Self Driving Car

In [1]:

```
# Credits: https://github.com/SullyChen/Autopilot-TensorFlow
# Research paper: End to End Learning for Self-Driving Cars by Nvidia. [https://arxiv.org/pdf/1604.07316.pdf]
# NVidia dataset: 72 hrs of video => 72*60*60*30 = 7,776,000 images
# Nvidia blog: https://devblogs.nvidia.com/deep-learning-self-driving-cars/
# Our Dataset: https://github.com/SullyChen/Autopilot-TensorFlow [https://drive.google.com/file/d/0B-KJCaaF7elleG
1RbzVPZWV4Tlk/view]
# Size: 25 minutes = 25*60*30 = 45,000 images ~ 2.3 GB
# If you want to try on a slightly large dataset: 70 minutes of data ~ 223GB
# Refer: https://medium.com/udacity/open-sourcing-223gb-of-mountain-view-driving-data-f6b5593fbfa5
# Format: Image, latitude, longitude, gear, brake, throttle, steering angles and speed
# Additional Installations:
# pip3 install h5py
# AWS: https://aws.amazon.com/blogs/machine-learning/get-started-with-deep-learning-using-the-aws-deep-learning-a
mi/
# Youtube:https://www.youtube.com/watch?v=qhUvQiKec2U
# Further reading and extensions: https://medium.com/udacity/teaching-a-machine-to-steer-a-car-d73217f2492c
# More data: https://medium.com/udacity/open-sourcing-223gb-of-mountain-view-driving-data-f6b5593fbfa5
```

Problem Statement

We have images captured by the front camera and the steering wheel angle values at that particular instant, captured from the CAN bus in vehicle. We are going to train a model, so that it can predict the steering wheel angle values when we feed it with new road images or the images captured by the front camera when the vehicle is being driven in real time.

1.Loading Data:

We will split the dataset into train and test in 70:30 ratio.

In [6]:

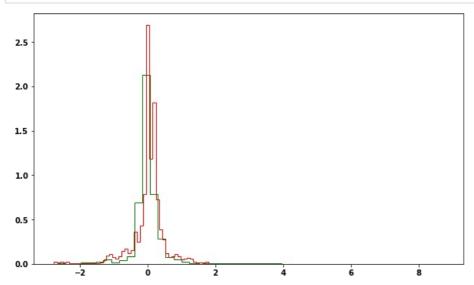
```
import scipy.misc
import random
xs = []
ys = []
#points to the end of the last batch
train_batch_pointer = 0
val_batch_pointer = 0
#read data.txt
with open("driving_dataset/data.txt") as f:
    for line in f:
        xs.append("driving_dataset/" + line.split()[0])
        #the paper by Nvidia uses the inverse of the turning radius,
        #but steering wheel angle is proportional to the inverse of turning radius
        #so the steering wheel angle in radians is used as the output
        ys.append(float(line.split()[1]) * scipy.pi / 180)
#get number of images
num_images = len(xs)
train_xs = xs[:int(len(xs) * 0.7)]
train_ys = ys[:int(len(xs) * 0.7)]
val_xs = xs[-int(len(xs) * 0.3):]
val_ys = ys[-int(len(xs) * 0.3):]
num_train_images = len(train_xs)
num_val_images = len(val_xs)
print('Total number of datapoints:',num_images)
print('Number of Train datapoints:',num_train_images)
print('Number of Test datapoints:',num_val_images)
```

Total number of datapoints: 45406 Number of Train datapoints: 31784 Number of Test datapoints: 13621

In [9]:

```
import warnings
warnings.filterwarnings('ignore')
import numpy;

# PDF of train and test 'y' values.
import matplotlib.pyplot as plt
fig = plt.figure(figsize = (10, 6))
plt.hist(train_ys, bins=50, normed=1, color='green', histtype ='step');
plt.hist(val_ys, bins=50, normed=1, color='red', histtype ='step');
plt.show()
```



```
In [4]:
import numpy as np
#Model 0: Base line Model: y_test_pred = mean(y_train_i)
train_mean_y = np.mean(train_ys)
print('Test_MSE(MEAN):%f' % np.mean(np.square(val_ys-train_mean_y)) )
print('Test_MSE(ZERO):%f' % np.mean(np.square([i-0.0 for i in val_ys])) )
Test_MSE(MEAN):0.241559
Test MSE(ZERO):0.241108
In [5]:
# scipy.misc.imresize(scipy.misc.imread(train_xs[(train_batch_pointer + i) % num_train_images])[-150:], [66, 200]
) / 255.0
# you can break the whole line into parts like this
# here (train_batch_pointer + i) % num_train_images => "% num_train_images" is used to make sure that the
# (train_batch_pointer + i) values should not cross number of train images.
# lets explain whats happening with the first images
image_read = scipy.misc.imread(train_xs[0])
print("original image size",image_read.shape)
print("After taking the last 150 rows i.e lower part of the images where road is present, ",image_read[-150:].sha
pe)
image_read = image_read[-150:]
resized_image = scipy.misc.imresize(image_read, [66, 200])
print("After resizing the images into 66*200, ",resized_image.shape)
# 200/66 = 455/150 = 3.0303 => we are keeping aspect ratio when we are resizing it
original image size (256, 455, 3)
After taking the last 150 rows i.e lower part of the images where road is present, (150, 455, 3)
After resizing the images into 66*200, (66, 200, 3)
In [7]:
#Functions to load the Train and Test data in batch
def LoadTrainBatch(batch_size):
    global train_batch_pointer
    x_{out} = []
    y_out = []
    for i in range(0, batch_size):
        x_out.append(scipy.misc.imresize(scipy.misc.imread(train_xs[(train_batch_pointer + i) % num_train_images]
)[-150:], [66, 200]) / 255.0)
        y_out.append([train_ys[(train_batch_pointer + i) % num_train_images]])
    train_batch_pointer += batch_size
    return x_out, y_out
def LoadValBatch(batch size):
    global val_batch_pointer
    x \text{ out} = []
    y_out = []
```

2. Defining Model:

:], [66, 200]) / 255.0)

return x_out, y_out

for i in range(0, batch_size):

val_batch_pointer += batch_size

In [1]:

```
import tensorflow as tf
import scipy

#To stop the warnings from printing.
tf.logging.set_verbosity(tf.logging.ERROR)

def weight_variable(shape):
   initial = tf.truncated_normal(shape, stddev=0.1)
   return tf.Variable(initial)

def bias_variable(shape):
   initial = tf.constant(0.1, shape=shape)
   return tf.Variable(initial)

def conv2d(x, W, stride):
```

x_out.append(scipy.misc.imresize(scipy.misc.imread(val_xs[(val_batch_pointer + i) % num_val_images])[-150

y_out.append([val_ys[(val_batch_pointer + i) % num_val_images]])

```
return tf.nn.conv2d(x, W, strides=[1, stride, stride, 1], padding='VALID')
x = tf.placeholder(tf.float32, shape=[None, 66, 200, 3])
y_ = tf.placeholder(tf.float32, shape=[None, 1])
x_{image} = x
#first convolutional layer
W_conv1 = weight_variable([5, 5, 3, 24])
b_conv1 = bias_variable([24])
h_conv1 = tf.nn.relu(conv2d(x_image, W_conv1, 2) + b_conv1)
#second convolutional layer
W_conv2 = weight_variable([5, 5, 24, 36])
b_conv2 = bias_variable([36])
h_conv2 = tf.nn.relu(conv2d(h_conv1, W_conv2, 2) + b_conv2)
#third convolutional layer
W_conv3 = weight_variable([5, 5, 36, 48])
b_conv3 = bias_variable([48])
h_conv3 = tf.nn.relu(conv2d(h_conv2, W_conv3, 2) + b_conv3)
#fourth convolutional layer
W_conv4 = weight_variable([3, 3, 48, 64])
b_conv4 = bias_variable([64])
h_conv4 = tf.nn.relu(conv2d(h_conv3, W_conv4, 1) + b_conv4)
#fifth convolutional layer
W_conv5 = weight_variable([3, 3, 64, 64])
b_conv5 = bias_variable([64])
h_conv5 = tf.nn.relu(conv2d(h_conv4, W_conv5, 1) + b_conv5)
#FCL 1
W_fc1 = weight_variable([1152, 1164])
b_fc1 = bias_variable([1164])
h_conv5_flat = tf.reshape(h_conv5, [-1, 1152])
h_fc1 = tf.nn.relu(tf.matmul(h_conv5_flat, W_fc1) + b_fc1)
keep_prob = tf.placeholder(tf.float32)
h_fc1_drop = tf.nn.dropout(h_fc1, keep_prob)
#FCL 2
W_fc2 = weight_variable([1164, 100])
b_fc2 = bias_variable([100])
h_fc2 = tf.nn.relu(tf.matmul(h_fc1_drop, W_fc2) + b_fc2)
h_fc2_drop = tf.nn.dropout(h_fc2, keep_prob)
#FCL 3
W_fc3 = weight_variable([100, 50])
b_fc3 = bias_variable([50])
h_fc3 = tf.nn.relu(tf.matmul(h_fc2_drop, W_fc3) + b_fc3)
h_fc3_drop = tf.nn.dropout(h_fc3, keep_prob)
#FCL 3
W_fc4 = weight_variable([50, 10])
b_fc4 = bias_variable([10])
h_fc4 = tf.nn.relu(tf.matmul(h_fc3_drop, W_fc4) + b_fc4)
h_fc4_drop = tf.nn.dropout(h_fc4, keep_prob)
#Output
W_fc5 = weight_variable([10, 1])
b_fc5 = bias_variable([1])
\#y = tf.multiply(tf.atan(tf.matmul(h_fc4_drop, W_fc5) + b_fc5), 2) \#scale the atan output
#y = tf.matmul(h_fc4_drop, W_fc5) + b_fc5
y = tf.keras.activations.linear(tf.matmul(h_fc4_drop, W_fc5) + b_fc5)
```

3. Training the model:

```
In [1]:
```

```
import os
import tensorflow as tf
from tensorflow.core.protobuf import saver_pb2
import driving_data
import model
#To stop the warnings from printing.
tf.logging.set_verbosity(tf.logging.ERROR)
LOGDIR = './save'
sess = tf.InteractiveSession()
12NormConst = 0.001
train_vars = tf.trainable_variables()
loss = tf.reduce_mean(tf.square(tf.subtract(model.y_, model.y))) + tf.add_n([tf.nn.l2_loss(v) for v in train_vars
]) * L2NormConst
train_step = tf.train.AdamOptimizer(1e-4).minimize(loss)
sess.run(tf.initialize_all_variables())
# create a summary to monitor cost tensor
tf.summary.scalar("loss", loss)
# merge all summaries into a single op
merged_summary_op = tf.summary.merge_all()
saver = tf.train.Saver(write_version = saver_pb2.SaverDef.V1)
# op to write logs to Tensorboard
logs_path = './logs'
summary_writer = tf.summary.FileWriter(logs_path, graph=tf.get_default_graph())
epochs = 30
batch_size = 100
#epoch_num, test_loss, = [], []
#train over the dataset about 30 times
for epoch in range(epochs):
 for i in range(int(driving_data.num_images/batch_size)):
    xs, ys = driving_data.LoadTrainBatch(batch_size)
    train_step.run(feed_dict={model.x: xs, model.y_: ys, model.keep_prob: 0.5})
    if i % 10 == 0:
      xs, ys = driving_data.LoadValBatch(batch_size)
      loss_value = loss.eval(feed_dict={model.x:xs, model.y_: ys, model.keep_prob: 1.0})
      print("Epoch: %d, Step: %d, Loss: %g" % (epoch, epoch * batch_size + i, loss_value))
    # write logs at every iteration
    summary = merged_summary_op.eval(feed_dict={model.x:xs, model.y_: ys, model.keep_prob: 1.0})
    summary_writer.add_summary(summary, epoch * driving_data.num_images/batch_size + i)
    if i % batch_size == 0:
      if not os.path.exists(LOGDIR):
        os.makedirs(LOGDIR)
      checkpoint_path = os.path.join(LOGDIR, "model.ckpt")
 filename = saver.save(sess, checkpoint_path)
print("Model saved in file: %s" % filename)
#Saving the average Test logs at the end of each epoch
  '''te_avg_loss = 0
  for i in range(int(num_val_images/batch_size)):
    xs, ys = LoadValBatch(batch_size)
    loss_value = loss.eval(feed_dict={x:xs, y_: ys, keep_prob: 1.0})
    te_avg_loss += loss_value / batch_size
 epoch_num.append(epoch)
 test_loss.append(te_avg_loss)'''
print("Run the command line:\n" \
          "--> tensorboard --logdir=./logs " \
          "\nThen open http://0.0.0.0:6006/ into your web browser")
```

```
/home/mitmakshay/.local/lib/python3.5/site-packages/tensorflow/python/framework/dtypes.py:469: Futur
eWarning: Passing (type, 1) or 'ltype' as a synonym of type is deprecated; in a future version of nu mpy, it will be understood as (type, (1,)) / '(1,)type'.
  _np_qint8 = np.dtype([("qint8", np.int8, 1)])
/home/mitmakshay/.local/lib/python3.5/site-packages/tensorflow/python/framework/dtypes.py:470: Futur
eWarning: Passing (type, 1) or '1type' as a synonym of type is deprecated; in a future version of nu
mpy, it will be understood as (type, (1,)) / '(1,)type'.
  _np_quint8 = np.dtype([("quint8", np.uint8, 1)])
/home/mitmakshay/.local/lib/python3.5/site-packages/tensorflow/python/framework/dtypes.py:471: Futur
eWarning: Passing (type, 1) or '1type' as a synonym of type is deprecated; in a future version of nu
mpy, it will be understood as (type, (1,)) / '(1,)type'.
  _np_qint16 = np.dtype([("qint16", np.int16, 1)])
/home/mitmakshay/.local/lib/python3.5/site-packages/tensorflow/python/framework/dtypes.py:472: Futur
eWarning: Passing (type, 1) or '1type' as a synonym of type is deprecated; in a future version of nu
mpy, it will be understood as (type, (1,)) / '(1,)type'.
  _np_quint16 = np.dtype([("quint16", np.uint16, 1)])
/home/mitmakshay/.local/lib/python3.5/site-packages/tensorflow/python/framework/dtypes.py:473: Futur
eWarning: Passing (type, 1) or '1type' as a synonym of type is deprecated; in a future version of nu
mpy, it will be understood as (type, (1,)) / (1,)type'.
  _np_qint32 = np.dtype([("qint32", np.int32, 1)])
/home/mitmakshay/.local/lib/python3.5/site-packages/tensorflow/python/framework/dtypes.py:476: Futur
eWarning: Passing (type, 1) or 'ltype' as a synonym of type is deprecated; in a future version of nu
mpy, it will be understood as (type, (1,)) / '(1,)type'.
  np_resource = np.dtype([("resource", np.ubyte, 1)])
Epoch: 0, Step: 0, Loss: 7.23927
Epoch: 0, Step: 10, Loss: 6.15085
Epoch: 0, Step: 20, Loss: 6.11055
Epoch: 0, Step: 30, Loss: 6.08727
Epoch: 0, Step: 40, Loss: 6.31588
Epoch: 0, Step: 50, Loss: 5.95452
Epoch: 0, Step: 60, Loss: 6.04857
Epoch: 0, Step: 70, Loss: 6.19643
Epoch: 0, Step: 80, Loss: 6.02859
Epoch: 0, Step: 90, Loss: 5.79539
Epoch: 0, Step: 100, Loss: 5.73596
Epoch: 0, Step: 110, Loss: 5.66733
Epoch: 0, Step: 120, Loss: 5.64613
Epoch: 0, Step: 130, Loss: 5.89964
Epoch: 0, Step: 140, Loss: 6.32584
Epoch: 0, Step: 150, Loss: 5.80418
Epoch: 0, Step: 160, Loss: 6.32924
Epoch: 0, Step: 170, Loss: 5.68333
Epoch: 0, Step: 180, Loss: 6.00784
Epoch: 0, Step: 190, Loss: 5.70039
Epoch: 0, Step: 200, Loss: 5.31908
Epoch: 0, Step: 210, Loss: 5.26713
Epoch: 0, Step: 220, Loss: 5.26726
Epoch: 0, Step: 230, Loss: 5.31399
Epoch: 0, Step: 240, Loss: 6.22611
Epoch: 0, Step: 250, Loss: 5.30876
Epoch: 0, Step: 260, Loss: 7.08992
Epoch: 0, Step: 270, Loss: 5.58917
Epoch: 0, Step: 280, Loss: 6.1741
Epoch: 0, Step: 290, Loss: 5.06409
Epoch: 0, Step: 300, Loss: 4.93774
Epoch: 0, Step: 310, Loss: 5.09491
Epoch: 0, Step: 320, Loss: 6.13581
Epoch: 0, Step: 330, Loss: 5.36394
Epoch: 0, Step: 340, Loss: 4.96409
Epoch: 0, Step: 350, Loss: 4.79719
Epoch: 0, Step: 360, Loss: 4.81536
```

