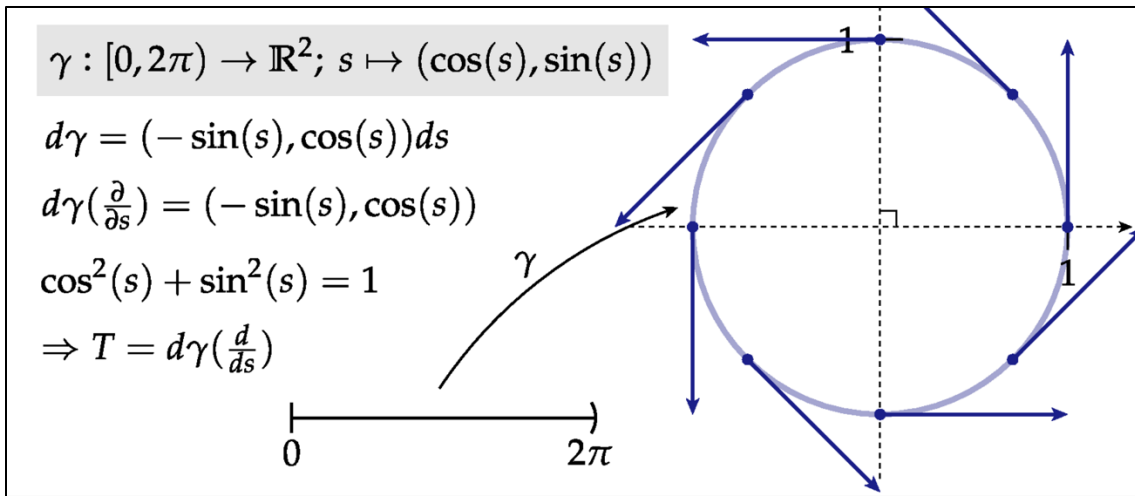
Analysis on the Given Vert Files

```
1      2
2     46
3     20.0 13.0
4     22.0 11.0
5     25.0 11.0
6     27.0 8.0
7     30.0 10.0
8     32.0 12.0
9     30.0 14.0
10    30.0 15.0
11    33.0 18.0
12    33.0 20.0
13    32.0 21.0
14    32.0 23.0
15    33.0 24.0
16    33.0 25.0
17    31.0 27.0
18    31.0 28.0
19    33.0 30.0
20    33.0 31.0
21    32.0 32.0
22    32.0 34.0
23    33.0 35.0
24    33.0 36.0
25    30.0 39.0
26    30.0 41.0
27    31.0 42.0
```

← 1st row: the number of shapes to be drawn

← 2nd row: the number of points in the 1st shape

← 3~n-th row: coordinates in the shape *i* (x, y)

```
45     8.0 90.0
46     6.0 80.0
47     8.0 70.0
48    20.0 67.0
49     8
50    30.0 89.0
51    27.0 88.0
52    24.0 89.0
53    23.0 92.0
54    24.0 95.0
55    27.0 96.0
56    30.0 95.0
57    31.0 92.0
58
```
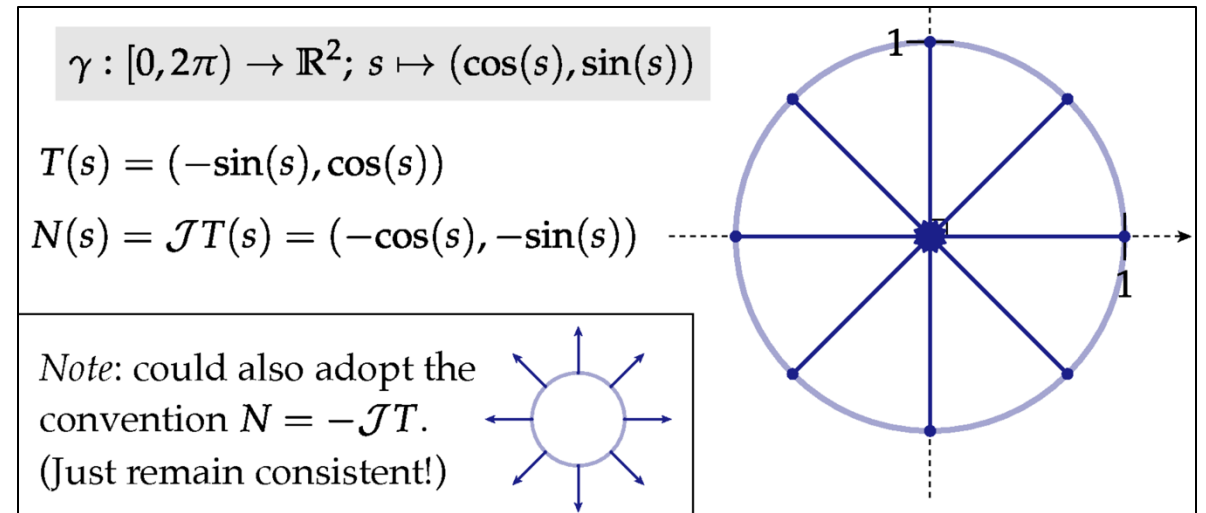
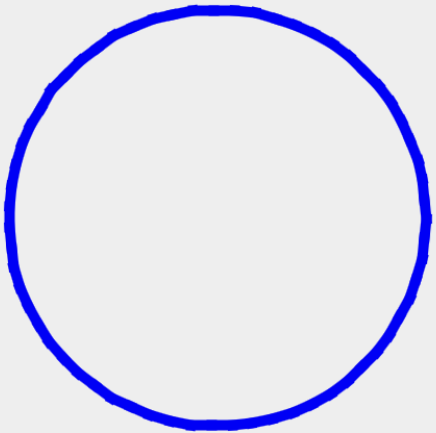2nd shape

