

Recurrent Neural Networks.

Recurrent Neural networks (RNN). are a deep learning strategy for modeling sequential data. RNNs are the recommendation for working with sequential data. A deep feed forward model for sequence may need specific parameters for each element of the sequence. It may not be able to generalize to sequence of variable lengths.

A successful strategy for dealing with sequential data should include these things.

- ①. Ability to model variable length sequences without requiring additional parameters that depend on the sequence of length.
- ② Capacity to respect element ordering.

→ Use of RNN in autonomous driving.

with the help of the Radar and Lidar sensors we collect the ground truth data to train the model. we propagate the Lidar and Radar information into the camera domain to label camera images with velocity data. This lets us exploit view-invariance fusion to create an automated data pipeline that generates ground truth information for RNN training. The RNN output consists of time-to-time collision (TTC), future position and future velocity predictions for each dynamic object detected in the scene. (e.g. cars and pedestrians). These outputs are very useful to provide information for control function in an autonomous vehicle.

Use of LSTM in Autonomous driving.

A lane detection method that combined convolutional neural networks (CNN) and long-short-time memory neural networks (LSTM) is proposed to extract key features of lane with great accuracy.

- (1) → The video is processed using a feature-based image processing method to extract key information of the lane which is stored as label.
- (2) The CNN and the CNN-LSTM models are established respectively.
- (3). Training and testing are operated on step(2) mentioned model using the image and label obtained in step(1).
- (4). Multi verification of trained model is operated with new videos.

Use of Gated recurrent units (GRU) in autonomous vehicles.

For autonomous vehicles road segmentation is a fundamental task that can provide the drivable area for path planning. A CNN-GRU model is proposed and trained to perform road segmentation using data captured by the front camera of a vehicle. GRU networks obtain a long spatial sequence with lower computational complexity, comparing.