Lane cutting

September 21, 2015

1 Problem description

To create the geometry and paths around an intersection, we need to determine where the normal road ends and how that geometry is shaped. For this, we have the following information:

$\vec{t_i}$	Exit tangent for each road i
w_i	Width of the road for each road i

Each node (where roads interconnect; a node is not necessarily an intersection, it only is if there are more than two roads connected) has an "internal" network of paths which connect each incoming lane with each other outgoing lane.

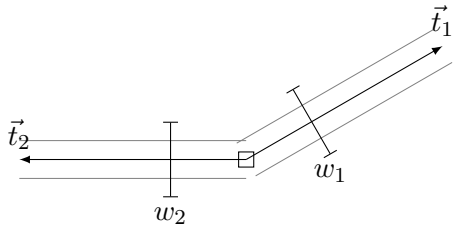
Three main cases need to be handled. If there is only one road at a node, it is a dead end. In that case, the internal network needs to connect the exits of the road with the entrances of the road.

The second case is where two roads interconnect. Here we need to insert a curve which is not part of the normal road. For this, the connecting roads need to be shortened ("cut") to make room for the internal paths.

The same is the case for the more complex third case where more than two roads interconnect.

1.1 The second case: two roads connecting

This case is very common, as we split each long patch of road at regular intervals and insert nodes. This is for easier hittesting and deletion of parts of roads.



The above figure shows a node with two connecting roads. The lanes of the roads are shown in gray. The exit tangents are shown as vectors and the physical width of the road is also given.

We are now looking for a way to cut the roads in such a way that a proper curve can be placed between the parts. For this, a minimum curve radius r can be given. The algorithm needs to have the following properties:

- Work for all "reasonable" angles; too sharp curves are probably not desirable and will be caught at a higher level, but angles as low as 30° between two roads should be possible.