Calculation of the Unit Tangent and the Unit Normal
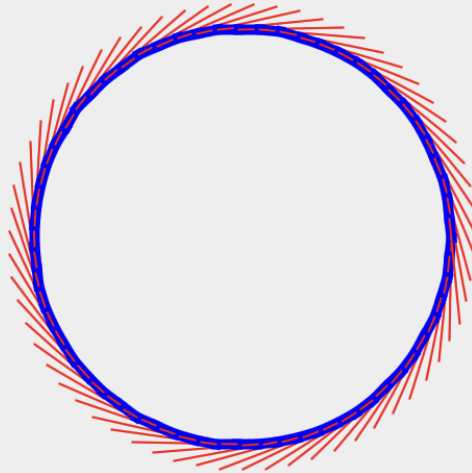

$\gamma : [0, 2\pi) \to \mathbb{R}^2; \ s \mapsto (\cos(s), \sin(s))$

$d\gamma = (-\sin(s), \cos(s))ds$

$d\gamma(\frac{\partial}{\partial s}) = (-\sin(s), \cos(s))$

$\cos^2(s) + \sin^2(s) = 1$

$\Rightarrow T = d\gamma(\frac{d}{ds})$

1. Unit tangent

$\gamma : [0, 2\pi) \to \mathbb{R}^2; \ s \mapsto (\cos(s), \sin(s))$

$T(s) = (-\sin(s), \cos(s))$

$N(s) = \mathcal{J}T(s) = (-\cos(s), -\sin(s))$

Note: could also adopt the convention $N = -\mathcal{J}T$. (Just remain consistent!)

