# Overview illustration

A graph with different colored squares

Description automatically generated

* Blue is the history region.
* Light blue is the delay compensation region of uncertainty (abbr. DCU) of size defined by – the time we expect ego to be within this region. We believe that ego is still tracking during most of this region.
* Red is a finite blending region of size defined by (detailed later) that we expect the blending of and to occur.
* Orange is the future region to track .
* Green arrow is the derivative of at point with angle .

# Solution Requirements

1. Follow in the history region (blue)
2. In the DCU (light blue) region, follow for most of the duration
3. Blend during the blending region (red)
4. Follow in the future region (orange)
5. Strive to maintain the derivative at the point dictated by the green arrow

# Solution Proposal

## Inputs

1. Paths
2. Region times

## Algorithm

Given two paths

A graph with a line

Description automatically generated

1. Calculate overlapping region of in order to define the start of DCU and blending regions

A graph with colored lines and numbers

Description automatically generated

1. Designate the regions using the overlapping regions and

A graph with different colored squares

Description automatically generated

1. Calculate the angle of the derivative at the beginning of the future region. Options:
   1. Fit a spline on (perhaps there already is one, since we may want to perform the merge after spline). Then calculate the angle at point
   2. Some high-order derivative approximation. For example:

Note: we may be able to assume even spacing if is the output of a uniformly sampled spline

A graph with different colored squares

Description automatically generated

1. Designate weight 1 to all points
2. Remove complexity in the blending region to allow for spline blending. Options:
   1. Remove points from paths in the blending region
   2. Keep points, but weigh them increasingly, starting from 0
3. Designate point weights in DCU to model uncertainty
   1. Incrementally decrease weights in the uncertainty region
4. Recalculate weights with softmax (or divide by sum if too extreme)

A graph with different colored squares

Description automatically generatedA graph with different colored squares

Description automatically generated

1. Fit a spline on the remaining points with their respective weights, with the derivative constraint

A graph with different colored squares

Description automatically generated

A graph with a line going up

Description automatically generated