



Please complete the following tasks using code written in Python.

1. Determine the leader and follower between two pairs of trajectories.
2. Determine minimum TTC between two pairs of trajectories.

The pairs of trajectories to consider to complete the tasks:

[T1, T2],  
[T1, T2\_2],  
[T3, T4].

TTC is defined in the provided image below. Trajectory files are provided within the data folder (T1.csv, T2.csv, T2\_2.csv, T3.csv, T4.csv). Assume vehicle lengths of 3m. Assume provided data (Latitude, Longitude) are from the front bumper of vehicles. Assume the Time (s) provided for all trajectories are starting from the same reference time. TTC should only be computed where data exists (do not approximate values for time(s) where no data exists).

$$TTC = \frac{x_l - x_f - D_l}{v_f - v_l}; \forall (v_f - v_l) > 0 \quad (3)$$

where,  $x_l$  and  $x_f$  are the positions of the front bumpers of the leading and the following vehicles at the time of observation, respectively,  $D_l$  is the length of the leading vehicle, and  $v_l$  and  $v_f$  are the speeds of the leading and following vehicles at the time of observation, respectively.