2. Unit normal

Visualization of the curve, the unit tangent, and the unit normal

1. disk.vert
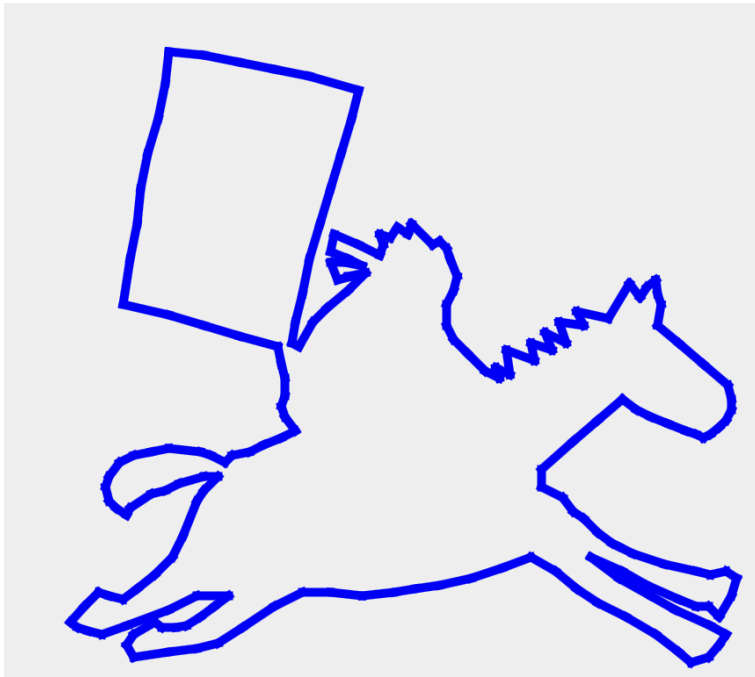

Original Discrete Curve
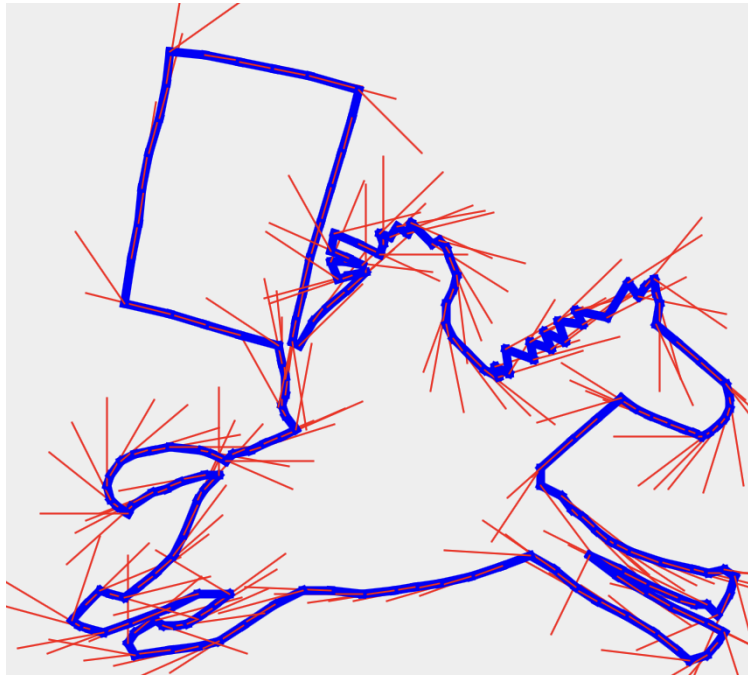
Discrete Curve with
Unit Tangent
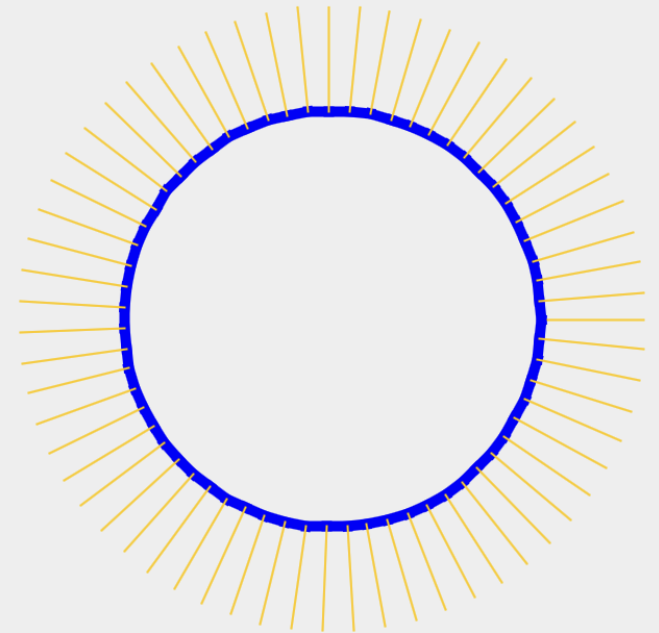
Discrete Curve with
Unit Normal

