

BeadsKnot -A knot drawing system allows us to simulate Reidemeister Moves

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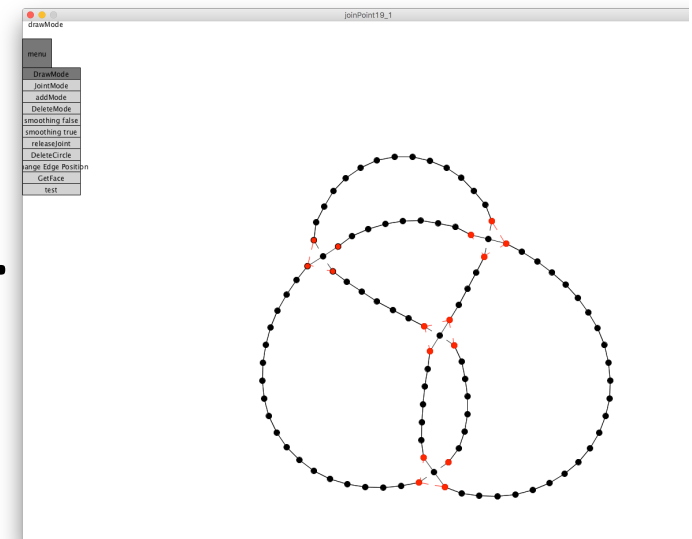
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1, Today's topic

About "BeadsKnot"

A Knot diagram drawing system I'm developing.

- A knot diagram is represented by beads and segments
- Segments role as springs.
- A intersection is called "Joint".
- Smoothing operation.



1, Develop Reidemeister Move

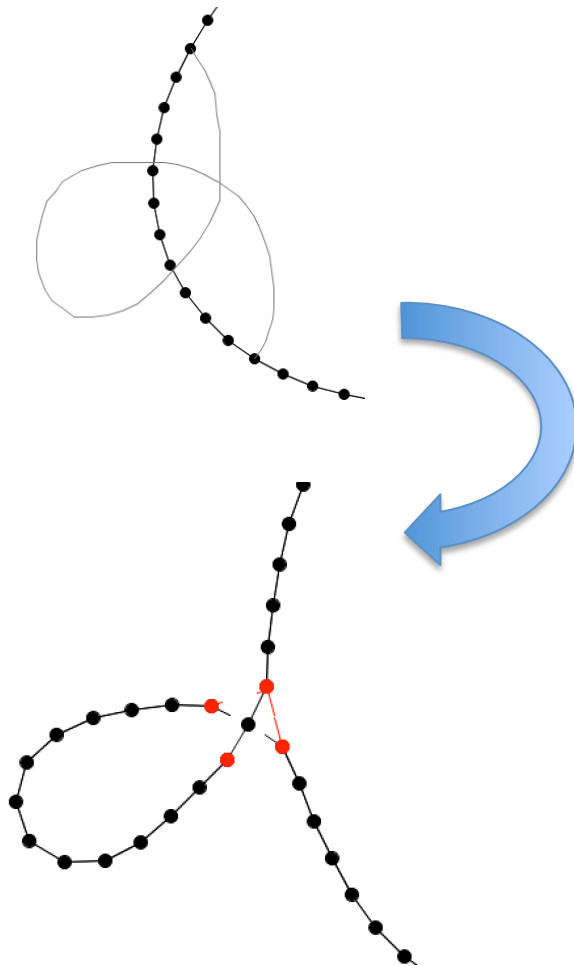
- In new version BeadsKnot, users are allowed to operate Reidemister Moves 1,2 and 3.

2, About UI

- All of moves can be manipulated by a single mouse dragging.
 - Type of Reidemeister move is determined by mouse track.