Epoch: 0, Step: 370, Loss: 5.03604 Epoch: 0, Step: 380, Loss: 4.96095 Epoch: 0, Step: 390, Loss: 5.98818 Epoch: 0, Step: 400, Loss: 5.38156 Epoch: 0, Step: 410, Loss: 4.62049 Epoch: 0, Step: 420, Loss: 4.58126 Epoch: 0, Step: 430, Loss: 4.56801 Epoch: 0, Step: 440, Loss: 4.55025 Epoch: 0, Step: 450, Loss: 4.54886 Model saved in file: ./save/model.ckpt Epoch: 1, Step: 100, Loss: 4.96495 Epoch: 1, Step: 110, Loss: 4.85402 Epoch: 1, Step: 120, Loss: 4.50771 Epoch: 1, Step: 130, Loss: 4.39911 Epoch: 1, Step: 140, Loss: 4.3663 Epoch: 1, Step: 150, Loss: 4.39617 Epoch: 1, Step: 160, Loss: 4.73635 Epoch: 1, Step: 170, Loss: 5.81686 Epoch: 1, Step: 180, Loss: 5.00314 Epoch: 1, Step: 190, Loss: 4.28735 Epoch: 1, Step: 200, Loss: 4.21208

```
Epoch: 1, Step: 210, Loss: 4.17464
Epoch: 1, Step: 220, Loss: 4.14453
Epoch: 1, Step: 230, Loss: 4.12161
Epoch: 1, Step: 240, Loss: 4.13352
Epoch: 1, Step: 250, Loss: 4.14549
Epoch: 1, Step: 260, Loss: 4.04239
Epoch: 1, Step: 270, Loss: 4.06662
Epoch: 1, Step: 280, Loss: 4.11219
Epoch: 1, Step: 290, Loss: 4.29938
Epoch: 1, Step: 300, Loss: 4.1199
Epoch: 1, Step: 310, Loss: 3.92396
Epoch: 1, Step: 320, Loss: 3.89981
Epoch: 1, Step: 330, Loss: 3.87733
Epoch: 1, Step: 340, Loss: 3.85548
Epoch: 1, Step: 350, Loss: 3.83723
Epoch: 1, Step: 360, Loss: 5.60748
Epoch: 1, Step: 370, Loss: 7.7003
Epoch: 1, Step: 380, Loss: 3.77724
Epoch: 1, Step: 390, Loss: 3.74708
Epoch: 1, Step: 400, Loss: 3.72518
Epoch: 1, Step: 410, Loss: 3.70766
Epoch: 1, Step: 420, Loss: 3.6849
Epoch: 1, Step: 430, Loss: 3.66579
Epoch: 1, Step: 440, Loss: 3.64675
Epoch: 1, Step: 450, Loss: 3.62606
Epoch: 1, Step: 460, Loss: 3.60684
Epoch: 1, Step: 470, Loss: 3.58341
Epoch: 1, Step: 480, Loss: 3.56883
Epoch: 1, Step: 490, Loss: 3.56632
Epoch: 1, Step: 500, Loss: 3.54534
Epoch: 1, Step: 510, Loss: 3.51102
Epoch: 1, Step: 520, Loss: 3.48614
Epoch: 1, Step: 530, Loss: 3.46855
Epoch: 1, Step: 540, Loss: 3.44895
Epoch: 1, Step: 550, Loss: 3.43089
Model saved in file: ./save/model.ckpt
Epoch: 2, Step: 200, Loss: 3.42472
Epoch: 2, Step: 210, Loss: 3.4037
Epoch: 2, Step: 220, Loss: 3.3864
Epoch: 2, Step: 230, Loss: 3.37164
Epoch: 2, Step: 240, Loss: 3.3513
Epoch: 2, Step: 250, Loss: 3.33555
Epoch: 2, Step: 260, Loss: 3.31753
Epoch: 2, Step: 270, Loss: 3.30153
Epoch: 2, Step: 280, Loss: 3.2844
Epoch: 2, Step: 290, Loss: 3.26845
Epoch: 2, Step: 300, Loss: 3.29526
Epoch: 2, Step: 310, Loss: 3.26034
Epoch: 2, Step: 320, Loss: 7.31614
Epoch: 2, Step: 330, Loss: 4.79659
Epoch: 2, Step: 340, Loss: 3.18651
Epoch: 2, Step: 350, Loss: 3.17477
Epoch: 2, Step: 360, Loss: 3.19509
Epoch: 2, Step: 370, Loss: 3.1928
Epoch: 2, Step: 380, Loss: 3.13329
Epoch: 2, Step: 390, Loss: 3.20084
Epoch: 2, Step: 400, Loss: 3.20201
Epoch: 2, Step: 410, Loss: 3.07473
Epoch: 2, Step: 420, Loss: 3.10841
Epoch: 2, Step: 430, Loss: 3.05781
Epoch: 2, Step: 440, Loss: 3.04623
Epoch: 2, Step: 450, Loss: 3.01995
Epoch: 2, Step: 460, Loss: 3.1051
Epoch: 2, Step: 470, Loss: 3.02949
Epoch: 2, Step: 480, Loss: 3.11356
Epoch: 2, Step: 490, Loss: 3.06832
Epoch: 2, Step: 500, Loss: 2.96068
Epoch: 2, Step: 510, Loss: 2.93894
Epoch: 2, Step: 520, Loss: 2.92554
Epoch: 2, Step: 530, Loss: 2.90929
Epoch: 2, Step: 540, Loss: 2.89595
Epoch: 2, Step: 550, Loss: 2.88288
Epoch: 2, Step: 560, Loss: 2.8693
Epoch: 2, Step: 570, Loss: 2.85474
Epoch: 2, Step: 580, Loss: 2.85121
Epoch: 2, Step: 590, Loss: 2.83523
Epoch: 2, Step: 600, Loss: 2.81843
Epoch: 2, Step: 610, Loss: 2.80264
Epoch: 2, Step: 620, Loss: 2.82271
Epoch: 2, Step: 630, Loss: 2.80969
Epoch: 2, Step: 640, Loss: 3.10207
Epoch: 2, Step: 650, Loss: 2.75917
Model saved in file: ./save/model.ckpt
```

```
Epoch: 3, Step: 300, Loss: 2.7876
Epoch: 3, Step: 310, Loss: 2.79944
Epoch: 3, Step: 320, Loss: 3.05548
Epoch: 3, Step: 330, Loss: 2.78441
Epoch: 3, Step: 340, Loss: 2.77422
Epoch: 3, Step: 350, Loss: 2.98385
Epoch: 3, Step: 360, Loss: 2.95682
Epoch: 3, Step: 370, Loss: 2.66583
Epoch: 3, Step: 380, Loss: 2.69541
Epoch: 3, Step: 390, Loss: 2.63404
Epoch: 3, Step: 400, Loss: 2.65648
Epoch: 3, Step: 410, Loss: 2.69112
Epoch: 3, Step: 420, Loss: 3.49792
Epoch: 3, Step: 430, Loss: 2.75128
Epoch: 3, Step: 440, Loss: 3.45687
Epoch: 3, Step: 450, Loss: 3.08085
Epoch: 3, Step: 460, Loss: 2.99592
Epoch: 3, Step: 470, Loss: 2.97555
Epoch: 3, Step: 480, Loss: 2.55415
Epoch: 3, Step: 490, Loss: 2.53031
Epoch: 3, Step: 500, Loss: 2.54019
Epoch: 3, Step: 510, Loss: 2.65691
Epoch: 3, Step: 520, Loss: 3.30429
Epoch: 3, Step: 530, Loss: 2.80226
Epoch: 3, Step: 540, Loss: 4.29501
Epoch: 3, Step: 550, Loss: 3.13347
Epoch: 3, Step: 560, Loss: 3.60727
Epoch: 3, Step: 570, Loss: 2.66332
Epoch: 3, Step: 580, Loss: 2.42861
Epoch: 3, Step: 590, Loss: 2.50959
Epoch: 3, Step: 600, Loss: 3.54753
Epoch: 3, Step: 610, Loss: 3.20085
Epoch: 3, Step: 620, Loss: 2.49428
Epoch: 3, Step: 630, Loss: 2.43643
Epoch: 3, Step: 640, Loss: 2.40857
Epoch: 3, Step: 650, Loss: 2.73894
Epoch: 3, Step: 660, Loss: 2.51812
Epoch: 3, Step: 670, Loss: 3.40239
Epoch: 3, Step: 680, Loss: 3.21292
Epoch: 3, Step: 690, Loss: 2.46988
Epoch: 3, Step: 700, Loss: 2.31836
Epoch: 3, Step: 710, Loss: 2.31957
Epoch: 3, Step: 720, Loss: 2.32371
Epoch: 3, Step: 730, Loss: 2.32208
Epoch: 3, Step: 740, Loss: 2.73366
Epoch: 3, Step: 750, Loss: 2.79509
Model saved in file: ./save/model.ckpt
Epoch: 4, Step: 400, Loss: 2.41275
Epoch: 4, Step: 410, Loss: 2.27576
Epoch: 4, Step: 420, Loss: 2.26058
Epoch: 4, Step: 430, Loss: 2.26333
Epoch: 4, Step: 440, Loss: 2.44714
Epoch: 4, Step: 450, Loss: 3.5576
Epoch: 4, Step: 460, Loss: 3.24307
Epoch: 4, Step: 470, Loss: 2.24565
Epoch: 4, Step: 480, Loss: 2.25454
Epoch: 4, Step: 490, Loss: 2.18083
Epoch: 4, Step: 500, Loss: 2.17531
Epoch: 4, Step: 510, Loss: 2.16968
Epoch: 4, Step: 520, Loss: 2.18766
Epoch: 4, Step: 530, Loss: 2.22495
Epoch: 4, Step: 540, Loss: 2.14592
Epoch: 4, Step: 550, Loss: 2.15056
Epoch: 4, Step: 560, Loss: 2.23429
Epoch: 4, Step: 570, Loss: 2.48009
Epoch: 4, Step: 580, Loss: 2.2966
Epoch: 4, Step: 590, Loss: 2.10422
Epoch: 4, Step: 600, Loss: 2.09131
Epoch: 4, Step: 610, Loss: 2.08322
Epoch: 4, Step: 620, Loss: 2.07525
Epoch: 4, Step: 630, Loss: 2.06738
Epoch: 4, Step: 640, Loss: 2.59772
Epoch: 4, Step: 650, Loss: 7.10373
Epoch: 4, Step: 660, Loss: 2.08779
Epoch: 4, Step: 670, Loss: 2.03847
Epoch: 4, Step: 680, Loss: 2.0267
Epoch: 4, Step: 690, Loss: 2.02234
Epoch: 4, Step: 700, Loss: 2.01417
Epoch: 4, Step: 710, Loss: 2.00483
Epoch: 4, Step: 720, Loss: 2.0001
Epoch: 4, Step: 730, Loss: 1.99101
Epoch: 4, Step: 740, Loss: 1.98347
Epoch: 4, Step: 750, Loss: 1.97451
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Epoch: 4, Step: 760, Loss: 1.97023
Epoch: 4, Step: 770, Loss: 1.98106
Epoch: 4, Step: 780, Loss: 1.97691
Epoch: 4, Step: 790, Loss: 1.95435
Epoch: 4, Step: 800, Loss: 1.93729
Epoch: 4, Step: 810, Loss: 1.92981
Epoch: 4, Step: 820, Loss: 1.92398
Epoch: 4, Step: 830, Loss: 1.91831
Epoch: 4, Step: 840, Loss: 1.91074
Epoch: 4, Step: 850, Loss: 1.90456
Model saved in file: ./save/model.ckpt
Epoch: 5, Step: 500, Loss: 1.89978
Epoch: 5, Step: 510, Loss: 1.8959
Epoch: 5, Step: 520, Loss: 1.88794
Epoch: 5, Step: 530, Loss: 1.88127
Epoch: 5, Step: 540, Loss: 1.87438
Epoch: 5, Step: 550, Loss: 1.86795
Epoch: 5, Step: 560, Loss: 1.85972
Epoch: 5, Step: 570, Loss: 1.85384
Epoch: 5, Step: 580, Loss: 1.85895
Epoch: 5, Step: 590, Loss: 1.89655
Epoch: 5, Step: 600, Loss: 4.64967
Epoch: 5, Step: 610, Loss: 4.62888
Epoch: 5, Step: 620, Loss: 1.82062
Epoch: 5, Step: 630, Loss: 1.81142
Epoch: 5, Step: 640, Loss: 1.8518
Epoch: 5, Step: 650, Loss: 1.84524
Epoch: 5, Step: 660, Loss: 1.83044
Epoch: 5, Step: 670, Loss: 1.84367
Epoch: 5, Step: 680, Loss: 1.90885
Epoch: 5, Step: 690, Loss: 1.77334
Epoch: 5, Step: 700, Loss: 1.7921
Epoch: 5, Step: 710, Loss: 1.7804
Epoch: 5, Step: 720, Loss: 1.76741
Epoch: 5, Step: 730, Loss: 1.75341
Epoch: 5, Step: 740, Loss: 1.81942
Epoch: 5, Step: 750, Loss: 1.80409
Epoch: 5, Step: 760, Loss: 1.81812
Epoch: 5, Step: 770, Loss: 1.81685
Epoch: 5, Step: 780, Loss: 1.73062
Epoch: 5, Step: 790, Loss: 1.72311
Epoch: 5, Step: 800, Loss: 1.71133
Epoch: 5, Step: 810, Loss: 1.70374
Epoch: 5, Step: 820, Loss: 1.69774
Epoch: 5, Step: 830, Loss: 1.69179
Epoch: 5, Step: 840, Loss: 1.68593
Epoch: 5, Step: 850, Loss: 1.67982
Epoch: 5, Step: 860, Loss: 1.68404
Epoch: 5, Step: 870, Loss: 1.6741
Epoch: 5, Step: 880, Loss: 1.66791
Epoch: 5, Step: 890, Loss: 1.65626
Epoch: 5, Step: 900, Loss: 1.66874
Epoch: 5, Step: 910, Loss: 1.69638
Epoch: 5, Step: 920, Loss: 1.94202
Epoch: 5, Step: 930, Loss: 1.68009
Epoch: 5, Step: 940, Loss: 1.65592
Epoch: 5, Step: 950, Loss: 1.70402
Model saved in file: ./save/model.ckpt
Epoch: 6, Step: 600, Loss: 1.88106
Epoch: 6, Step: 610, Loss: 1.77947
Epoch: 6, Step: 620, Loss: 1.63234
Epoch: 6, Step: 630, Loss: 1.86992
Epoch: 6, Step: 640, Loss: 1.91465
Epoch: 6, Step: 650, Loss: 1.60504
Epoch: 6, Step: 660, Loss: 1.63618
Epoch: 6, Step: 670, Loss: 1.57643
Epoch: 6, Step: 680, Loss: 1.60281
Epoch: 6, Step: 690, Loss: 1.5803
Epoch: 6, Step: 700, Loss: 2.35745
Epoch: 6, Step: 710, Loss: 1.73657
Epoch: 6, Step: 720, Loss: 2.316
Epoch: 6, Step: 730, Loss: 2.22123
Epoch: 6, Step: 740, Loss: 1.79287
Epoch: 6, Step: 750, Loss: 2.07991
Epoch: 6, Step: 760, Loss: 1.60304
Epoch: 6, Step: 770, Loss: 1.52787
Epoch: 6, Step: 780, Loss: 1.53311
Epoch: 6, Step: 790, Loss: 1.65573
Epoch: 6, Step: 800, Loss: 1.98654
Epoch: 6, Step: 810, Loss: 2.20005
Epoch: 6, Step: 820, Loss: 2.75035
Epoch: 6, Step: 830, Loss: 2.61842
Epoch: 6, Step: 840, Loss: 2.5125
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Epoch: 6, Step: 850, Loss: 1.89684
Epoch: 6, Step: 860, Loss: 1.47496
Epoch: 6, Step: 870, Loss: 1.50074
Epoch: 6, Step: 880, Loss: 2.33827
Epoch: 6, Step: 890, Loss: 2.59666
Epoch: 6, Step: 900, Loss: 1.52433
Epoch: 6, Step: 910, Loss: 1.53965
Epoch: 6, Step: 920, Loss: 1.45163
Epoch: 6, Step: 930, Loss: 1.72488
Epoch: 6, Step: 940, Loss: 1.63703
Epoch: 6, Step: 950, Loss: 2.2519
Epoch: 6, Step: 960, Loss: 2.48427
Epoch: 6, Step: 970, Loss: 1.68323
Epoch: 6, Step: 980, Loss: 1.421
Epoch: 6, Step: 990, Loss: 1.42679
Epoch: 6, Step: 1000, Loss: 1.43191
Epoch: 6, Step: 1010, Loss: 1.44091
Epoch: 6, Step: 1020, Loss: 1.73183
Epoch: 6, Step: 1030, Loss: 1.93834
Epoch: 6, Step: 1040, Loss: 1.60113
Epoch: 6, Step: 1050, Loss: 1.43504
Model saved in file: ./save/model.ckpt
Epoch: 7, Step: 700, Loss: 1.40966
Epoch: 7, Step: 710, Loss: 1.38855
Epoch: 7, Step: 720, Loss: 1.52741
Epoch: 7, Step: 730, Loss: 2.48196
Epoch: 7, Step: 740, Loss: 2.7669
Epoch: 7, Step: 750, Loss: 1.43913
Epoch: 7, Step: 760, Loss: 1.4371
Epoch: 7, Step: 770, Loss: 1.34603
Epoch: 7, Step: 780, Loss: 1.35279
Epoch: 7, Step: 790, Loss: 1.34352
Epoch: 7, Step: 800, Loss: 1.35407
Epoch: 7, Step: 810, Loss: 1.36699
Epoch: 7, Step: 820, Loss: 1.34877
Epoch: 7, Step: 830, Loss: 1.32766
Epoch: 7, Step: 840, Loss: 1.40838
Epoch: 7, Step: 850, Loss: 1.70076
Epoch: 7, Step: 860, Loss: 1.42424
Epoch: 7, Step: 870, Loss: 1.40391
Epoch: 7, Step: 880, Loss: 1.30032
Epoch: 7, Step: 890, Loss: 1.29322
Epoch: 7, Step: 900, Loss: 1.28832
Epoch: 7, Step: 910, Loss: 1.28479
Epoch: 7, Step: 920, Loss: 1.33482
Epoch: 7, Step: 930, Loss: 6.60161
Epoch: 7, Step: 940, Loss: 1.46634
Epoch: 7, Step: 950, Loss: 1.27011
Epoch: 7, Step: 960, Loss: 1.25928
Epoch: 7, Step: 970, Loss: 1.25629
Epoch: 7, Step: 980, Loss: 1.25595
Epoch: 7, Step: 990, Loss: 1.24578
Epoch: 7, Step: 1000, Loss: 1.25051
Epoch: 7, Step: 1010, Loss: 1.24308
Epoch: 7, Step: 1020, Loss: 1.23848
Epoch: 7, Step: 1030, Loss: 1.2399
Epoch: 7, Step: 1040, Loss: 1.24201
Epoch: 7, Step: 1050, Loss: 1.22774
Epoch: 7, Step: 1060, Loss: 1.23871
Epoch: 7, Step: 1070, Loss: 1.22282
Epoch: 7, Step: 1080, Loss: 1.2127
Epoch: 7, Step: 1090, Loss: 1.20396
Epoch: 7, Step: 1100, Loss: 1.2034
Epoch: 7, Step: 1110, Loss: 1.19725
Epoch: 7, Step: 1120, Loss: 1.19193