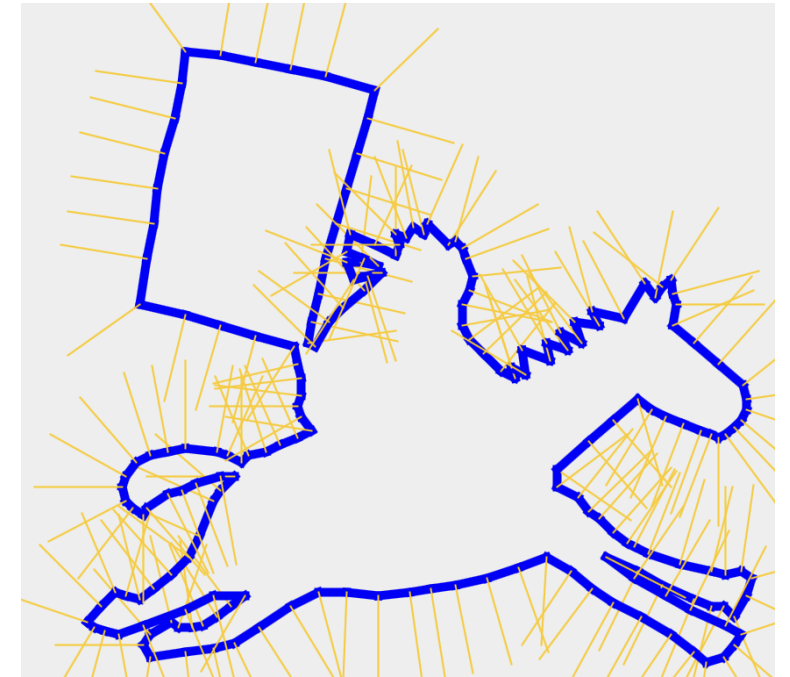# Visualization of the curve, the unit tangent, and the unit normal

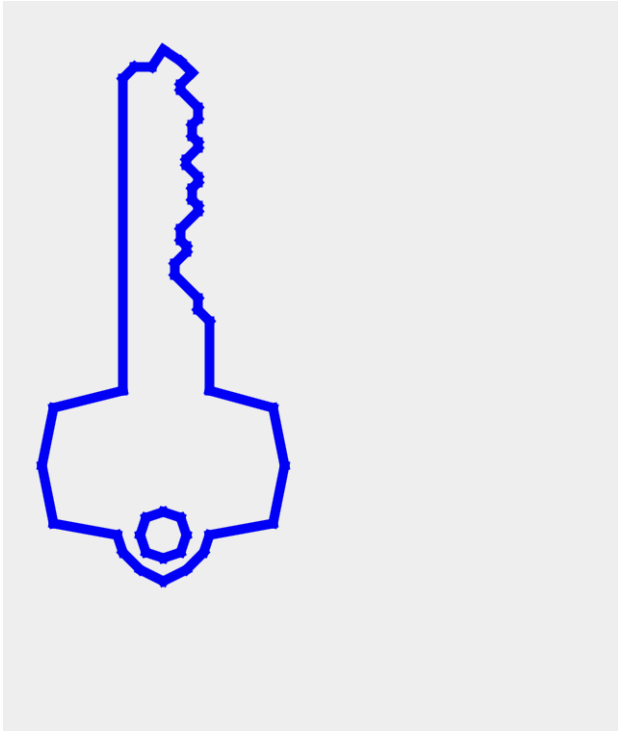2. rider.vert (flipped vertically)