2, About UI

- 1, Reidemister Move 1

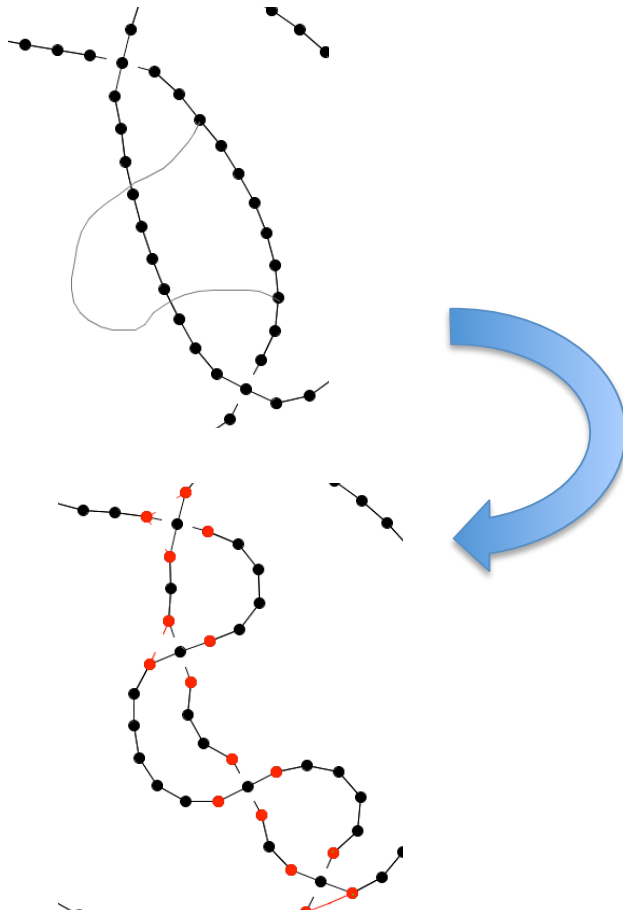


(1) We need one self intersecting in mouse track

(2) The start point and the end point of a mouse track lie on the same edge.

2, About UI

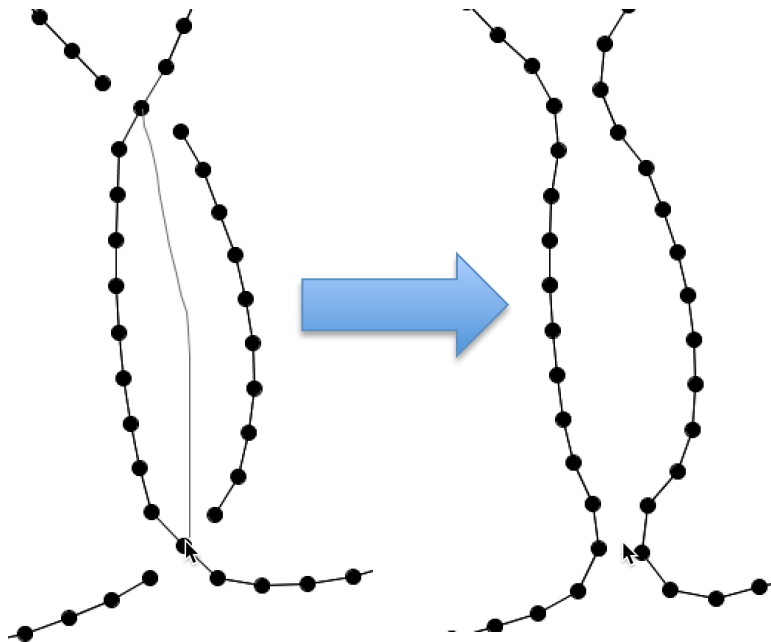
- 2, Reidemister Move 2



- (1) We need to draw a mouse track without self intersection.
- (2) The start point and the end point of a mouse track lie on the same edge.
- (3) Mouse track need to intersect twice another edge transversally.

