

Lane Path Geometry (Lane Drive Path)

- 1- "Each Lane has a single 3D Lane Path geometry, or Lane Drive Path, representing a **nominal** path through the lane.

Lane Path Geometries are expected to be 3D continuous where they meet at Lane Group Connectors.

Lane-level geometries (e.g. lane boundary lines, lane paths, lane group reference lines) are represented by polylines. Each polyline consists of an ordered series of 2D or 3D shape points."

It seems like HERE maps represent roads as consecutive points consisting of latitude and longitude. This representation does not include curvature. My planning algorithms so far required initial and final curvature for path planning. A simple spline interpolation algorithm can be used here to derive initial and final curvature.

We can also check whether the vehicle will stay in road throughout the trajectory or not easily with this representation. For this case spline interpolation may not be necessary.

Link for lane geometry information:

https://developer.here.com/documentation/here-lanes/dev_guide/topics_api/lanes/com.here.hdlm.protobuf.schema.v1.lane.geometrypolyline.lanegeometry.html

This link states that the deviation from real road is set to 10 cm maximum and the roads are represented as polylines. Therefore simple spline interpolation may be used.

https://developer.here.com/documentation/here-lanes/dev_guide/topics/hdlm2-appendix-lane-model-geometry-polyline-sampling.html

2- **"4.2.2 Spatial Curvature Formulation"** part of the guidance thesis can be utilized to calculate the curvature of road since the roads in HERE maps are represented as consecutive points. This information is crucial since our algorithms depend on curvature.

"4.2.4 Road Curvature Decomposition" describes the implementation of this method. This chapter is also useful to extract information from the HERE map output.

It is important to point out that HERE map provides road centerline for each of the lanes.

Therefore with this method it is possible to calculate curvature along each lane individually.

Additionally since adjacent lane information is acquired, it is possible to calculate a new path for lane change.