An LSTM Network for Real-Time Odometry Estimation

RCNN + 2D Laser , 仿 deepvo

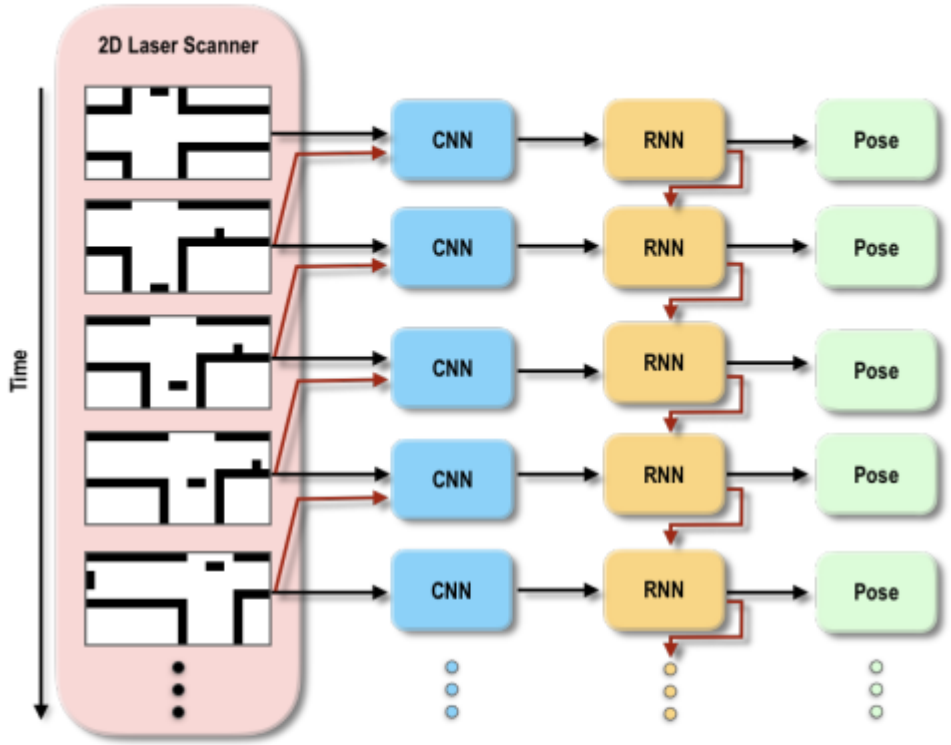
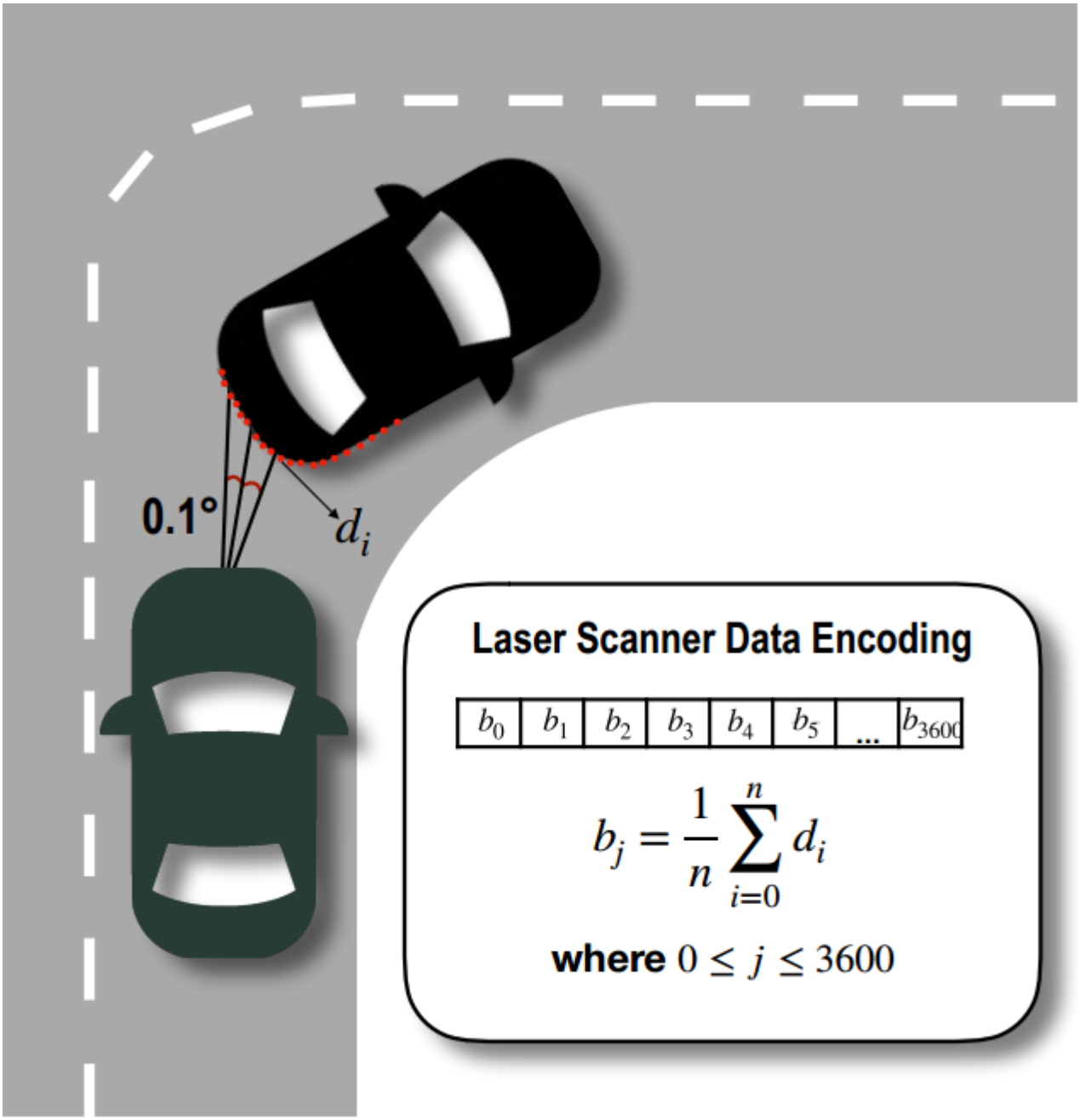