Epoch: 7, Step: 1130, Loss: 1.1924
Epoch: 7, Step: 1140, Loss: 1.18327
Epoch: 7, Step: 1150, Loss: 1.18234
Model saved in file: ./save/model.ckpt
Epoch: 8, Step: 800, Loss: 1.18273
Epoch: 8, Step: 810, Loss: 1.17558
Epoch: 8, Step: 820, Loss: 1.16995
Epoch: 8, Step: 830, Loss: 1.16588
Epoch: 8, Step: 840, Loss: 1.16036
Epoch: 8, Step: 850, Loss: 1.1573
Epoch: 8, Step: 860, Loss: 1.15927
Epoch: 8, Step: 870, Loss: 1.21215
Epoch: 8, Step: 880, Loss: 2.61699
Epoch: 8, Step: 890, Loss: 5.23809
Epoch: 8, Step: 900, Loss: 1.14285
Epoch: 8, Step: 910, Loss: 1.13026
Epoch: 8, Step: 920, Loss: 1.17051
Epoch: 8, Step: 930, Loss: 1.1623
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Epoch: 8, Step: 940, Loss: 1.16575
Epoch: 8, Step: 950, Loss: 1.14144
Epoch: 8, Step: 960, Loss: 1.25414
Epoch: 8, Step: 970, Loss: 1.11749
Epoch: 8, Step: 980, Loss: 1.11723
Epoch: 8, Step: 990, Loss: 1.12233
Epoch: 8, Step: 1000, Loss: 1.10539
Epoch: 8, Step: 1010, Loss: 1.10506
Epoch: 8, Step: 1020, Loss: 1.133
Epoch: 8, Step: 1030, Loss: 1.15187
Epoch: 8, Step: 1040, Loss: 1.18234
Epoch: 8, Step: 1050, Loss: 1.20754
Epoch: 8, Step: 1060, Loss: 1.09628
Epoch: 8, Step: 1070, Loss: 1.09042
Epoch: 8, Step: 1080, Loss: 1.07118
Epoch: 8, Step: 1090, Loss: 1.06621
Epoch: 8, Step: 1100, Loss: 1.06725
Epoch: 8, Step: 1110, Loss: 1.06624
Epoch: 8, Step: 1120, Loss: 1.05958
Epoch: 8, Step: 1130, Loss: 1.05459
Epoch: 8, Step: 1140, Loss: 1.06115
Epoch: 8, Step: 1150, Loss: 1.0529
Epoch: 8, Step: 1160, Loss: 1.0546
Epoch: 8, Step: 1170, Loss: 1.03272
Epoch: 8, Step: 1180, Loss: 1.04547
Epoch: 8, Step: 1190, Loss: 1.0963
Epoch: 8, Step: 1200, Loss: 1.2118
Epoch: 8, Step: 1210, Loss: 1.15017
Epoch: 8, Step: 1220, Loss: 1.03868
Epoch: 8, Step: 1230, Loss: 1.09242
Epoch: 8, Step: 1240, Loss: 1.19057
Epoch: 8, Step: 1250, Loss: 1.2491
Model saved in file: ./save/model.ckpt
Epoch: 9, Step: 900, Loss: 1.00609
Epoch: 9, Step: 910, Loss: 1.17594
Epoch: 9, Step: 920, Loss: 1.25721
Epoch: 9, Step: 930, Loss: 1.0167
Epoch: 9, Step: 940, Loss: 1.05018
Epoch: 9, Step: 950, Loss: 0.97996
Epoch: 9, Step: 960, Loss: 0.985339
Epoch: 9, Step: 970, Loss: 0.983179
Epoch: 9, Step: 980, Loss: 1.65296
Epoch: 9, Step: 990, Loss: 1.23729
Epoch: 9, Step: 1000, Loss: 1.51186
Epoch: 9, Step: 1010, Loss: 1.66658
Epoch: 9, Step: 1020, Loss: 1.10741
Epoch: 9, Step: 1030, Loss: 1.63813
Epoch: 9, Step: 1040, Loss: 1.09581
Epoch: 9, Step: 1050, Loss: 0.949807
Epoch: 9, Step: 1060, Loss: 0.958807
Epoch: 9, Step: 1070, Loss: 1.06847
Epoch: 9, Step: 1080, Loss: 1.15744
Epoch: 9, Step: 1090, Loss: 1.79147
Epoch: 9, Step: 1100, Loss: 1.6734
Epoch: 9, Step: 1110, Loss: 2.66764
Epoch: 9, Step: 1120, Loss: 1.6302
Epoch: 9, Step: 1130, Loss: 1.54854
Epoch: 9, Step: 1140, Loss: 0.918081
Epoch: 9, Step: 1150, Loss: 0.91954
Epoch: 9, Step: 1160, Loss: 1.57545
Epoch: 9, Step: 1170, Loss: 2.30135
Epoch: 9, Step: 1180, Loss: 0.970063
Epoch: 9, Step: 1190, Loss: 1.00987
Epoch: 9, Step: 1200, Loss: 0.896906
Epoch: 9, Step: 1210, Loss: 1.07733
Epoch: 9, Step: 1220, Loss: 1.20642
Epoch: 9, Step: 1230, Loss: 1.31311
Epoch: 9, Step: 1240, Loss: 1.98324
Epoch: 9, Step: 1250, Loss: 1.16055
Epoch: 9, Step: 1260, Loss: 0.874583
Epoch: 9, Step: 1270, Loss: 0.870962
Epoch: 9, Step: 1280, Loss: 0.974618
Epoch: 9, Step: 1290, Loss: 0.894495
Epoch: 9, Step: 1300, Loss: 1.12392
Epoch: 9, Step: 1310, Loss: 1.3581
Epoch: 9, Step: 1320, Loss: 1.06036
Epoch: 9, Step: 1330, Loss: 0.916576
Epoch: 9, Step: 1340, Loss: 0.869998
Epoch: 9, Step: 1350, Loss: 0.864989
Model saved in file: ./save/model.ckpt
Epoch: 10, Step: 1000, Loss: 0.954433
Epoch: 10, Step: 1010, Loss: 1.52173
Epoch: 10, Step: 1020, Loss: 2.07028
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Epoch: 10, Step: 1030, Loss: 1.00149
Epoch: 10, Step: 1040, Loss: 0.929472
Epoch: 10, Step: 1050, Loss: 0.827817
Epoch: 10, Step: 1060, Loss: 0.832393
Epoch: 10, Step: 1070, Loss: 0.824277
Epoch: 10, Step: 1080, Loss: 0.822811
Epoch: 10, Step: 1090, Loss: 0.836168
Epoch: 10, Step: 1100, Loss: 0.861359
Epoch: 10, Step: 1110, Loss: 0.815065
Epoch: 10, Step: 1120, Loss: 0.905218
Epoch: 10, Step: 1130, Loss: 1.18153
Epoch: 10, Step: 1140, Loss: 0.886257
Epoch: 10, Step: 1150, Loss: 0.961239
Epoch: 10, Step: 1160, Loss: 0.795391
Epoch: 10, Step: 1170, Loss: 0.800131
Epoch: 10, Step: 1180, Loss: 0.79072
Epoch: 10, Step: 1190, Loss: 0.788009
Epoch: 10, Step: 1200, Loss: 0.837506
Epoch: 10, Step: 1210, Loss: 5.06611
Epoch: 10, Step: 1220, Loss: 1.66974
Epoch: 10, Step: 1230, Loss: 0.77749
Epoch: 10, Step: 1240, Loss: 0.776982
Epoch: 10, Step: 1250, Loss: 0.768145
Epoch: 10, Step: 1260, Loss: 0.764668
Epoch: 10, Step: 1270, Loss: 0.76153
Epoch: 10, Step: 1280, Loss: 0.765792
Epoch: 10, Step: 1290, Loss: 0.756493
Epoch: 10, Step: 1300, Loss: 0.755399
Epoch: 10, Step: 1310, Loss: 0.755055
Epoch: 10, Step: 1320, Loss: 0.75261
Epoch: 10, Step: 1330, Loss: 0.7481
Epoch: 10, Step: 1340, Loss: 0.768552
Epoch: 10, Step: 1350, Loss: 0.757813
Epoch: 10, Step: 1360, Loss: 0.735673
Epoch: 10, Step: 1370, Loss: 0.729374
Epoch: 10, Step: 1380, Loss: 0.729553
Epoch: 10, Step: 1390, Loss: 0.727899
Epoch: 10, Step: 1400, Loss: 0.719924
Epoch: 10, Step: 1410, Loss: 0.719237
Epoch: 10, Step: 1420, Loss: 0.713807
Epoch: 10, Step: 1430, Loss: 0.711931
Epoch: 10, Step: 1440, Loss: 0.710816
Epoch: 10, Step: 1450, Loss: 0.707039
Model saved in file: ./save/model.ckpt
Epoch: 11, Step: 1100, Loss: 0.705847
Epoch: 11, Step: 1110, Loss: 0.701992
Epoch: 11, Step: 1120, Loss: 0.698919
Epoch: 11, Step: 1130, Loss: 0.695672
Epoch: 11, Step: 1140, Loss: 0.695773
Epoch: 11, Step: 1150, Loss: 0.764604
Epoch: 11, Step: 1160, Loss: 0.903744
Epoch: 11, Step: 1170, Loss: 6.2472
Epoch: 11, Step: 1180, Loss: 0.702432
Epoch: 11, Step: 1190, Loss: 0.691651
Epoch: 11, Step: 1200, Loss: 0.687373
Epoch: 11, Step: 1210, Loss: 0.681261
Epoch: 11, Step: 1220, Loss: 0.714149
Epoch: 11, Step: 1230, Loss: 0.674287
Epoch: 11, Step: 1240, Loss: 0.830382
Epoch: 11, Step: 1250, Loss: 0.72602
Epoch: 11, Step: 1260, Loss: 0.661719
Epoch: 11, Step: 1270, Loss: 0.722811
Epoch: 11, Step: 1280, Loss: 0.661326
Epoch: 11, Step: 1290, Loss: 0.675217
Epoch: 11, Step: 1300, Loss: 0.680383
Epoch: 11, Step: 1310, Loss: 0.722898
Epoch: 11, Step: 1320, Loss: 0.700233
Epoch: 11, Step: 1330, Loss: 0.758319
Epoch: 11, Step: 1340, Loss: 0.690092
Epoch: 11, Step: 1350, Loss: 0.669704
Epoch: 11, Step: 1360, Loss: 0.648372
Epoch: 11, Step: 1370, Loss: 0.640304
Epoch: 11, Step: 1380, Loss: 0.63897
Epoch: 11, Step: 1390, Loss: 0.635136
Epoch: 11, Step: 1400, Loss: 0.633157
Epoch: 11, Step: 1410, Loss: 0.630198
Epoch: 11, Step: 1420, Loss: 0.632185
Epoch: 11, Step: 1430, Loss: 0.62961
Epoch: 11, Step: 1440, Loss: 0.631019
Epoch: 11, Step: 1450, Loss: 0.616787
Epoch: 11, Step: 1460, Loss: 0.614013
Epoch: 11, Step: 1470, Loss: 0.636736
Epoch: 11, Step: 1480, Loss: 0.681412
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Epoch: 11, Step: 1490, Loss: 0.842191
Epoch: 11, Step: 1500, Loss: 0.601111
Epoch: 11, Step: 1510, Loss: 0.633317
Epoch: 11, Step: 1520, Loss: 0.677929
Epoch: 11, Step: 1530, Loss: 0.640431
Epoch: 11, Step: 1540, Loss: 0.609927
Epoch: 11, Step: 1550, Loss: 0.780638
Model saved in file: ./save/model.ckpt
Epoch: 12, Step: 1200, Loss: 0.950872
Epoch: 12, Step: 1210, Loss: 0.720244
Epoch: 12, Step: 1220, Loss: 0.642725
Epoch: 12, Step: 1230, Loss: 0.592047
Epoch: 12, Step: 1240, Loss: 0.58654
Epoch: 12, Step: 1250, Loss: 0.595531
Epoch: 12, Step: 1260, Loss: 1.12238
Epoch: 12, Step: 1270, Loss: 1.01836
Epoch: 12, Step: 1280, Loss: 1.05286
Epoch: 12, Step: 1290, Loss: 1.38362
Epoch: 12, Step: 1300, Loss: 0.688954
Epoch: 12, Step: 1310, Loss: 1.13912
Epoch: 12, Step: 1320, Loss: 0.728906
Epoch: 12, Step: 1330, Loss: 0.563381
Epoch: 12, Step: 1340, Loss: 0.570226
Epoch: 12, Step: 1350, Loss: 0.632617
Epoch: 12, Step: 1360, Loss: 0.708173
Epoch: 12, Step: 1370, Loss: 1.55481
Epoch: 12, Step: 1380, Loss: 0.877132
Epoch: 12, Step: 1390, Loss: 2.66559
Epoch: 12, Step: 1400, Loss: 1.04911
Epoch: 12, Step: 1410, Loss: 1.41247
Epoch: 12, Step: 1420, Loss: 0.556594
Epoch: 12, Step: 1430, Loss: 0.540909
Epoch: 12, Step: 1440, Loss: 0.885109
Epoch: 12, Step: 1450, Loss: 2.03554
Epoch: 12, Step: 1460, Loss: 0.870679
Epoch: 12, Step: 1470, Loss: 0.657074
Epoch: 12, Step: 1480, Loss: 0.558266
Epoch: 12, Step: 1490, Loss: 0.544579
Epoch: 12, Step: 1500, Loss: 0.777546
Epoch: 12, Step: 1510, Loss: 0.766997
Epoch: 12, Step: 1520, Loss: 1.71056
Epoch: 12, Step: 1530, Loss: 1.07214
Epoch: 12, Step: 1540, Loss: 0.517497
Epoch: 12, Step: 1550, Loss: 0.52763
Epoch: 12, Step: 1560, Loss: 0.539033
Epoch: 12, Step: 1570, Loss: 0.546086
Epoch: 12, Step: 1580, Loss: 0.645888
Epoch: 12, Step: 1590, Loss: 0.971773
Epoch: 12, Step: 1600, Loss: 0.81434
Epoch: 12, Step: 1610, Loss: 0.588248
Epoch: 12, Step: 1620, Loss: 0.506767
Epoch: 12, Step: 1630, Loss: 0.497805
Epoch: 12, Step: 1640, Loss: 0.52296
Epoch: 12, Step: 1650, Loss: 0.867308
Model saved in file: ./save/model.ckpt
Epoch: 13, Step: 1300, Loss: 1.61885
Epoch: 13, Step: 1310, Loss: 0.85603
Epoch: 13, Step: 1320, Loss: 0.582618
Epoch: 13, Step: 1330, Loss: 0.485459
Epoch: 13, Step: 1340, Loss: 0.483313
Epoch: 13, Step: 1350, Loss: 0.476189
Epoch: 13, Step: 1360, Loss: 0.478597
Epoch: 13, Step: 1370, Loss: 0.489529
Epoch: 13, Step: 1380, Loss: 0.494351
Epoch: 13, Step: 1390, Loss: 0.495163
Epoch: 13, Step: 1400, Loss: 0.551396
Epoch: 13, Step: 1410, Loss: 0.724375
Epoch: 13, Step: 1420, Loss: 0.721848
Epoch: 13, Step: 1430, Loss: 0.78876
Epoch: 13, Step: 1440, Loss: 0.482609
Epoch: 13, Step: 1450, Loss: 0.469596
Epoch: 13, Step: 1460, Loss: 0.525697
Epoch: 13, Step: 1470, Loss: 0.452017
Epoch: 13, Step: 1480, Loss: 0.456613
Epoch: 13, Step: 1490, Loss: 3.53326
Epoch: 13, Step: 1500, Loss: 3.10759
Epoch: 13, Step: 1510, Loss: 0.45305
Epoch: 13, Step: 1520, Loss: 0.445777
Epoch: 13, Step: 1530, Loss: 0.440617
Epoch: 13, Step: 1540, Loss: 0.441079
Epoch: 13, Step: 1550, Loss: 0.438926
Epoch: 13, Step: 1560, Loss: 0.44081
Epoch: 13, Step: 1570, Loss: 0.438142
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Epoch: 13, Step: 1580, Loss: 0.438721
Epoch: 13, Step: 1590, Loss: 0.434019
Epoch: 13, Step: 1600, Loss: 0.426818
Epoch: 13, Step: 1610, Loss: 0.437265
Epoch: 13, Step: 1620, Loss: 0.477013
Epoch: 13, Step: 1630, Loss: 0.457749
Epoch: 13, Step: 1640, Loss: 0.419365
Epoch: 13, Step: 1650, Loss: 0.4174
Epoch: 13, Step: 1660, Loss: 0.419201
Epoch: 13, Step: 1670, Loss: 0.419437
Epoch: 13, Step: 1680, Loss: 0.414072
Epoch: 13, Step: 1690, Loss: 0.411688
Epoch: 13, Step: 1700, Loss: 0.410687
Epoch: 13, Step: 1710, Loss: 0.415527
Epoch: 13, Step: 1720, Loss: 0.427268
Epoch: 13, Step: 1730, Loss: 0.420291
Epoch: 13, Step: 1740, Loss: 0.410829
Epoch: 13, Step: 1750, Loss: 0.408143
Model saved in file: ./save/model.ckpt
Epoch: 14, Step: 1400, Loss: 0.425036
Epoch: 14, Step: 1410, Loss: 0.435355
Epoch: 14, Step: 1420, Loss: 0.490897
Epoch: 14, Step: 1430, Loss: 0.521559
Epoch: 14, Step: 1440, Loss: 0.422714
Epoch: 14, Step: 1450, Loss: 5.70126
Epoch: 14, Step: 1460, Loss: 0.891703
Epoch: 14, Step: 1470, Loss: 0.3926
Epoch: 14, Step: 1480, Loss: 0.402816
Epoch: 14, Step: 1490, Loss: 0.422604
Epoch: 14, Step: 1500, Loss: 0.434461
Epoch: 14, Step: 1510, Loss: 0.389596
Epoch: 14, Step: 1520, Loss: 0.46805
Epoch: 14, Step: 1530, Loss: 0.454384
Epoch: 14, Step: 1540, Loss: 0.379146
Epoch: 14, Step: 1550, Loss: 0.408725
Epoch: 14, Step: 1560, Loss: 0.403503
Epoch: 14, Step: 1570, Loss: 0.381444
Epoch: 14, Step: 1580, Loss: 0.382816
Epoch: 14, Step: 1590, Loss: 0.502287
Epoch: 14, Step: 1600, Loss: 0.401868
Epoch: 14, Step: 1610, Loss: 0.499185
Epoch: 14, Step: 1620, Loss: 0.43898
Epoch: 14, Step: 1630, Loss: 0.391021
Epoch: 14, Step: 1640, Loss: 0.375974
Epoch: 14, Step: 1650, Loss: 0.372552
Epoch: 14, Step: 1660, Loss: 0.379432