2, About UI

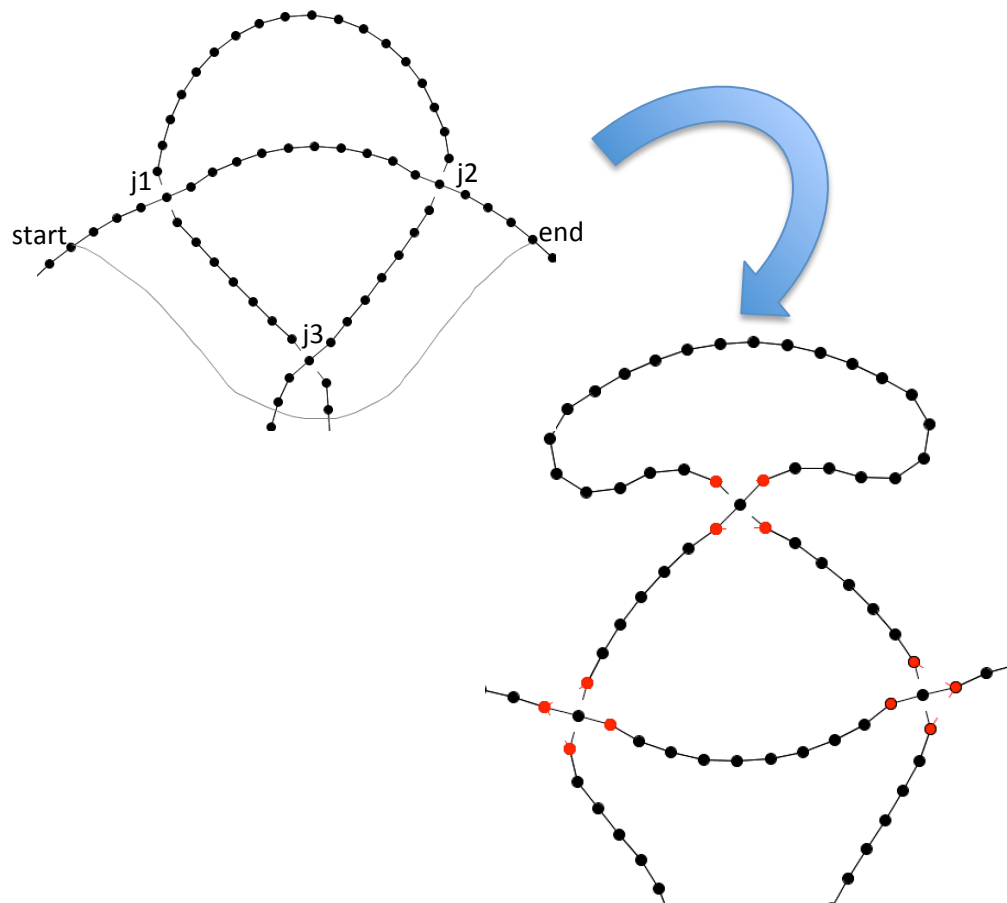
- 2, Reidemeister Move 2



- (1) We need to draw a mouse track without self intersection.
- (2) The start point and the end point of a mouse track are Joint.
- (3) Mouse track need no intersection edge.

2, About UI

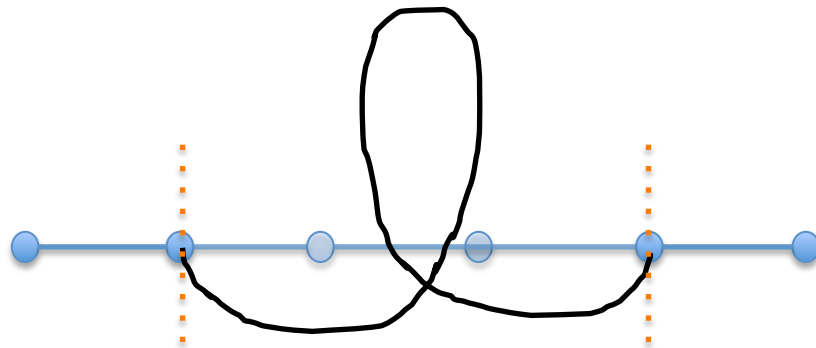
- 3, Reidemister Move 3



- (1) We need to draw a mouse track without self intersection.
- (2) The start point and the end point of a mouse track is on different edges as in upper left figure.
- (3) There are two joints on the curve from the start point to the end point.
- (4) There is one joint in a region surrounded by the mouse track and the curve from the start point to the end point.

