Supplementary Material for CVPR2020 Submission
TPNet: Trajectory Proposal Network for Motion Prediction

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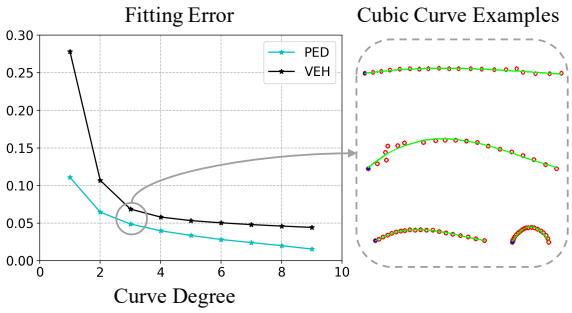

Figure 1. **Top**: fitting errors of different curve degrees. **Right**: cubic curve fitting for agent trajectory. Blue point is the start of the trajectory. Red points are the original trajectory locations while green curve represents the corresponding fitted trajectory.

In the supplementary material, we provide the fitting errors of different curve degrees as shown in Fig. 1.

In the TPNet, we model the agent trajectory in a limited time as a continuous curve to enable efficiency, flexibility, and robustness. Instead of traditional representation with discrete point sequence prediction, the continuous curve avoids inefficient combinatorial explosion of future trajectory set and the lack of physical constraint in some combinations.

We choose polynomial curve to represent the trajectory due to its simplicity. To find the best polynomial fitting degree, we conduct experiments with different degrees and calculate the fitting errors for trajectories of time length $T = T_{obs} + T_{pre}$, where T_{obs} is the length for the history observations and T_{pre} is the length for the future predictions.

Results are shown in Fig. 1 left, We choose cubic curve with a balance of accuracy and complexity. The average fitting error is $0.048\ m$ for pedestrians on ApolloScape dataset, and $0.068\ m$ for vehicles on Argoverse dataset, which is accurate enough for most cases.

⋆ indicates equal contribution.