Epoch: 14, Step: 1670, Loss: 0.368137
Epoch: 14, Step: 1680, Loss: 0.367485
Epoch: 14, Step: 1690, Loss: 0.383092
Epoch: 14, Step: 1700, Loss: 0.354524
Epoch: 14, Step: 1710, Loss: 0.370113
Epoch: 14, Step: 1720, Loss: 0.354854
Epoch: 14, Step: 1730, Loss: 0.371464
Epoch: 14, Step: 1740, Loss: 0.483371
Epoch: 14, Step: 1750, Loss: 0.354441
Epoch: 14, Step: 1760, Loss: 0.359419
Epoch: 14, Step: 1770, Loss: 0.753124
Epoch: 14, Step: 1780, Loss: 0.353455
Epoch: 14, Step: 1790, Loss: 0.375565
Epoch: 14, Step: 1800, Loss: 0.415374
Epoch: 14, Step: 1810, Loss: 0.605977
Epoch: 14, Step: 1820, Loss: 0.359432
Epoch: 14, Step: 1830, Loss: 0.383757
Epoch: 14, Step: 1840, Loss: 0.423104
Epoch: 14, Step: 1850, Loss: 0.43707
Model saved in file: ./save/model.ckpt
Epoch: 15, Step: 1500, Loss: 0.372595
Epoch: 15, Step: 1510, Loss: 0.372792
Epoch: 15, Step: 1520, Loss: 0.33554
Epoch: 15, Step: 1530, Loss: 0.376868
Epoch: 15, Step: 1540, Loss: 0.410981
Epoch: 15, Step: 1550, Loss: 0.746274
Epoch: 15, Step: 1560, Loss: 0.623414
Epoch: 15, Step: 1570, Loss: 1.16257
Epoch: 15, Step: 1580, Loss: 0.623351
Epoch: 15, Step: 1590, Loss: 0.699651
Epoch: 15, Step: 1600, Loss: 0.501777
Epoch: 15, Step: 1610, Loss: 0.325039
Epoch: 15, Step: 1620, Loss: 0.327415
Epoch: 15, Step: 1630, Loss: 0.35109
Epoch: 15, Step: 1640, Loss: 0.429193
Epoch: 15, Step: 1650, Loss: 0.668786
Epoch: 15, Step: 1660, Loss: 0.388603
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Epoch: 15, Step: 1670, Loss: 2.22548
Epoch: 15, Step: 1680, Loss: 0.692037
Epoch: 15, Step: 1690, Loss: 1.16867
Epoch: 15, Step: 1700, Loss: 0.592312
Epoch: 15, Step: 1710, Loss: 0.340628
Epoch: 15, Step: 1720, Loss: 0.465652
Epoch: 15, Step: 1730, Loss: 1.34588
Epoch: 15, Step: 1740, Loss: 0.845035
Epoch: 15, Step: 1750, Loss: 0.478191
Epoch: 15, Step: 1760, Loss: 0.344129
Epoch: 15, Step: 1770, Loss: 0.343192
Epoch: 15, Step: 1780, Loss: 0.63427
Epoch: 15, Step: 1790, Loss: 0.471115
Epoch: 15, Step: 1800, Loss: 0.947433
Epoch: 15, Step: 1810, Loss: 0.630133
Epoch: 15, Step: 1820, Loss: 0.34196
Epoch: 15, Step: 1830, Loss: 0.295383
Epoch: 15, Step: 1840, Loss: 0.293766
Epoch: 15, Step: 1850, Loss: 0.297573
Epoch: 15, Step: 1860, Loss: 0.344542
Epoch: 15, Step: 1870, Loss: 0.787682
Epoch: 15, Step: 1880, Loss: 0.725489
Epoch: 15, Step: 1890, Loss: 0.442072
Epoch: 15, Step: 1900, Loss: 0.322098
Epoch: 15, Step: 1910, Loss: 0.306439
Epoch: 15, Step: 1920, Loss: 0.307522
Epoch: 15, Step: 1930, Loss: 0.430812
Epoch: 15, Step: 1940, Loss: 1.01841
Epoch: 15, Step: 1950, Loss: 0.55999
Model saved in file: ./save/model.ckpt
Epoch: 16, Step: 1600, Loss: 0.346799
Epoch: 16, Step: 1610, Loss: 0.315101
Epoch: 16, Step: 1620, Loss: 0.293547
Epoch: 16, Step: 1630, Loss: 0.283011
Epoch: 16, Step: 1640, Loss: 0.291713
Epoch: 16, Step: 1650, Loss: 0.386827
Epoch: 16, Step: 1660, Loss: 0.438668
Epoch: 16, Step: 1670, Loss: 0.300325
Epoch: 16, Step: 1680, Loss: 0.30395
Epoch: 16, Step: 1690, Loss: 0.420367
Epoch: 16, Step: 1700, Loss: 0.513313
Epoch: 16, Step: 1710, Loss: 0.47409
Epoch: 16, Step: 1720, Loss: 0.274867
Epoch: 16, Step: 1730, Loss: 0.265932
Epoch: 16, Step: 1740, Loss: 0.265429
Epoch: 16, Step: 1750, Loss: 0.266306
Epoch: 16, Step: 1760, Loss: 0.295038
Epoch: 16, Step: 1770, Loss: 1.56633
Epoch: 16, Step: 1780, Loss: 4.37035
Epoch: 16, Step: 1790, Loss: 0.270628
Epoch: 16, Step: 1800, Loss: 0.263298
Epoch: 16, Step: 1810, Loss: 0.258932
Epoch: 16, Step: 1820, Loss: 0.271942
Epoch: 16, Step: 1830, Loss: 0.262505
Epoch: 16, Step: 1840, Loss: 0.266702
Epoch: 16, Step: 1850, Loss: 0.275074
Epoch: 16, Step: 1860, Loss: 0.261067
Epoch: 16, Step: 1870, Loss: 0.264409
Epoch: 16, Step: 1880, Loss: 0.260565
Epoch: 16, Step: 1890, Loss: 0.274759
Epoch: 16, Step: 1900, Loss: 0.257313
Epoch: 16, Step: 1910, Loss: 0.254484
Epoch: 16, Step: 1920, Loss: 0.268306
Epoch: 16, Step: 1930, Loss: 0.25978
Epoch: 16, Step: 1940, Loss: 0.252371
Epoch: 16, Step: 1950, Loss: 0.270236
Epoch: 16, Step: 1960, Loss: 0.266696
Epoch: 16, Step: 1970, Loss: 0.258094
Epoch: 16, Step: 1980, Loss: 0.371096
Epoch: 16, Step: 1990, Loss: 0.332681
Epoch: 16, Step: 2000, Loss: 0.265439
Epoch: 16, Step: 2010, Loss: 0.276955
Epoch: 16, Step: 2020, Loss: 0.271717
Epoch: 16, Step: 2030, Loss: 0.245255
Epoch: 16, Step: 2040, Loss: 0.252584
Epoch: 16, Step: 2050, Loss: 0.245862
Model saved in file: ./save/model.ckpt
Epoch: 17, Step: 1700, Loss: 0.241209
Epoch: 17, Step: 1710, Loss: 0.293854
Epoch: 17, Step: 1720, Loss: 0.272462
Epoch: 17, Step: 1730, Loss: 3.77844
Epoch: 17, Step: 1740, Loss: 2.03841
Epoch: 17, Step: 1750, Loss: 0.236982
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Epoch: 17, Step: 1760, Loss: 0.236611
Epoch: 17, Step: 1770, Loss: 0.291594
Epoch: 17, Step: 1780, Loss: 0.309898
Epoch: 17, Step: 1790, Loss: 0.27189
Epoch: 17, Step: 1800, Loss: 0.282155
Epoch: 17, Step: 1810, Loss: 0.333
Epoch: 17, Step: 1820, Loss: 0.228943
Epoch: 17, Step: 1830, Loss: 0.266396
Epoch: 17, Step: 1840, Loss: 0.24147
Epoch: 17, Step: 1850, Loss: 0.240276
Epoch: 17, Step: 1860, Loss: 0.229313
Epoch: 17, Step: 1870, Loss: 0.26474
Epoch: 17, Step: 1880, Loss: 0.239607
Epoch: 17, Step: 1890, Loss: 0.253425
Epoch: 17, Step: 1900, Loss: 0.257379
Epoch: 17, Step: 1910, Loss: 0.28505
Epoch: 17, Step: 1920, Loss: 0.23271
Epoch: 17, Step: 1930, Loss: 0.229326
Epoch: 17, Step: 1940, Loss: 0.24515
Epoch: 17, Step: 1950, Loss: 0.29905
Epoch: 17, Step: 1960, Loss: 0.226967
Epoch: 17, Step: 1970, Loss: 0.229246
Epoch: 17, Step: 1980, Loss: 0.222377
Epoch: 17, Step: 1990, Loss: 0.224155
Epoch: 17, Step: 2000, Loss: 0.225326
Epoch: 17, Step: 2010, Loss: 0.221017
Epoch: 17, Step: 2020, Loss: 0.230187
Epoch: 17, Step: 2030, Loss: 0.245285
Epoch: 17, Step: 2040, Loss: 0.290088
Epoch: 17, Step: 2050, Loss: 0.459852
Epoch: 17, Step: 2060, Loss: 0.220748
Epoch: 17, Step: 2070, Loss: 0.255619
Epoch: 17, Step: 2080, Loss: 0.287833
Epoch: 17, Step: 2090, Loss: 0.577075
Epoch: 17, Step: 2100, Loss: 0.312176
Epoch: 17, Step: 2110, Loss: 0.221277
Epoch: 17, Step: 2120, Loss: 0.232893
Epoch: 17, Step: 2130, Loss: 0.319798
Epoch: 17, Step: 2140, Loss: 0.217978
Epoch: 17, Step: 2150, Loss: 0.257947
Model saved in file: ./save/model.ckpt
Epoch: 18, Step: 1800, Loss: 0.208651
Epoch: 18, Step: 1810, Loss: 0.239031
Epoch: 18, Step: 1820, Loss: 0.224748
Epoch: 18, Step: 1830, Loss: 0.479363
Epoch: 18, Step: 1840, Loss: 0.34823
Epoch: 18, Step: 1850, Loss: 0.702182
Epoch: 18, Step: 1860, Loss: 0.463319
Epoch: 18, Step: 1870, Loss: 0.235972
Epoch: 18, Step: 1880, Loss: 0.256739
Epoch: 18, Step: 1890, Loss: 0.232206
Epoch: 18, Step: 1900, Loss: 0.203165
Epoch: 18, Step: 1910, Loss: 0.230364
Epoch: 18, Step: 1920, Loss: 0.223905
Epoch: 18, Step: 1930, Loss: 0.458288
Epoch: 18, Step: 1940, Loss: 0.370353
Epoch: 18, Step: 1950, Loss: 1.57534
Epoch: 18, Step: 1960, Loss: 0.873478
Epoch: 18, Step: 1970, Loss: 0.779806
Epoch: 18, Step: 1980, Loss: 0.395962
Epoch: 18, Step: 1990, Loss: 0.204303
Epoch: 18, Step: 2000, Loss: 0.293125
Epoch: 18, Step: 2010, Loss: 1.11279
Epoch: 18, Step: 2020, Loss: 1.11927
Epoch: 18, Step: 2030, Loss: 0.257967
Epoch: 18, Step: 2040, Loss: 0.242506
Epoch: 18, Step: 2050, Loss: 0.239188
Epoch: 18, Step: 2060, Loss: 0.598092
Epoch: 18, Step: 2070, Loss: 0.322058
Epoch: 18, Step: 2080, Loss: 0.412744
Epoch: 18, Step: 2090, Loss: 0.365706
Epoch: 18, Step: 2100, Loss: 0.321091
Epoch: 18, Step: 2110, Loss: 0.191573
Epoch: 18, Step: 2120, Loss: 0.197404
Epoch: 18, Step: 2130, Loss: 0.191961
Epoch: 18, Step: 2140, Loss: 0.22221
Epoch: 18, Step: 2150, Loss: 0.600393
Epoch: 18, Step: 2160, Loss: 0.639774
Epoch: 18, Step: 2170, Loss: 0.304827
Epoch: 18, Step: 2180, Loss: 0.193366
Epoch: 18, Step: 2190, Loss: 0.214115
Epoch: 18, Step: 2200, Loss: 0.190325
Epoch: 18, Step: 2210, Loss: 0.208955
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Epoch: 18, Step: 2220, Loss: 0.223621
Epoch: 18, Step: 2230, Loss: 0.346105
Epoch: 18, Step: 2240, Loss: 0.262558
Epoch: 18, Step: 2250, Loss: 0.201132
Model saved in file: ./save/model.ckpt
Epoch: 19, Step: 1900, Loss: 0.210138
Epoch: 19, Step: 1910, Loss: 0.196234
Epoch: 19, Step: 1920, Loss: 0.187376
Epoch: 19, Step: 1930, Loss: 0.20073
Epoch: 19, Step: 1940, Loss: 0.238847
Epoch: 19, Step: 1950, Loss: 0.192162
Epoch: 19, Step: 1960, Loss: 0.19348
Epoch: 19, Step: 1970, Loss: 0.299138
Epoch: 19, Step: 1980, Loss: 0.554525
Epoch: 19, Step: 1990, Loss: 0.44155
Epoch: 19, Step: 2000, Loss: 0.222135
Epoch: 19, Step: 2010, Loss: 0.349213
Epoch: 19, Step: 2020, Loss: 0.372608
Epoch: 19, Step: 2030, Loss: 0.304592
Epoch: 19, Step: 2040, Loss: 0.20349
Epoch: 19, Step: 2050, Loss: 0.419675
Epoch: 19, Step: 2060, Loss: 4.71971
Epoch: 19, Step: 2070, Loss: 0.241137
Epoch: 19, Step: 2080, Loss: 0.178479
Epoch: 19, Step: 2090, Loss: 0.180259
Epoch: 19, Step: 2100, Loss: 0.187562
Epoch: 19, Step: 2110, Loss: 0.192023
Epoch: 19, Step: 2120, Loss: 0.187679
Epoch: 19, Step: 2130, Loss: 0.217559
Epoch: 19, Step: 2140, Loss: 0.20425
Epoch: 19, Step: 2150, Loss: 0.218942
Epoch: 19, Step: 2160, Loss: 0.207703
Epoch: 19, Step: 2170, Loss: 0.273092
Epoch: 19, Step: 2180, Loss: 0.183003
Epoch: 19, Step: 2190, Loss: 0.286267
Epoch: 19, Step: 2200, Loss: 0.420936
Epoch: 19, Step: 2210, Loss: 0.208459
Epoch: 19, Step: 2220, Loss: 0.226786
Epoch: 19, Step: 2230, Loss: 0.179302
Epoch: 19, Step: 2240, Loss: 0.179006
Epoch: 19, Step: 2250, Loss: 0.176024
Epoch: 19, Step: 2260, Loss: 0.186193
Epoch: 19, Step: 2270, Loss: 0.172947
Epoch: 19, Step: 2280, Loss: 0.171897
Epoch: 19, Step: 2290, Loss: 0.175255
Epoch: 19, Step: 2300, Loss: 0.171266
Epoch: 19, Step: 2310, Loss: 0.168959
Epoch: 19, Step: 2320, Loss: 0.173354
Epoch: 19, Step: 2330, Loss: 0.167927
Epoch: 19, Step: 2340, Loss: 0.179273
Epoch: 19, Step: 2350, Loss: 0.183576
Model saved in file: ./save/model.ckpt
Epoch: 20, Step: 2000, Loss: 0.240836
Epoch: 20, Step: 2010, Loss: 2.57194
Epoch: 20, Step: 2020, Loss: 3.10031
Epoch: 20, Step: 2030, Loss: 0.173164
Epoch: 20, Step: 2040, Loss: 0.17154
Epoch: 20, Step: 2050, Loss: 0.199214
Epoch: 20, Step: 2060, Loss: 0.205422
Epoch: 20, Step: 2070, Loss: 0.216002
Epoch: 20, Step: 2080, Loss: 0.188935
Epoch: 20, Step: 2090, Loss: 0.264515
Epoch: 20, Step: 2100, Loss: 0.166803
Epoch: 20, Step: 2110, Loss: 0.172619
Epoch: 20, Step: 2120, Loss: 0.180945
Epoch: 20, Step: 2130, Loss: 0.181315
Epoch: 20, Step: 2140, Loss: 0.168856
Epoch: 20, Step: 2150, Loss: 0.17017
Epoch: 20, Step: 2160, Loss: 0.178551
Epoch: 20, Step: 2170, Loss: 0.318931
Epoch: 20, Step: 2180, Loss: 0.323195
Epoch: 20, Step: 2190, Loss: 0.176782
Epoch: 20, Step: 2200, Loss: 0.165608
Epoch: 20, Step: 2210, Loss: 0.167114
Epoch: 20, Step: 2220, Loss: 0.16379
Epoch: 20, Step: 2230, Loss: 0.165448
Epoch: 20, Step: 2240, Loss: 0.170317
Epoch: 20, Step: 2250, Loss: 0.179916
Epoch: 20, Step: 2260, Loss: 0.18408
Epoch: 20, Step: 2270, Loss: 0.193455
Epoch: 20, Step: 2280, Loss: 0.187268
Epoch: 20, Step: 2290, Loss: 0.191897
Epoch: 20, Step: 2300, Loss: 0.164193
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Epoch: 20, Step: 2310, Loss: 0.212632
Epoch: 20, Step: 2320, Loss: 0.29009
Epoch: 20, Step: 2330, Loss: 0.38088
Epoch: 20, Step: 2340, Loss: 0.188339
Epoch: 20, Step: 2350, Loss: 0.196655
Epoch: 20, Step: 2360, Loss: 0.255003
Epoch: 20, Step: 2370, Loss: 0.358219
Epoch: 20, Step: 2380, Loss: 0.291533
Epoch: 20, Step: 2390, Loss: 0.167846
Epoch: 20, Step: 2400, Loss: 0.17316
Epoch: 20, Step: 2410, Loss: 0.239134
Epoch: 20, Step: 2420, Loss: 0.190393
Epoch: 20, Step: 2430, Loss: 0.220781
Epoch: 20, Step: 2440, Loss: 0.169097
Epoch: 20, Step: 2450, Loss: 0.21636
Model saved in file: ./save/model.ckpt
Epoch: 21, Step: 2100, Loss: 0.189708
Epoch: 21, Step: 2110, Loss: 0.191123
Epoch: 21, Step: 2120, Loss: 0.269959
Epoch: 21, Step: 2130, Loss: 0.416923
Epoch: 21, Step: 2140, Loss: 0.242952