Fig. 1: Overview of the proposed system. The complete Recurrent Convolutional Neural Network takes a sequence of 2D laser scanner measurements as input, learns its features by a sequence of CNNs, which are used by the RNN to estimate the poses of vehicle. The output is a 2D pose of the vehicle composed by two values, one for translation and another one for rotation.

Data encoding



360度，0.1度步进，取每个度中所有点的深度的平均值，生成一个1*3601的向量
concatenate前后两帧作为网络的输入： 2×3601

Network Architecture

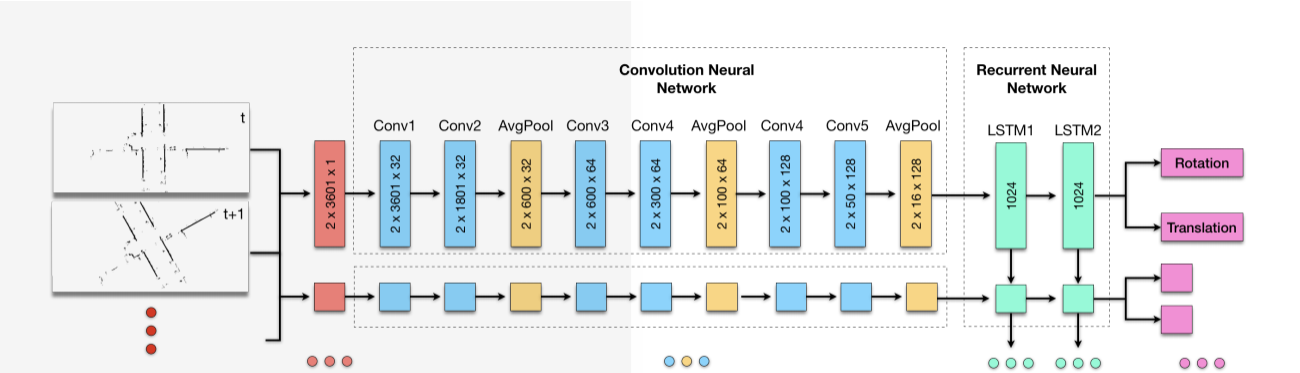


Fig. 3: Architecture of the proposed RCNN. Each block of the illustration presents the size of the tensors considering that the input is two sequences of laser scanners concatenated after being encoded as presented in subsection III-A.

使用1d卷积。
CNN输出大小： 2 × 8 × 128

Training

CNN Pre-Training + RCNN Training

CNN Pre-Training: cnn的输出送入两个全连接，分别分别估计rotation和translation.对rotation有两种训练方式，regression和classification.实验证明classification要好很多。loss使用二范数（translation） 和 cross-entropy(rotation)

RCNN Training: 定义RNN的输入为CNN的输出concatenated with estimated rotation and translation. rotation使用112维向量表示（分类的输出大小），（+- 5.6度，0.1步进）。