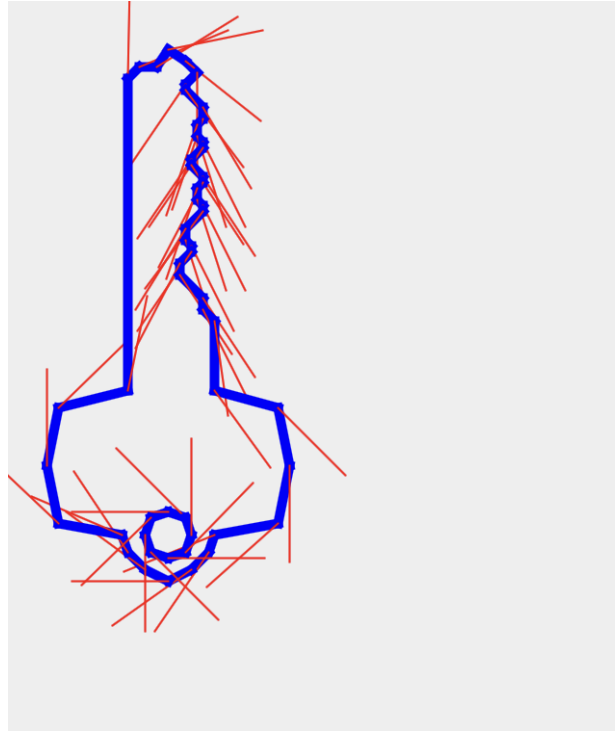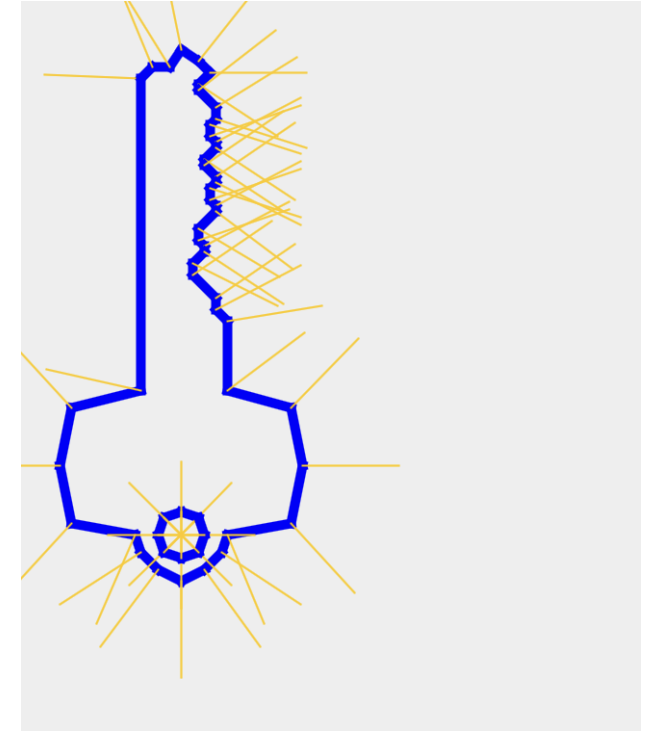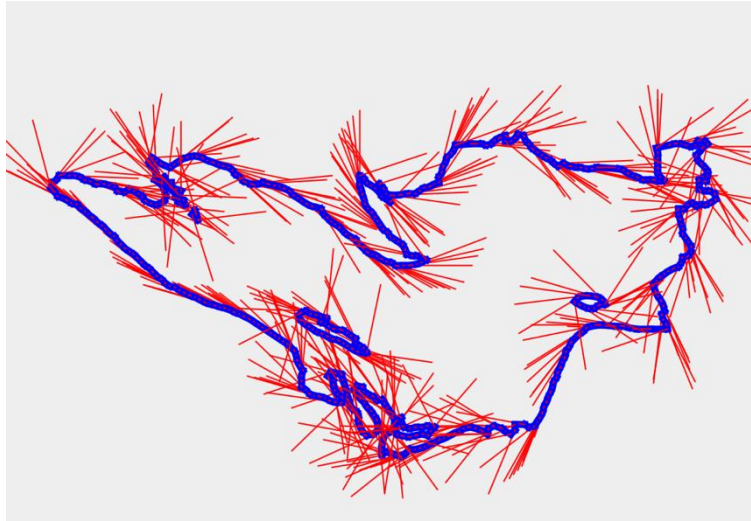Original Discrete Curve

Discrete Curve with
Unit Tangent

Discrete Curve with
Unit Normal

3. key.vert

Original Discrete Curve

Discrete Curve with
Unit Tangent
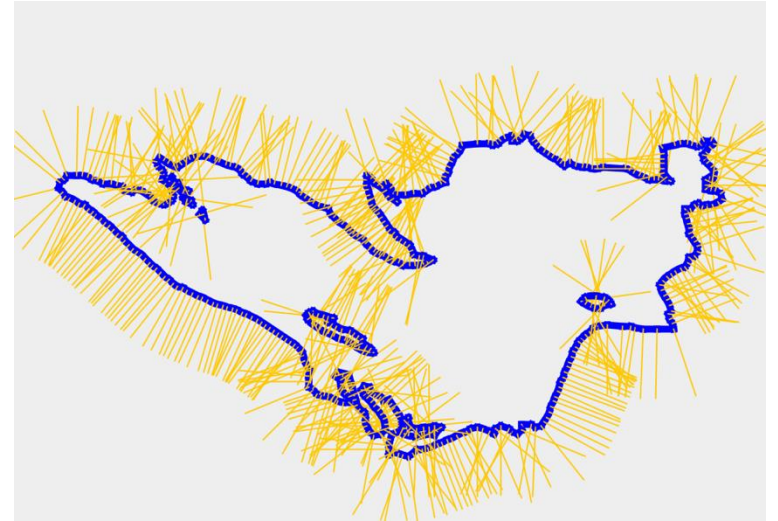
Discrete Curve with
Unit Normal

4. sperior.vert

Original Discrete Curve

Discrete Curve with
Unit Tangent

Discrete Curve with
Unit Normal

Implementation of the evolution of the curvature flow

Not successfully implemented yet...
(To be done)