Epoch: 21, Step: 2150, Loss: 0.33474
Epoch: 21, Step: 2160, Loss: 0.229498
Epoch: 21, Step: 2170, Loss: 0.173761
Epoch: 21, Step: 2180, Loss: 0.16332
Epoch: 21, Step: 2190, Loss: 0.171605
Epoch: 21, Step: 2200, Loss: 0.276004
Epoch: 21, Step: 2210, Loss: 0.25465
Epoch: 21, Step: 2220, Loss: 0.303605
Epoch: 21, Step: 2230, Loss: 1.09343
Epoch: 21, Step: 2240, Loss: 1.10759
Epoch: 21, Step: 2250, Loss: 0.265867
Epoch: 21, Step: 2260, Loss: 0.232816
Epoch: 21, Step: 2270, Loss: 0.206838
Epoch: 21, Step: 2280, Loss: 0.261666
Epoch: 21, Step: 2290, Loss: 0.793886
Epoch: 21, Step: 2300, Loss: 1.09409
Epoch: 21, Step: 2310, Loss: 0.198445
Epoch: 21, Step: 2320, Loss: 0.220462
Epoch: 21, Step: 2330, Loss: 0.155556
Epoch: 21, Step: 2340, Loss: 0.388255
Epoch: 21, Step: 2350, Loss: 0.317086
Epoch: 21, Step: 2360, Loss: 0.268418
Epoch: 21, Step: 2370, Loss: 0.221312
Epoch: 21, Step: 2380, Loss: 0.192496
Epoch: 21, Step: 2390, Loss: 0.154779
Epoch: 21, Step: 2400, Loss: 0.209864
Epoch: 21, Step: 2410, Loss: 0.221885
Epoch: 21, Step: 2420, Loss: 0.223444
Epoch: 21, Step: 2430, Loss: 0.276136
Epoch: 21, Step: 2440, Loss: 0.192115
Epoch: 21, Step: 2450, Loss: 0.225857
Epoch: 21, Step: 2460, Loss: 0.1991
Epoch: 21, Step: 2470, Loss: 0.205585
Epoch: 21, Step: 2480, Loss: 0.182873
Epoch: 21, Step: 2490, Loss: 0.195552
Epoch: 21, Step: 2500, Loss: 0.547367
Epoch: 21, Step: 2510, Loss: 0.818169
Epoch: 21, Step: 2520, Loss: 0.210668
Epoch: 21, Step: 2530, Loss: 0.227383
Epoch: 21, Step: 2540, Loss: 0.159805
Epoch: 21, Step: 2550, Loss: 0.155583
Model saved in file: ./save/model.ckpt
Epoch: 22, Step: 2200, Loss: 0.146557
Epoch: 22, Step: 2210, Loss: 0.166185
Epoch: 22, Step: 2220, Loss: 0.169253
Epoch: 22, Step: 2230, Loss: 0.274898
Epoch: 22, Step: 2240, Loss: 0.19918
Epoch: 22, Step: 2250, Loss: 0.206888
Epoch: 22, Step: 2260, Loss: 0.490225
Epoch: 22, Step: 2270, Loss: 0.231544
Epoch: 22, Step: 2280, Loss: 0.295734
Epoch: 22, Step: 2290, Loss: 0.159196
Epoch: 22, Step: 2300, Loss: 0.159855
Epoch: 22, Step: 2310, Loss: 0.163421
Epoch: 22, Step: 2320, Loss: 0.171974
Epoch: 22, Step: 2330, Loss: 0.238392
Epoch: 22, Step: 2340, Loss: 4.70229
Epoch: 22, Step: 2350, Loss: 0.326973
Epoch: 22, Step: 2360, Loss: 0.179491
Epoch: 22, Step: 2370, Loss: 0.168736
Epoch: 22, Step: 2380, Loss: 0.159708
Epoch: 22, Step: 2390, Loss: 0.163822
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Epoch: 22, Step: 2400, Loss: 0.531252
Epoch: 22, Step: 2410, Loss: 1.06913
Epoch: 22, Step: 2420, Loss: 0.482257
Epoch: 22, Step: 2430, Loss: 0.98379
Epoch: 22, Step: 2440, Loss: 0.436006
Epoch: 22, Step: 2450, Loss: 0.271591
Epoch: 22, Step: 2460, Loss: 0.175627
Epoch: 22, Step: 2470, Loss: 0.153383
Epoch: 22, Step: 2480, Loss: 0.168056
Epoch: 22, Step: 2490, Loss: 0.157651
Epoch: 22, Step: 2500, Loss: 0.155059
Epoch: 22, Step: 2510, Loss: 0.155479
Epoch: 22, Step: 2520, Loss: 0.16395
Epoch: 22, Step: 2530, Loss: 0.147497
Epoch: 22, Step: 2540, Loss: 0.254631
Epoch: 22, Step: 2550, Loss: 0.191848
Epoch: 22, Step: 2560, Loss: 0.183273
Epoch: 22, Step: 2570, Loss: 0.166952
Epoch: 22, Step: 2580, Loss: 0.144036
Epoch: 22, Step: 2590, Loss: 0.14067
Epoch: 22, Step: 2600, Loss: 0.149135
Epoch: 22, Step: 2610, Loss: 0.140293
Epoch: 22, Step: 2620, Loss: 0.143409
Epoch: 22, Step: 2630, Loss: 0.156925
Epoch: 22, Step: 2640, Loss: 0.213767
Epoch: 22, Step: 2650, Loss: 1.4379
Model saved in file: ./save/model.ckpt
Epoch: 23, Step: 2300, Loss: 4.99098
Epoch: 23, Step: 2310, Loss: 0.20812
Epoch: 23, Step: 2320, Loss: 0.147505
Epoch: 23, Step: 2330, Loss: 0.14487
Epoch: 23, Step: 2340, Loss: 0.146022
Epoch: 23, Step: 2350, Loss: 0.202592
Epoch: 23, Step: 2360, Loss: 0.148748
Epoch: 23, Step: 2370, Loss: 0.288041
Epoch: 23, Step: 2380, Loss: 0.189435
Epoch: 23, Step: 2390, Loss: 0.145303
Epoch: 23, Step: 2400, Loss: 0.466736
Epoch: 23, Step: 2410, Loss: 0.156572
Epoch: 23, Step: 2420, Loss: 0.145409
Epoch: 23, Step: 2430, Loss: 0.153517
Epoch: 23, Step: 2440, Loss: 0.146876
Epoch: 23, Step: 2450, Loss: 0.20474
Epoch: 23, Step: 2460, Loss: 0.148167
Epoch: 23, Step: 2470, Loss: 0.17775
Epoch: 23, Step: 2480, Loss: 0.142118
Epoch: 23, Step: 2490, Loss: 0.149468
Epoch: 23, Step: 2500, Loss: 0.186469
Epoch: 23, Step: 2510, Loss: 0.16387
Epoch: 23, Step: 2520, Loss: 0.168799
Epoch: 23, Step: 2530, Loss: 0.16138
Epoch: 23, Step: 2540, Loss: 0.150823
Epoch: 23, Step: 2550, Loss: 0.146294
Epoch: 23, Step: 2560, Loss: 0.138259
Epoch: 23, Step: 2570, Loss: 0.14106
Epoch: 23, Step: 2580, Loss: 0.159994
Epoch: 23, Step: 2590, Loss: 0.145034
Epoch: 23, Step: 2600, Loss: 0.189806
Epoch: 23, Step: 2610, Loss: 0.336927
Epoch: 23, Step: 2620, Loss: 0.219382
Epoch: 23, Step: 2630, Loss: 0.152388
Epoch: 23, Step: 2640, Loss: 0.149748
Epoch: 23, Step: 2650, Loss: 0.343578
Epoch: 23, Step: 2660, Loss: 0.238566
Epoch: 23, Step: 2670, Loss: 0.149572
Epoch: 23, Step: 2680, Loss: 0.153584
Epoch: 23, Step: 2690, Loss: 0.311366
Epoch: 23, Step: 2700, Loss: 0.284373
Epoch: 23, Step: 2710, Loss: 0.283445
Epoch: 23, Step: 2720, Loss: 0.145557
Epoch: 23, Step: 2730, Loss: 0.159382
Epoch: 23, Step: 2740, Loss: 0.158634
Epoch: 23, Step: 2750, Loss: 0.275581
Model saved in file: ./save/model.ckpt
Epoch: 24, Step: 2400, Loss: 0.340984
Epoch: 24, Step: 2410, Loss: 0.483519
Epoch: 24, Step: 2420, Loss: 0.403645
Epoch: 24, Step: 2430, Loss: 0.163582
Epoch: 24, Step: 2440, Loss: 0.18455
Epoch: 24, Step: 2450, Loss: 0.17334
Epoch: 24, Step: 2460, Loss: 0.16674
Epoch: 24, Step: 2470, Loss: 0.164186
Epoch: 24, Step: 2480, Loss: 0.29746
```

```
Epoch: 24, Step: 2490, Loss: 0.301658
Epoch: 24, Step: 2500, Loss: 0.230823
Epoch: 24, Step: 2510, Loss: 0.614013
Epoch: 24, Step: 2520, Loss: 1.37661
Epoch: 24, Step: 2530, Loss: 0.218342
Epoch: 24, Step: 2540, Loss: 0.228568
Epoch: 24, Step: 2550, Loss: 0.190101
Epoch: 24, Step: 2560, Loss: 0.203165
Epoch: 24, Step: 2570, Loss: 0.58796
Epoch: 24, Step: 2580, Loss: 0.87659
Epoch: 24, Step: 2590, Loss: 0.211309
Epoch: 24, Step: 2600, Loss: 0.197375
Epoch: 24, Step: 2610, Loss: 0.139118
Epoch: 24, Step: 2620, Loss: 0.296999
Epoch: 24, Step: 2630, Loss: 0.425391
Epoch: 24, Step: 2640, Loss: 0.199029
Epoch: 24, Step: 2650, Loss: 0.312133
Epoch: 24, Step: 2660, Loss: 0.331832
Epoch: 24, Step: 2670, Loss: 0.181553
Epoch: 24, Step: 2680, Loss: 0.146926
Epoch: 24, Step: 2690, Loss: 0.136941
Epoch: 24, Step: 2700, Loss: 0.168877
Epoch: 24, Step: 2710, Loss: 0.363206
Epoch: 24, Step: 2720, Loss: 0.250848
Epoch: 24, Step: 2730, Loss: 0.312692
Epoch: 24, Step: 2740, Loss: 0.166534
Epoch: 24, Step: 2750, Loss: 0.165824
Epoch: 24, Step: 2760, Loss: 0.150852
Epoch: 24, Step: 2770, Loss: 0.158397
Epoch: 24, Step: 2780, Loss: 0.187028
Epoch: 24, Step: 2790, Loss: 0.277416
Epoch: 24, Step: 2800, Loss: 0.146237
Epoch: 24, Step: 2810, Loss: 0.233509
Epoch: 24, Step: 2820, Loss: 0.219252
Epoch: 24, Step: 2830, Loss: 0.140781
Epoch: 24, Step: 2840, Loss: 0.131304
Epoch: 24, Step: 2850, Loss: 0.147785
Model saved in file: ./save/model.ckpt
Epoch: 25, Step: 2500, Loss: 0.163676
Epoch: 25, Step: 2510, Loss: 0.186368
Epoch: 25, Step: 2520, Loss: 0.163964
Epoch: 25, Step: 2530, Loss: 0.173892
Epoch: 25, Step: 2540, Loss: 0.57641
Epoch: 25, Step: 2550, Loss: 0.382943
Epoch: 25, Step: 2560, Loss: 0.446054
Epoch: 25, Step: 2570, Loss: 0.187735
Epoch: 25, Step: 2580, Loss: 0.203335
Epoch: 25, Step: 2590, Loss: 0.233457
Epoch: 25, Step: 2600, Loss: 0.186331
Epoch: 25, Step: 2610, Loss: 0.152188
Epoch: 25, Step: 2620, Loss: 5.8189
Epoch: 25, Step: 2630, Loss: 1.77217
Epoch: 25, Step: 2640, Loss: 0.651177
Epoch: 25, Step: 2650, Loss: 0.248381
Epoch: 25, Step: 2660, Loss: 0.234112
Epoch: 25, Step: 2670, Loss: 0.146245
Epoch: 25, Step: 2680, Loss: 0.261489
Epoch: 25, Step: 2690, Loss: 0.513631
Epoch: 25, Step: 2700, Loss: 0.214291
Epoch: 25, Step: 2710, Loss: 0.135329
Epoch: 25, Step: 2720, Loss: 0.180042
Epoch: 25, Step: 2730, Loss: 0.158635
Epoch: 25, Step: 2740, Loss: 0.229425
Epoch: 25, Step: 2750, Loss: 0.347674
Epoch: 25, Step: 2760, Loss: 0.563709
Epoch: 25, Step: 2770, Loss: 0.196911
Epoch: 25, Step: 2780, Loss: 0.146267
Epoch: 25, Step: 2790, Loss: 0.133063
Epoch: 25, Step: 2800, Loss: 0.145497
Epoch: 25, Step: 2810, Loss: 0.135121
Epoch: 25, Step: 2820, Loss: 0.150425
Epoch: 25, Step: 2830, Loss: 0.185229
Epoch: 25, Step: 2840, Loss: 0.131014
Epoch: 25, Step: 2850, Loss: 0.159716
Epoch: 25, Step: 2860, Loss: 0.2994
Epoch: 25, Step: 2870, Loss: 0.257212
Epoch: 25, Step: 2880, Loss: 0.188331
Epoch: 25, Step: 2890, Loss: 0.23865
Epoch: 25, Step: 2900, Loss: 0.270226
Epoch: 25, Step: 2910, Loss: 0.145511
Epoch: 25, Step: 2920, Loss: 0.252974
Epoch: 25, Step: 2930, Loss: 0.227504
Epoch: 25, Step: 2940, Loss: 5.3258
```

```
Epoch: 25, Step: 2950, Loss: 0.194984
Model saved in file: ./save/model.ckpt
Epoch: 26, Step: 2600, Loss: 0.142594
Epoch: 26, Step: 2610, Loss: 0.431988
Epoch: 26, Step: 2620, Loss: 0.427926
Epoch: 26, Step: 2630, Loss: 0.192078
Epoch: 26, Step: 2640, Loss: 0.187439
Epoch: 26, Step: 2650, Loss: 0.311236
Epoch: 26, Step: 2660, Loss: 0.392414
Epoch: 26, Step: 2670, Loss: 0.145633
Epoch: 26, Step: 2680, Loss: 0.153299
Epoch: 26, Step: 2690, Loss: 0.135483
Epoch: 26, Step: 2700, Loss: 0.231547
Epoch: 26, Step: 2710, Loss: 0.153579
Epoch: 26, Step: 2720, Loss: 0.134079
Epoch: 26, Step: 2730, Loss: 0.18592
Epoch: 26, Step: 2740, Loss: 0.165004
Epoch: 26, Step: 2750, Loss: 0.139073
Epoch: 26, Step: 2760, Loss: 0.128351
Epoch: 26, Step: 2770, Loss: 0.131045
Epoch: 26, Step: 2780, Loss: 0.163556
Epoch: 26, Step: 2790, Loss: 0.149911
Epoch: 26, Step: 2800, Loss: 0.128565
Epoch: 26, Step: 2810, Loss: 0.130921
Epoch: 26, Step: 2820, Loss: 0.134682
Epoch: 26, Step: 2830, Loss: 0.138797
Epoch: 26, Step: 2840, Loss: 0.138836
Epoch: 26, Step: 2850, Loss: 0.145003
Epoch: 26, Step: 2860, Loss: 0.230443
Epoch: 26, Step: 2870, Loss: 0.143078
Epoch: 26, Step: 2880, Loss: 0.143215
Epoch: 26, Step: 2890, Loss: 0.238867
Epoch: 26, Step: 2900, Loss: 0.789612
Epoch: 26, Step: 2910, Loss: 0.147021
Epoch: 26, Step: 2920, Loss: 0.270855
Epoch: 26, Step: 2930, Loss: 0.182139
Epoch: 26, Step: 2940, Loss: 0.396455
Epoch: 26, Step: 2950, Loss: 0.144475
Epoch: 26, Step: 2960, Loss: 0.191001
Epoch: 26, Step: 2970, Loss: 0.219868
Epoch: 26, Step: 2980, Loss: 0.255386
Epoch: 26, Step: 2990, Loss: 0.162688
Epoch: 26, Step: 3000, Loss: 0.135974
Epoch: 26, Step: 3010, Loss: 0.138999
Epoch: 26, Step: 3020, Loss: 0.167306
Epoch: 26, Step: 3030, Loss: 0.32157
Epoch: 26, Step: 3040, Loss: 0.297355
Epoch: 26, Step: 3050, Loss: 0.984541
Model saved in file: ./save/model.ckpt
Epoch: 27, Step: 2700, Loss: 2.07176
Epoch: 27, Step: 2710, Loss: 0.466204
Epoch: 27, Step: 2720, Loss: 0.244336
Epoch: 27, Step: 2730, Loss: 0.190669
Epoch: 27, Step: 2740, Loss: 0.158539
Epoch: 27, Step: 2750, Loss: 0.133978
Epoch: 27, Step: 2760, Loss: 0.163315
Epoch: 27, Step: 2770, Loss: 0.258036
Epoch: 27, Step: 2780, Loss: 0.206605
Epoch: 27, Step: 2790, Loss: 0.205001
Epoch: 27, Step: 2800, Loss: 0.826196
Epoch: 27, Step: 2810, Loss: 0.334377
Epoch: 27, Step: 2820, Loss: 0.282246
Epoch: 27, Step: 2830, Loss: 0.143237
Epoch: 27, Step: 2840, Loss: 0.152289
Epoch: 27, Step: 2850, Loss: 0.240106
Epoch: 27, Step: 2860, Loss: 0.390245
Epoch: 27, Step: 2870, Loss: 0.462434
Epoch: 27, Step: 2880, Loss: 0.211998
Epoch: 27, Step: 2890, Loss: 0.174453
Epoch: 27, Step: 2900, Loss: 0.17147
Epoch: 27, Step: 2920, Loss: 0.339113
Epoch: 27, Step: 2930, Loss: 0.315655
Epoch: 27, Step: 2940, Loss: 0.33427
Epoch: 27, Step: 2950, Loss: 0.161013
Epoch: 27, Step: 2960, Loss: 0.125398
Epoch: 27, Step: 2970, Loss: 0.13998
Epoch: 27, Step: 2980, Loss: 0.135401
Epoch: 27, Step: 2990, Loss: 0.455833
Epoch: 27, Step: 3000, Loss: 0.800976
Epoch: 27, Step: 3010, Loss: 0.573463
Epoch: 27, Step: 3020, Loss: 0.195641
Epoch: 27, Step: 3030, Loss: 0.248966
Epoch: 27, Step: 3040, Loss: 0.156671
```