3, About algorithm

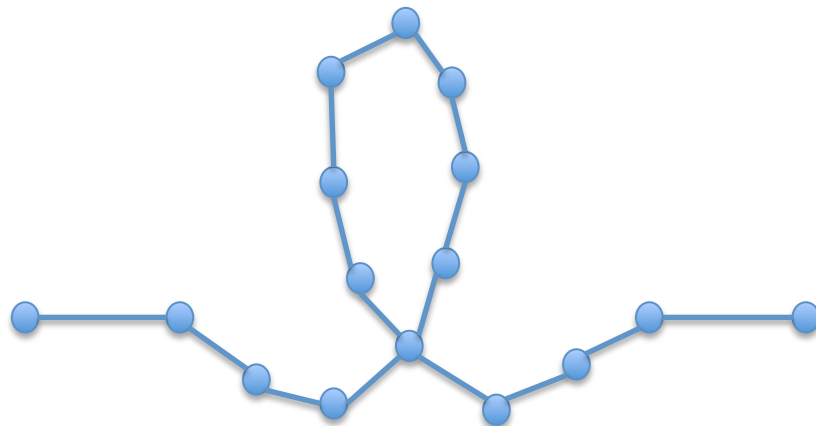
- 1, Reidemeister Move 1 & 2



(1) Delete current segments between the start point and the end point.

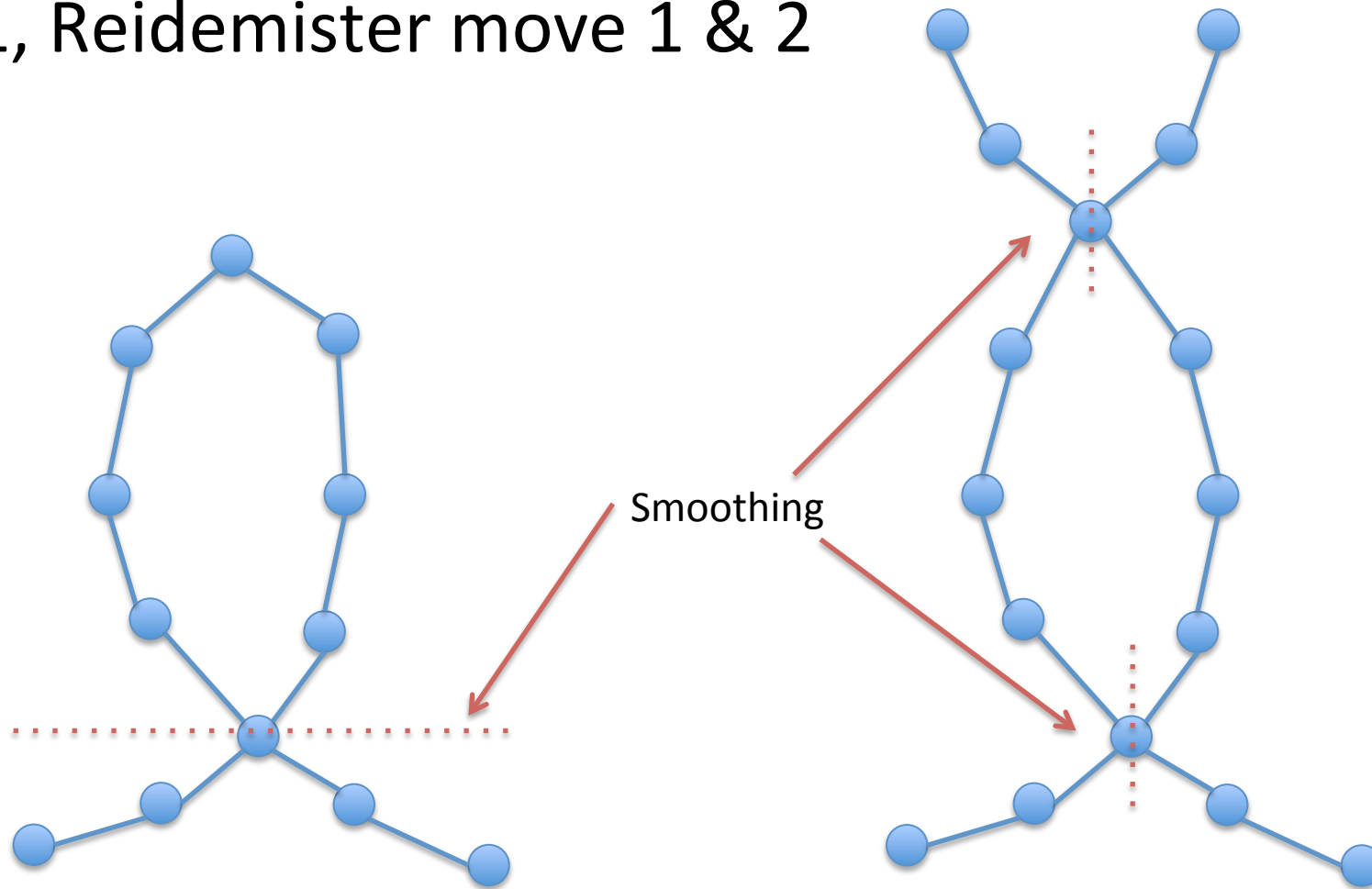
(2) Convert mouse track into points and edges.