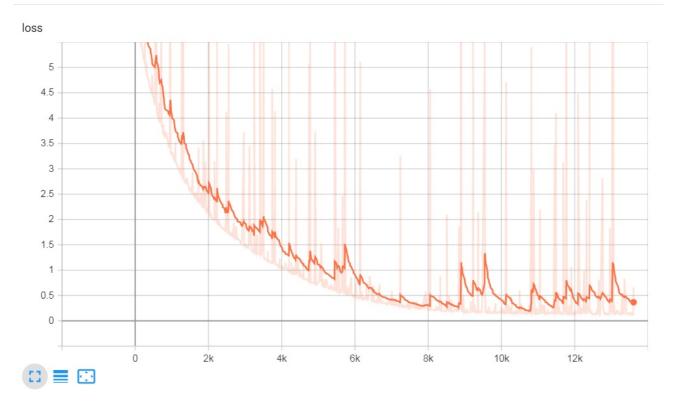
```
Epoch: 27, Step: 3050, Loss: 0.152205
Epoch: 27, Step: 3060, Loss: 0.310536
Epoch: 27, Step: 3070, Loss: 0.687036
Epoch: 27, Step: 3080, Loss: 0.42706
Epoch: 27, Step: 3090, Loss: 0.214588
Epoch: 27, Step: 3100, Loss: 0.227376
Epoch: 27, Step: 3110, Loss: 0.142845
Epoch: 27, Step: 3120, Loss: 0.130408
Epoch: 27, Step: 3130, Loss: 0.151902
Epoch: 27, Step: 3140, Loss: 0.129895
Epoch: 27, Step: 3150, Loss: 0.143789
Model saved in file: ./save/model.ckpt
Epoch: 28, Step: 2800, Loss: 0.167727
Epoch: 28, Step: 2810, Loss: 0.159193
Epoch: 28, Step: 2820, Loss: 0.517374
Epoch: 28, Step: 2830, Loss: 0.179207
Epoch: 28, Step: 2840, Loss: 0.337585
Epoch: 28, Step: 2850, Loss: 0.139767
Epoch: 28, Step: 2860, Loss: 0.136895
Epoch: 28, Step: 2870, Loss: 0.139532
Epoch: 28, Step: 2880, Loss: 0.136346
Epoch: 28, Step: 2890, Loss: 0.14365
Epoch: 28, Step: 2900, Loss: 3.07781
Epoch: 28, Step: 2910, Loss: 2.3201
Epoch: 28, Step: 2920, Loss: 0.203987
Epoch: 28, Step: 2930, Loss: 0.304761
Epoch: 28, Step: 2940, Loss: 0.13686
Epoch: 28, Step: 2950, Loss: 0.139155
Epoch: 28, Step: 2960, Loss: 0.127533
Epoch: 28, Step: 2970, Loss: 0.409246
Epoch: 28, Step: 2980, Loss: 0.31066
Epoch: 28, Step: 2990, Loss: 0.149543
Epoch: 28, Step: 3000, Loss: 0.344239
Epoch: 28, Step: 3010, Loss: 0.180355
Epoch: 28, Step: 3020, Loss: 0.426077
Epoch: 28, Step: 3030, Loss: 0.169476
Epoch: 28, Step: 3040, Loss: 0.309643
Epoch: 28, Step: 3050, Loss: 0.219683
Epoch: 28, Step: 3060, Loss: 0.155181
Epoch: 28, Step: 3070, Loss: 0.169345
Epoch: 28, Step: 3080, Loss: 0.17243
Epoch: 28, Step: 3090, Loss: 0.161958
Epoch: 28, Step: 3100, Loss: 0.139238
Epoch: 28, Step: 3110, Loss: 0.159939
Epoch: 28, Step: 3120, Loss: 0.155466
Epoch: 28, Step: 3130, Loss: 0.156394
Epoch: 28, Step: 3140, Loss: 0.225145
Epoch: 28, Step: 3150, Loss: 0.155042
Epoch: 28, Step: 3160, Loss: 0.135067
Epoch: 28, Step: 3170, Loss: 0.3096
Epoch: 28, Step: 3180, Loss: 0.148805
Epoch: 28, Step: 3190, Loss: 0.130316
Epoch: 28, Step: 3200, Loss: 0.289625
Epoch: 28, Step: 3210, Loss: 0.173442
Epoch: 28, Step: 3220, Loss: 4.73872
Epoch: 28, Step: 3230, Loss: 0.830133
Epoch: 28, Step: 3240, Loss: 0.124432
Epoch: 28, Step: 3250, Loss: 0.145574
Model saved in file: ./save/model.ckpt
Epoch: 29, Step: 2900, Loss: 0.208032
Epoch: 29, Step: 2910, Loss: 0.217798
Epoch: 29, Step: 2920, Loss: 0.140771
Epoch: 29, Step: 2930, Loss: 0.18755
Epoch: 29, Step: 2940, Loss: 0.182083
Epoch: 29, Step: 2950, Loss: 0.124505
Epoch: 29, Step: 2960, Loss: 0.167627
Epoch: 29, Step: 2970, Loss: 0.129756
Epoch: 29, Step: 2980, Loss: 0.141095
Epoch: 29, Step: 2990, Loss: 0.129411
Epoch: 29, Step: 3000, Loss: 0.22054
Epoch: 29, Step: 3010, Loss: 0.157709
Epoch: 29, Step: 3020, Loss: 0.308187
Epoch: 29, Step: 3030, Loss: 0.487497
Epoch: 29, Step: 3040, Loss: 0.163245
Epoch: 29, Step: 3050, Loss: 0.169584
Epoch: 29, Step: 3060, Loss: 0.159829
Epoch: 29, Step: 3070, Loss: 0.139567
Epoch: 29, Step: 3080, Loss: 0.123196
Epoch: 29, Step: 3090, Loss: 0.123639
Epoch: 29, Step: 3100, Loss: 0.295899
Epoch: 29, Step: 3110, Loss: 0.255358
Epoch: 29, Step: 3120, Loss: 0.158363
Epoch: 29, Step: 3130, Loss: 0.125496
```

```
Epoch: 29, Step: 3140, Loss: 0.142845
Epoch: 29, Step: 3150, Loss: 0.134493
Epoch: 29, Step: 3160, Loss: 0.158767
Epoch: 29, Step: 3170, Loss: 0.144372
Epoch: 29, Step: 3180, Loss: 0.594471
Epoch: 29, Step: 3190, Loss: 0.127882
Epoch: 29, Step: 3200, Loss: 0.207857
Epoch: 29, Step: 3210, Loss: 0.27698
Epoch: 29, Step: 3220, Loss: 0.335281
Epoch: 29, Step: 3230, Loss: 0.180508
Epoch: 29, Step: 3240, Loss: 0.123556
Epoch: 29, Step: 3250, Loss: 0.144178
Epoch: 29, Step: 3260, Loss: 0.16667
Epoch: 29, Step: 3270, Loss: 0.146
Epoch: 29, Step: 3280, Loss: 0.159763
Epoch: 29, Step: 3290, Loss: 0.122579
Epoch: 29, Step: 3300, Loss: 0.143687
Epoch: 29, Step: 3310, Loss: 0.182019
Epoch: 29, Step: 3320, Loss: 0.290257
Epoch: 29, Step: 3330, Loss: 0.386058
Epoch: 29, Step: 3340, Loss: 0.658552
Epoch: 29, Step: 3350, Loss: 0.352457
Model saved in file: ./save/model.ckpt
Run the command line:
--> tensorboard --logdir=./logs
Then open http://0.0.0.0:6006/ into your web browser
```

In [2]:

```
#Tensorboard plot(smoothed): Loss Vs Each_batch
from IPython.display import Image
Image(filename='Tensorboard_Plot_Loss_vs_Each_batch.PNG')
```

Out[2]:



4. Visualizing the results:

Instructions for updating:

Starting frameofvideo:31785

Use standard file APIs to check for files with this prefix. INFO:tensorflow:Restoring parameters from save/model.ckpt

```
#pip3 install opencv-python
import tensorflow as tf
import scipy.misc
import model
import cv2
from subprocess import call
import math
sess = tf.InteractiveSession()
saver = tf.train.Saver()
saver.restore(sess, "save/model.ckpt")
img = cv2.imread('steering_wheel_image.jpg',0)
rows, cols = img.shape
smoothed_angle = 0
#read data.txt
xs = []
ys = []
with open("driving_dataset/data.txt") as f:
    for line in f:
        xs.append("driving_dataset/" + line.split()[0])
        #the paper by Nvidia uses the inverse of the turning radius,
        #but steering wheel angle is proportional to the inverse of turning radius
        #so the steering wheel angle in radians is used as the output
        ys.append(float(line.split()[1]) * scipy.pi / 180)
#get number of images
num_images = len(xs)
i = math.ceil(num_images*0.7)
print("Starting frameofvideo:" +str(i))
while(cv2.waitKey(10) != ord('q')):
    full_image = scipy.misc.imread("driving_dataset/" + str(i) + ".jpg", mode="RGB")
    image = scipy.misc.imresize(full_image[-150:], [66, 200]) / 255.0
    degrees = model.y.eval(feed_dict={model.x: [image], model.keep_prob: 1.0})[0][0] * 180.0 / scipy.pi
    #call("clear")
    #print("Predicted Steering angle: " + str(degrees))
    print("Steering angle: " + str(degrees) + " (pred)\t" + str(ys[i]*180/scipy.pi) + " (actual)")
    cv2.imshow("frame", cv2.cvtColor(full_image, cv2.COLOR_RGB2BGR))
    #make smooth angle transitions by turning the steering wheel based on the difference of the current angle
    #and the predicted angle
    smoothed_angle += 0.2 * pow(abs((degrees - smoothed_angle)), 2.0 / 3.0) * (degrees - smoothed_angle) / abs(de
grees - smoothed_angle)
    M = cv2.getRotationMatrix2D((cols/2,rows/2),-smoothed_angle,1)
    dst = cv2.warpAffine(img,M,(cols,rows))
    cv2.imshow("steering wheel", dst)
    i += 1
cv2.destroyAllWindows()
WARNING:tensorflow:From C:\Users\AkKUmar\AppData\Local\Continuum\anaconda3\lib\site-packages\tensorf
low\python\framework\op_def_library.py:263: colocate_with (from tensorflow.python.framework.ops) is
deprecated and will be removed in a future version.
Instructions for updating:
Colocations handled automatically by placer.
WARNING:tensorflow:From C:\Users\AkKUmar\Desktop\Desktop_Backup\AAIC_python_ML\28.Self driving car\s
elf driving\model.py:58: calling dropout (from tensorflow.python.ops.nn_ops) with keep_prob is depre
cated and will be removed in a future version.
Instructions for updating:
Please use `rate` instead of `keep_prob`. Rate should be set to `rate = 1 - keep_prob`.
WARNING:tensorflow:From C:\Users\AkKUmar\AppData\Local\Continuum\anaconda3\lib\site-packages\tensorf
low\python\training\saver.py:1266: checkpoint_exists (from tensorflow.python.training.checkpoint_man
agement) is deprecated and will be removed in a future version.
```

```
C:\Users\AkKUmar\AppData\Local\Continuum\anaconda3\lib\site-packages\ipykernel_launcher.py:39: Depre
cationWarning: `imread` is deprecated!
 imread` is deprecated in SciPy 1.0.0, and will be removed in 1.2.0.
Use ``imageio.imread`` instead.
\verb|C:\Users\AkKUmar\AppData\Local\Continuum\anaconda3\lib\site-packages\ipykernel\_launcher.py: 40: Depre | Packages\Ipykernel\_launcher.py: 40: Depre | Pa
cationWarning: `imresize` is deprecated!
`imresize` is deprecated in SciPy 1.0.0, and will be removed in 1.2.0. Use ``skimage.transform.resize`` instead.
Steering angle: -5.610251216790889 (pred)
                                                                      -28.34 (actual)
Steering angle: -9.332913915877993 (pred)
                                                                      -28.840000000000003 (actual)
                                                                      -29.75 (actual)
Steering angle: -11.619608316032195 (pred)
Steering angle: -2.274710406368591 (pred)
                                                                      -31.06 (actual)
Steering angle: -2.4178318977843305 (pred)
                                                                      -32.27 (actual)
Steering angle: -0.030615469180935904 (pred)
                                                                      -33.48 (actual)
Steering angle: 1.4868809558930007 (pred)
                                                                      -34.39 (actual)
Steering angle: -0.6138739238254741 (pred)
                                                                      -35.5999999999999 (actual)
Steering angle: 6.495218336981932 (pred)
                                                                      -36.5 (actual)
Steering angle: 10.947406711128927 (pred)
                                                                      -37.61 (actual)
Steering angle: 10.790447256454742 (pred)
                                                                      -38.62 (actual)
                                                                      -39.63 (actual)
Steering angle: 12.112836766566325 (pred)
Steering angle: 13.534906057425076 (pred)
                                                                      -39.9300000000001 (actual)
Steering angle: 11.657408290446337 (pred)
                                                                      -40.03000000000001 (actual)
Steering angle: 16.158479047822645 (pred)
                                                                      -40.0300000000001 (actual)
                                                                      -40.0300000000001 (actual)
Steering angle: 20.28068091948564 (pred)
Steering angle: 22.83231494245005 (pred)
                                                                      -40.03000000000001 (actual)
Steering angle: 22.349323237934474 (pred)
                                                                      -40.03000000000001 (actual)
Steering angle: 17.44735452722427 (pred)
                                                                      -40.03000000000001 (actual)
Steering angle: 15.983665478658047 (pred)
                                                                      -40.03000000000001 (actual)
Steering angle: 12.802742221798265 (pred)
                                                                      -40.0300000000001 (actual)
Steering angle: 11.604001333778715 (pred)
                                                                      -40.24 (actual)
Steering angle: 12.779792786187024 (pred)
Steering angle: 25.683959902065393 (pred)
                                                                      -40.939999999999 (actual)
                                                                      -41.14 (actual)
Steering angle: 23.100819924007006 (pred)
                                                                      -41.14 (actual)
Steering angle: 18.03658299409022 (pred)
                                                                      -41.14 (actual)
Steering angle: 17.01899921342692 (pred)
                                                                      -41.34 (actual)
                                                                      -41.45 (actual)
Steering angle: 13.777512669196636 (pred)
                                                                      -41.45 (actual)
Steering angle: 10.000815916698738 (pred)
Steering angle: 7.556438915591976 (pred)
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Steering angle: -6.499704917492983 (pred)
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Steering angle: -10.501041896037547 (pred)
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Steering angle: -7.163534844907931 (pred)
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Steering angle: -3.9253767372375585 (pred)
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Steering angle: -0.5198930821670374 (pred)
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-23.5 (actual)
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Steering angle: 0.6658913638838219 (pred)
Steering angle: 0.9868013987345241 (pred)
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Steering angle: 1.1574724581675102 (pred)
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Steering angle: 1.0485633843043645 (pred)
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Steering angle: 1.1087053343804423 (pred)
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Steering angle: 1.3673056878672338 (pred)
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Steering angle: 1.4530599935572133 (pred)
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Steering angle: 1.803145181447625 (pred)
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                                                                      -19.36 (actual)
Steering angle: 1.9913860487468227 (pred)
Steering angle: 2.776704124041964 (pred)
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Steering angle: 2.6351582718903814 (pred)
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Steering angle: 2.223514296557937 (pred)
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Steering angle: 2.6180123626395337 (pred)
Steering angle: 2.4512204237682917 (pred)
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                                                 -7.87 (actual)
Steering angle: 3.045886361543809 (pred)
Steering angle: 3.0501974915705565 (pred)
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                                                 -7.26 (actual)
Steering angle: 3.753754147075825 (pred)
Steering angle: 4.286354369306848 (pred)
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Steering angle: 4.553202603103253 (pred)
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Steering angle: 5.043132072268268 (pred)
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Steering angle: 5.344256329753913 (pred)
Steering angle: 5.501083876399752 (pred)
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Steering angle: 5.5579917319038294 (pred)
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Steering angle: 5.4278719324600315 (pred)
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Steering angle: 5.251650917439587 (pred)
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Steering angle: 4.514303822006385 (pred)
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Steering angle: 4.108099665461032 (pred)
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Steering angle: 2.2890762151838318 (pred)
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Steering angle: 1.871242167472652 (pred)
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Steering angle: 1.092959187022624 (pred)
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                                                 -3.23 (actual)
Steering angle: 0.9734594779645505 (pred)
Steering angle: 1.1658616380155784 (pred)
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21.78 (actual)
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Steering angle: 7.73545817373801 (pred) 23.1899999999999 (actual)
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Steering angle: 6.824190556374187 (pred)
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                                                -8.97 (actual)
-8.77 (actual)
Steering angle: 2.1709337927798864 (pred)
Steering angle: 3.493647096546811 (pred)
Steering angle: 3.1120075019079985 (pred)
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                                                -8.570000000000000 (actual)
Steering angle: 4.035101591819698 (pred)
Steering angle: 5.8690236056674 (pred) -8.07 (actual)
Steering angle: 2.2107911482380844 (pred)
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Steering angle: 0.5784508552424955 (pred)
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                                                -6.76 (actual)
Steering angle: 3.281318926809329 (pred)
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Steering angle: 3.0121655041680446 (pred)
Steering angle: 1.1992749234352809 (pred)
                                                -6.45 (actual)
Steering angle: 2.398801283209383 (pred)
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Steering angle: 3.351211825699246 (pred)
Steering angle: 1.51094157790484 (pred) -5.45 (actual)
Steering angle: 2.1172036827871583 (pred)
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Steering angle: 0.8811289807643181 (pred)
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Steering angle: 3.2700365215175258 (pred)
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Steering angle: 2.52799516513382 (pred) -4.13 (actual)
Steering angle: 5.20923843090157 (pred) -2.52 (actual)
Steering angle: 5.8951943292459505 (pred)
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Steering angle: 6.854478603361786 (pred)
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Steering angle: 7.227552500451168 (pred)
                                                -2.22 (actual)
Steering angle: 7.466311154399072 (pred)
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Steering angle: 7.880656896435079 (pred)
                                                -2.22 (actual)
Steering angle: 8.043130021316758 (pred)
                                                -2.22 (actual)
Steering angle: 8.54439162808847 (pred) -2.22 (actual)
Steering angle: 8.535281009509319 (pred)
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Steering angle: 9.19513448616685 (pred) -2.22 (actual)
                                          -1.82 (actual)
Steering angle: 8.179316309403996 (pred)
Steering angle: 8.074678665093046 (pred)
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Steering angle: 6.945986916540678 (pred)
                                                -1.6100000000000003 (actual)
Steering angle: 6.4913878815180235 (pred)
                                                -1.6100000000000003 (actual)
Steering angle: 6.196701077325116 (pred)
                                                 -1.6100000000000003 (actual)
Steering angle: 4.918554544449113 (pred)
                                                -1.51 (actual)
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-1.41 (actual)
Steering angle: 4.6765891166858875 (pred)
Steering angle: 5.223295387100279 (pred)
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Steering angle: 5.303578711265079 (pred)
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Steering angle: 6.42525798997396 (pred) -0.91 (actual)
Steering angle: 6.244997344946276 (pred)
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Steering angle: 5.799284812920631 (pred)
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Steering angle: 5.751721083087955 (pred)
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Steering angle: 6.094995718602218 (pred)
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Steering angle: 5.896565062835007 (pred)
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Steering angle: 6.133290027957541 (pred)
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Steering angle: 6.5616099101485705 (pred)
Steering angle: 7.0649299651813955 (pred)
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Steering angle: 6.954062334573749 (pred)
Steering angle: 7.135541314594634 (pred)
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                                                4.44 (actual)
Steering angle: 6.814848138250079 (pred)
Steering angle: 7.258525700789884 (pred)
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Steering angle: 5.578268002228659 (pred)
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Steering angle: 1.1862335309887877 (pred)
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Steering angle: 0.8947091043815959 (pred)
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Steering angle: 2.8965677541167523 (pred)
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                                                 0.0 (actual)
Steering angle: 2.751875105748498 (pred)
Steering angle: 1.6350424865859752 (pred)
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Steering angle: 2.1379798375818675 (pred)
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Steering angle: 1.9532492606292333 (pred)
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                                                 4.94 (actual)
Steering angle: 2.737248682527739 (pred)
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Steering angle: 3.4298772488043987 (pred)
Steering angle: 4.66774530237119 (pred) 6.150000000000001 (actual)
Steering angle: 5.4716636903235685 (pred)
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Steering angle: 5.4456991530805885 (pred)
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Steering angle: 5.5481963868603845 (pred)
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Steering angle: 5.723422755582946 (pred)
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Steering angle: 5.191897434372554 (pred)
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Steering angle: 4.180612795671296 (pred)
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Steering angle: 4.472930377995855 (pred)
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Steering angle: 4.476180267380312 (pred)
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Steering angle: 4.462290650816268 (pred)
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Steering angle: 2.651442296645338 (pred)
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Steering angle: 2.138066495606962 (pred)
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Steering angle: 3.0099158106101718 (pred)
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Steering angle: 2.936327992822689 (pred)
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Steering angle: 3.710649250110698 (pred)
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Steering angle: 3.813878594792155 (pred)
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Steering angle: 3.9693951720041754 (pred)
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Steering angle: 4.33933102405676 (pred) 6.6599999999999 (actual)
Steering angle: 4.789478056401035 (pred)
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Steering angle: 4.335702486060191 (pred)
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Steering angle: 3.744902221911489 (pred)
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Steering angle: 2.699221604323693 (pred)
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Steering angle: 1.4722139784240447 (pred)
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Steering angle: 1.2425821647545696 (pred)
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Steering angle: 1.1936579466165915 (pred)
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Steering angle: 1.3559628780899582 (pred)
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Steering angle: 1.7412190578942928 (pred)
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Steering angle: 2.484624531121297 (pred)
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                                                 -5.340000000000001 (actual)
Steering angle: 0.9636841966017928 (pred)
Steering angle: 1.629261371783794 (pred)
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Steering angle: 2.335897802274504 (pred)
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Steering angle: 2.6981025205168687 (pred)
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Steering angle: 2.9315882684255232 (pred)
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Steering angle: 3.1237774119518114 (pred)
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Steering angle: 2.8603067066999777 (pred)
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Steering angle: 3.3231467918430755 (pred)
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Steering angle: 3.227462671760367 (pred)
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Steering angle: 2.8416097041773023 (pred)
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Steering angle: 3.760411020195649 (pred)
                                                 -18.8599999999999 (actual)
Steering angle: 3.8392228654811333 (pred)
                                                 -19.36 (actual)
Steering angle: 3.709240950481206 (pred)
                                                -19.56 (actual)
-19.76 (actual)
Steering angle: 4.063069508923608 (pred)
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Steering angle: 4.749004062926832 (pred)
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Steering angle: 4.66254752841281 (pred) -20.27 (actual)
Steering angle: 5.292807929830792 (pred)
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Steering angle: 5.122540278445659 (pred)
                                                -20.4699999999999 (actual)
                                               -20.4699999999999 (actual)
Steering angle: 5.172232039091618 (pred)
Steering angle: 4.30150970530146 (pred) -20.37000000000000 (actual)
                                           -20.27 (actual)
Steering angle: 2.7612313976943574 (pred)
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Steering angle: 2.840123284259178 (pred)
Steering angle: 4.313951748648285 (pred)
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Steering angle: 4.666101788102156 (pred)
Steering angle: 4.7286005803287114 (pred)
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Steering angle: 4.89480213472357 (pred) -19.56 (actual)
                                            -19.16 (actual)
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Steering angle: 5.241498268125186 (pred)
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Steering angle: 6.1553984965272255 (pred)
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Steering angle: 6.323901397785556 (pred)
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                                                -14.920000000000002 (actual)
Steering angle: 6.7598373677879735 (pred)
Steering angle: 6.829677759598646 (pred)
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                                                -5.8499999999999 (actual)
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Steering angle: 6.3955492284053435 (pred)
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Steering angle: 6.147687212954281 (pred)
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                                                -4.94 (actual)
Steering angle: 5.846941177193926 (pred)
Steering angle: 5.7870545054380775 (pred)
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Steering angle: 6.354730310378055 (pred)
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Steering angle: 6.158469093445969 (pred)
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Steering angle: 6.278807635111486 (pred)
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Steering angle: 6.085205069313828 (pred)
Steering angle: 5.885177856828127 (pred)
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Steering angle: 5.630157376240068 (pred)
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Steering angle: 5.164775180065257 (pred)
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                                                -3.13 (actual)
Steering angle: 4.448493241806019 (pred)
Steering angle: 4.3873762822259215 (pred)
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Steering angle: 4.712155619241436 (pred)
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                                                -4.64 (actual)
Steering angle: 4.594031339527474 (pred)
Steering angle: 3.495185810100768 (pred)
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Steering angle: 4.85879295053244 (pred) -4.94 (actual)
Steering angle: 4.357401570166497 (pred)
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Steering angle: 3.7703685822318813 (pred)
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Steering angle: 3.0256406136268335 (pred)
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Steering angle: 2.9023311531157736 (pred)
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Steering angle: 2.583761311829447 (pred)
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                                                -3.9300000000000006 (actual)
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Steering angle: 2.4405380079063916 (pred)
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Steering angle: 2.1229320770666833 (pred)
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Steering angle: 1.7136590311498798 (pred)
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Steering angle: 2.013420025565872 (pred)
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Steering angle: 2.52630170510648 (pred) -2.62 (actual)
Steering angle: 2.9191393948895286 (pred)
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Steering angle: 3.328975717969447 (pred)
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Steering angle: 4.126392619605619 (pred)
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Steering angle: 4.4417817271728355 (pred)
                                                -1.21 (actual)
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Steering angle: 5.53138003423699 (pred) 2.62 (actual)
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Steering angle: 6.0699455729343725 (pred)
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Steering angle: 6.099506204775365 (pred)
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Steering angle: 6.0459323353599 (pred) 10.18 (actual)
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Steering angle: 6.180663793153926 (pred)
Steering angle: 6.086343149584281 (pred)
                                                11.89999999999999 (actual)
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Steering angle: 6.095560916756036 (pred)
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Steering angle: 6.16677801857129 (pred) 11.8 (actual)
Steering angle: 6.142899677232926 (pred) 11.6 (actual)
Steering angle: 6.17469079272475 (pred) 11.6 (actual)
Steering angle: 6.128962676231515 (pred) 11.6 (actual)
Steering angle: 6.164816473619027 (pred)
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19.76 (act
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Steering angle: 6.635109148920255 (pred)
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Steering angle: -12.97268928117923 (pred)
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Steering angle: -9.409410327034843 (pred) -37.31 Steering angle: -8.8609734574395 (pred) -37.41 (actual)
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Steering angle: 10.625318895533221 (pred)
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Steering angle: 7.03487713283334 (pred) 18.96 (actual)
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Steering angle: 12.753925152252892 (pred)
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Steering angle: 11.626463264637948 (pred)
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Steering angle: 10.703741420036016 (pred)
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Steering angle: 9.713427169633988 (pred)
Steering angle: 9.117544390969151 (pred)
                                                  28.54 (actual)
Steering angle: 7.707245223597626 (pred)
                                                  28.24 (actual)
Steering angle: 8.32236181496522 (pred) 28.24 (actual)
Steering angle: 7.996940867054547 (pred)
                                                  26.82 (actual)
Steering angle: 7.818123099489028 (pred)
                                                  24.91 (actual)
Steering angle: 7.583958601531603 (pred)
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Steering angle: 7.731320786648275 (pred)
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Steering angle: 7.662053276954237 (pred)
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Steering angle: 7.852584818946327 (pred)
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                                                  22.89 (actual)
Steering angle: 7.631351576635029 (pred)
Steering angle: 7.477726961823103 (pred)
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Steering angle: 7.462642489041129 (pred)
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Steering angle: 7.40864045214207 (pred) 18.96 (actual)
Steering angle: 7.593005187087285 (pred)
                                                 16.34 (actual)
Steering angle: 7.513242237959876 (pred)
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Steering angle: 7.563631104787999 (pred)
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Steering angle: 7.670592720964045 (pred)
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Steering angle: 7.855866724842518 (pred)
Steering angle: 7.804228787169929 (pred)
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Steering angle: 8.015417382533077 (pred)
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Steering angle: 7.619181887081359 (pred)
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Steering angle: 7.426994877989187 (pred)
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Steering angle: 7.278784041868141 (pred)
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Steering angle: 6.951137732948514 (pred)
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Steering angle: 6.578080911332057 (pred)
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Steering angle: 6.4441827366167725 (pred)
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Steering angle: 6.404927931909417 (pred)
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Steering angle: 6.504302915464871 (pred)
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Steering angle: 6.198244273190715 (pred)
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Steering angle: 6.153697352537069 (pred)