(3) Connect the ends of these segments.



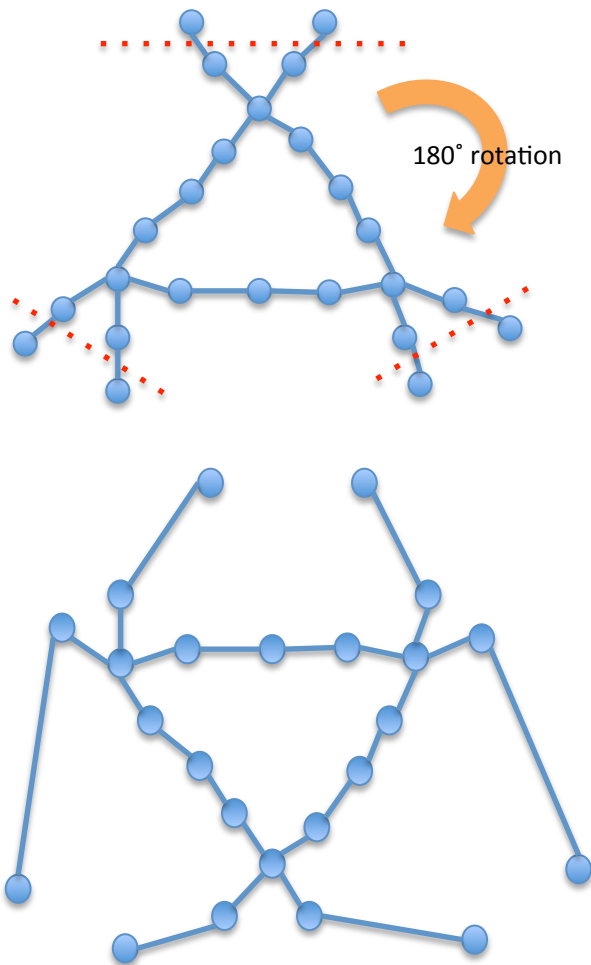
3. About algorithm

- 1, Reidemister move 1 & 2



3, About algorithm

- 1, Reidemeister Move 3



(1) Split the knot at the red dotted lines.

(2) Rotate a triangle part of knot by 180° .

(3) Connect a triangle part to the rest part.

4. Future plans

- Calculating invariants.
- Input module (use Kamikawa work).
- Automatically having a edge length good.