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Steering angle: 6.010615134709057 (pred)
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Steering angle: 5.698983058072171 (pred)
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Steering angle: 5.336879298563476 (pred)
Steering angle: 5.099320196588555 (pred)
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                                                  -1.71 (actual)
Steering angle: 3.8186823522127895 (pred)
Steering angle: 3.744129556761631 (pred)
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Steering angle: 3.6163537928636176 (pred)
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Steering angle: 3.4741490409005404 (pred)
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Steering angle: 3.3243764393370894 (pred)
Steering angle: 3.281283281759598 (pred)
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Steering angle: 3.1428731267672863 (pred)
Steering angle: 3.3178373869804485 (pred)
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Steering angle: 3.304949887233692 (pred)
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Steering angle: 2.9042320801391526 (pred)
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Steering angle: 2.7339751009245985 (pred)
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Steering angle: 2.469268985206639 (pred)
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Steering angle: 2.4452595896135745 (pred)
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Steering angle: 2.038359394103116 (pred)
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Steering angle: 1.7980684299036014 (pred)
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Steering angle: 1.6964772634058896 (pred)
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Steering angle: 1.4744436083012307 (pred)
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Steering angle: 1.6123122573584074 (pred)
Steering angle: 1.5881737285013477 (pred)
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Steering angle: 1.406260391137932 (pred)
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Steering angle: 1.016904176840886 (pred)
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Steering angle: -4.660213738150782 (pred)
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Steering angle: -12.123865814528603 (pred)
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Steering angle: -18.894026159473405 (pred)
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Steering angle: -21.74010622246248 (pred)
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Steering angle: -22.442193320079138 (pred)
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Steering angle: -27.07302401130735 (pred)
Steering angle: -28.26257658734594 (pred)
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Steering angle: -29.924008150120493 (pred)
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Steering angle: -33.5621049964332 (pred)
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Steering angle: -50.963555529793105 (pred)
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Steering angle: -53.44503838733961 (pred)
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Steering angle: -53.312566868387215 (pred)
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Steering angle: -5.4346496145508 (pred) -20.07 (actual)
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Steering angle: -5.4857573587890665 (pred)
Steering angle: -5.897055128907956 (pred)
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Steering angle: 8.689490459268928 (pred)
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Steering angle: 8.128637159536147 (pred)
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Steering angle: 8.101958440638077 (pred)
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Steering angle: 7.6242404959354 (pred) 24.5 (actual)
Steering angle: 7.197956437003857 (pred)
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Steering angle: 6.732410743175787 (pred)
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Steering angle: 6.844462984717608 (pred)
                                                   25.71 (actual)
Steering angle: 6.74473368509896 (pred) 26.22 (actual)
Steering angle: 6.68255804619751 (pred) 26.520000000000003 (actual)
Steering angle: 6.341813568883914 (pred)
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Steering angle: 6.318870109688195 (pred)
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Steering angle: 6.438428302241038 (pred)
Steering angle: 6.374973710417503 (pred)
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Steering angle: 6.234267117760186 (pred)
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                                                   29.450000000000003 (actual)
Steering angle: 6.3595225418544645 (pred)
Steering angle: 6.0914179801376 (pred) 30.14999999999999 (actual)

      Steering angle: 5.640914924182838 (pred)
      30.76 (actual)

      Steering angle: 5.620845693967225 (pred)
      30.86 (actual)

      Steering angle: 5.285774969419794 (pred)
      30.86 (actual)

                                                   30.96 (actual)
30.96 (actual)
Steering angle: 5.285774969419794 (pred)
Steering angle: 4.565167386981823 (pred)
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Steering angle: 2.7706715729009614 (pred)
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Steering angle: 6.660952023418645 (pred)
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Steering angle: 7.8678519992885985 (pred)
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Steering angle: 7.674790725982664 (pred)
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Steering angle: 5.947932354261734 (pred)
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Steering angle: 5.342888584372617 (pred)
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Steering angle: 4.95151917181771 (pred) 23.29 (actual)
Steering angle: 4.27614878602638 (pred) 22.69 (actual)
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Steering angle: -21.273047641733253 (pred)
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                                                    -21.38 (actual)
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Steering angle: -24.413276631518098 (pred)
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Steering angle: -23.690608466384898 (pred)
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                                                    -37.31 (actual)
Steering angle: -17.634081653848664 (pred)
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Steering angle: -17.816522836768872 (pred)
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Steering angle: -14.806941705428033 (pred)
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-75.83 (actual)
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Steering angle: 8.691238987696451 (pred)
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Steering angle: 8.57487390858059 (pred) 17.140000000000004 (actual)
Steering angle: 8.34019373134083 (pred) 18.35 (actual)
Steering angle: 8.098677388515533 (pred)
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Steering angle: 7.761960161491306 (pred)
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Steering angle: 7.9490083070066895 (pred)
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Steering angle: 7.88793617054302 (pred) 24.810000000000000 (actual)
Steering angle: 7.886659778941874 (pred)
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Steering angle: 12.684841203892798 (pred)
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Steering angle: 8.44397930955282 (pred) 92.87 (actual)
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Steering angle: 5.733282987423506 (pred)
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Steering angle: 5.546472190981779 (pred)
                                                97.92 (actual)
99.13 (actual)
Steering angle: 6.927865144012165 (pred)
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Steering angle: 7.912613644014277 (pred)
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Steering angle: 8.68252025122093 (pred) 99.63 (actual)
Steering angle: 8.982834277516282 (pred)
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                                                 99.93000000000002 (actual)
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Steering angle: 8.745119788737743 (pred)
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Steering angle: 9.789600854352555 (pred)
Steering angle: 13.209041147218352 (pred)
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Steering angle: 22.1077223715182 (pred) 100.54 (actual)
Steering angle: 31.642357386796057 (pred)
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Steering angle: 37.804499414468204 (pred)
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Steering angle: 34.17421630456599 (pred)
Steering angle: 40.184506151515826 (pred)
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Steering angle: 35.07747808644891 (pred)
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                                                 101.55 (actual)
Steering angle: 47.240228167922396 (pred)
Steering angle: 46.640059445553376 (pred)
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Steering angle: 44.21201940316764 (pred)
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Steering angle: 51.748706265453585 (pred)
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Steering angle: 58.04567281224719 (pred)
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Steering angle: 54.00603255972402 (pred)
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Steering angle: 45.182510737051 (pred) 95.9 (actual)
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Steering angle: 36.2635472660108 (pred) 74.42 (actual)
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Steering angle: 1.1282695574842976 (pred)
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Steering angle: -76.4868010806881 (pred)
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Steering angle: -78.10902565007949 (pred)
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Steering angle: -38.852612433174166 (pred)
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Steering angle: -27.63479341016256 (pred)
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-44.47 (actual)
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Steering angle: 1.8291101455774283 (pred)
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Steering angle: 2.0645969254694854 (pred)
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Steering angle: 3.322219593663246 (pred)
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Steering angle: 4.032812624674097 (pred)
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Steering angle: 4.456751794286211 (pred)
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Steering angle: 4.853571270911965 (pred)
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Steering angle: 5.465624949323631 (pred)
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Steering angle: 6.127453631311765 (pred)
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Steering angle: 5.27026019472011 (pred) 15.03000000000001 (actual)
Steering angle: 4.631128658230752 (pred)
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Steering angle: 4.3227887327738115 (pred)
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Steering angle: 4.906580369060435 (pred)
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Steering angle: 5.102060383106199 (pred)
Steering angle: 5.018426851153508 (pred)
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Steering angle: 5.706644822773633 (pred)
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Steering angle: 5.65003109229069 (pred) 23.7999999999999 (actual)
Steering angle: 5.902389933536559 (pred)
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Steering angle: 6.1400156298558874 (pred)
Steering angle: 6.541546229461658 (pred)
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Steering angle: 7.123179525970556 (pred)
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Steering angle: 8.060386494254795 (pred)
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Steering angle: 8.431512506770254 (pred)
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Steering angle: 7.238863293716709 (pred)
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Steering angle: 6.579895180330341 (pred)
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Steering angle: 7.338073498958437 (pred)
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Steering angle: 8.10137702078498 (pred) 29.95 (actual)
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Steering angle: 7.315900997365283 (pred)
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Steering angle: 6.967307778921696 (pred)
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Steering angle: 6.440326667943477 (pred)
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Steering angle: 6.1356605304863585 (pred)
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Steering angle: 5.589177094993638 (pred)
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Steering angle: 5.859926220579767 (pred)
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Steering angle: 6.09043742110488 (pred) 38.52 (actual)
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Steering angle: 16.872319193453603 (pred)
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Steering angle: 15.201678828130579 (pred)
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                                                 64.54 (actual)
66.45 (actual)
Steering angle: 16.49435189271073 (pred)
Steering angle: 16.566166209191536 (pred)
Steering angle: 20.05618626184566 (pred)
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                                                 68.2699999999998 (actual)
Steering angle: 20.633190397644583 (pred)
Steering angle: 21.549475642727426 (pred)
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Steering angle: 22.419185827859952 (pred)
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Steering angle: 23.824428947698376 (pred)
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Steering angle: 35.03670868729311 (pred)
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Steering angle: 36.05393217547769 (pred)
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Steering angle: 35.02052113896017 (pred)
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Steering angle: 25.936261967363787 (pred)
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Steering angle: 21.38374281006436 (pred)
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Steering angle: 20.19752848898261 (pred)
Steering angle: 19.168005537650128 (pred)
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                                                 68.269999999999 (actual)
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67.6599999999998 (actual)
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Steering angle: 16.7663607613119 (pred) 67.36 (actual)
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Steering angle: 18.285473379898193 (pred)
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                                                 67.36 (actual)
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Steering angle: 20.916392238748113 (pred)
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Steering angle: 22.425233960369997 (pred)
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Steering angle: 29.489959873649937 (pred)
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Steering angle: 34.915862150308065 (pred)
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Steering angle: 34.77703855542756 (pred)
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72.91 (actual)
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Steering angle: 7.279323626812572 (pred)
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Steering angle: 1.9784908650372501 (pred)
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26.12 (actual)
Steering angle: 6.4923552070592265 (pred)
Steering angle: 6.384321251183489 (pred)
Steering angle: 6.026172598091054 (pred)
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Steering angle: 5.843037724083263 (pred)
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Steering angle: 4.875786888074255 (pred)
                                                 26.22 (actual)
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Steering angle: 3.5337810746663947 (pred)
Steering angle: 3.4278130375711737 (pred)
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Steering angle: 3.4134045400736204 (pred)
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Steering angle: 3.047325610467978 (pred)
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Steering angle: 2.3273779950585594 (pred)
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Steering angle: 1.0940084748338674 (pred)
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Steering angle: 0.8536447264310099 (pred)
Steering angle: 1.3959288762446416 (pred)
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Steering angle: 1.3258063122438826 (pred)
                                                 27.530000000000005 (actual)
Steering angle: 0.8601415169921613 (pred)
                                                 27.530000000000005 (actual)
Steering angle: 0.19981078086637613 (pred)
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Steering angle: -0.40358051013042096 (pred)
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Steering angle: 0.8040502959807242 (pred)
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32.87 (actual)
Steering angle: 3.141438146711349 (pred)
Steering angle: 3.7580546049319947 (pred)
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Steering angle: 6.6053999604648155 (pred)
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Steering angle: 6.648838256038804 (pred)
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                                                  36.0 (actual)
Steering angle: 6.817364636072406 (pred)
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Steering angle: 6.888707242613658 (pred)
Steering angle: 7.076450786763915 (pred)
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Steering angle: 6.7758268406349735 (pred)
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Steering angle: 6.1592631029369835 (pred)
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Steering angle: 5.643274327654255 (pred)
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Steering angle: 4.719812261301021 (pred)
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Steering angle: 3.7709538440663866 (pred)
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Steering angle: 1.8587561547830456 (pred)
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Steering angle: 4.445559675557498 (pred)
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Steering angle: 2.7473257728744462 (pred)
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Steering angle: 2.4846648719260824 (pred)
Steering angle: -9.596607029164675 (pred)
Steering angle: -12.4006524004542 (pred)
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                                                  46.39 (actual)
Steering angle: -13.557599360942442 (pred)
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Steering angle: -19.956404028260945 (pred)
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Steering angle: -54.959701137681634 (pred)
Steering angle: -47.05126073925024 (pred)
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                                                  53.75 (actual)
Steering angle: 13.436170550330663 (pred)
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Steering angle: 10.335730827555729 (pred)
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56.17 (actual)
Steering angle: 11.05065185062284 (pred)
Steering angle: 13.256104565694324 (pred)
Steering angle: 12.710317809496946 (pred)
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Steering angle: 11.144237395083062 (pred)
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                                                  56.27 (actual)
Steering angle: 9.681601049422667 (pred)
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Steering angle: 10.043976735837694 (pred)
Steering angle: 10.383991236683745 (pred)
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                                                  56.27 (actual) 56.27 (actual)
Steering angle: 11.080103626323934 (pred)
Steering angle: 14.262751505949144 (pred)
Steering angle: 14.542401648684269 (pred)
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                                                  53.85 (actual)
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Steering angle: 15.112882953825828 (pred)
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Steering angle: 5.592165302755519 (pred)
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Steering angle: 5.361713439498819 (pred)
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Steering angle: 5.741743884257859 (pred)
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Steering angle: 2.4970977372062095 (pred)
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                                                  13.82 (actual)
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Steering angle: 1.5170925901392598 (pred)
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Steering angle: 1.548631202075205 (pred)
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Steering angle: 2.2388867045021086 (pred)
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Steering angle: 2.0215050485524633 (pred)
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Steering angle: 4.147679331040787 (pred)
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Steering angle: 3.7039535302899695 (pred)
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Steering angle: 4.868894800314889 (pred)
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Steering angle: 4.742071847806092 (pred)
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Steering angle: 4.228459978354528 (pred)
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Steering angle: 4.221782614667194 (pred)
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Steering angle: 3.7593527677611203 (pred)
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Steering angle: 4.585769798839521 (pred)
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Steering angle: 5.800924485208258 (pred)
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Steering angle: 5.725639151968616 (pred)
                                                  -2.62 (actual)
Steering angle: 5.776262379662634 (pred)
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Steering angle: 5.77382272146847 (pred) -4.03 (actual)
Steering angle: 0.39048106107598274 (pred)
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Steering angle: 0.2660896559117105 (pred)
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Steering angle: 2.2149953431156386 (pred)
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Steering angle: 3.635094551285663 (pred)
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                                                  -10.69 (actual)
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Steering angle: -4.220558730145292 (pred)
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Steering angle: 1.030278114122594 (pred)
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Steering angle: -5.0011947107643895 (pred)
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Steering angle: 1.8026721908476016 (pred)
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Steering angle: -4.169377561373448 (pred)
                                                   -4.44 (actual)
Steering angle: -5.576032822822771 (pred)
                                                   -4.44 (actual)
Steering angle: -6.067103787352824 (pred)
                                                   -4.44 (actual)
Steering angle: -6.11769926740334 (pred)
                                                   -4.44 (actual)
                                                   -4.44 (actual)
Steering angle: -6.116654248460328 (pred)
Steering angle: -3.2739397611847765 (pred)
                                                   -4.54 (actual)
Steering angle: -3.5213292129226383 (pred)
                                                   -4.94 (actual)
Steering angle: -1.9998260281268427 (pred)
                                                   -5.1399999999999 (actual)
Steering angle: -1.8012442544242457 (pred)
                                                   -5.24 (actual)
Steering angle: -2.0519309799839314 (pred)
                                                   -5.340000000000001 (actual)
Steering angle: -3.081987539845323 (pred)
                                                   -5.45 (actual)
Steering angle: -3.78331648646411 (pred)
                                                   -5.65 (actual)
Steering angle: -4.549430631134114 (pred)
Steering angle: -9.045853017893405 (pred)
                                                   -5.65 (actual)
                                                   -5.75 (actual)
Steering angle: -13.714222428800005 (pred)
                                                   -5.8499999999999 (actual)
Steering angle: -18.601091298802604 (pred)
                                                   -5.9499999999999 (actual)
Steering angle: -15.705996090782225 (pred)
                                                   -6.050000000000001 (actual)
Steering angle: -12.706525346960296 (pred)
                                                   -6.050000000000001 (actual)
Steering angle: -4.483912895294413 (pred)
                                                   -6.150000000000001 (actual)
Steering angle: -4.893126603942802 (pred)
                                                   -6.150000000000001 (actual)
Steering angle: -14.393583779500739 (pred)
                                                   -6.150000000000001 (actual)
Steering angle: -16.172072831818262 (pred)
                                                   -5.8499999999999 (actual)
Steering angle: -16.062666861693 (pred) -5.55 (actual)
Steering angle: -1.6037036576832526 (pred)
                                                   -5.24 (actual)
Steering angle: -1.016191702733089 (pred)
Steering angle: 1.9030768254204353 (pred)
                                                   -4.94 (actual)
                                                   -4.74 (actual)
                                                   -4.64 (actual)
Steering angle: 1.1415167093795373 (pred)
Steering angle: 0.8110862445994835 (pred)
                                                   -4.54 (actual)
Steering angle: 0.6844758817286034 (pred)
                                                   -4.24 (actual)
                                                   -4.03 (actual)
Steering angle: 0.551898921730894 (pred)
                                                   -4.03 (actual)
Steering angle: 0.46124737040601543 (pred)
                                                   -4.03 (actual)
Steering angle: 0.450424081892484 (pred)
Steering angle: -1.2835581771327687 (pred)
Steering angle: -1.9694009504690209 (pred)
                                                   -4.03 (actual)
                                                   -4.03 (actual)
Steering angle: -2.7169190513500188 (pred)
                                                   -4.03 (actual)
Steering angle: -3.3097077543208404 (pred)
                                                   -4.03 (actual)
Steering angle: -3.536319770603524 (pred)
                                                   -4.03 (actual)
Steering angle: -3.3741540042344957 (pred)
                                                   -4.03 (actual)
Steering angle: -3.3418173273827168 (pred)
                                                   -4.13 (actual)
                                                   -4.34 (actual)
Steering angle: -3.4091006671228663 (pred)
Steering angle: -3.2414878248907533 (pred)
Steering angle: -3.030677451252895 (pred)
                                                   -4.74 (actual)
                                                   -4.84 (actual)
Steering angle: -3.0032166756948584 (pred)
                                                   -4.84 (actual)
                                                   -4.84 (actual)
Steering angle: -3.2046722514907384 (pred)
Steering angle: -3.4156747241990035 (pred)
                                                   -4.94 (actual)
Steering angle: -3.32677468950941 (pred)
                                                   -5.04 (actual)
Steering angle: -3.419771130153719 (pred)
                                                   -5.04 (actual)
Steering angle: -3.4755293794431177 (pred)
                                                   -5.04 (actual)
Steering angle: -3.559407517545459 (pred)
                                                   -5.04 (actual)
Steering angle: -3.3023977443616346 (pred)
                                                   -5.04 (actual)
Steering angle: -3.2448730373981407 (pred)
                                                   -5.1399999999999 (actual)
Steering angle: -2.9431724827012764 (pred)
                                                   -5.13999999999999 (actual)
Steering angle: -3.1140125893162205 (pred)
                                                   -5.1399999999999 (actual)
Steering angle: -2.6022427365064438 (pred)
                                                   -5.1399999999999 (actual)
Steering angle: -2.777407206639652 (pred)
                                                   -5.04 (actual)
Steering angle: -2.772388725146985 (pred)
                                                   -4.74 (actual)
Steering angle: -2.6744830860367297 (pred)
                                                   -4.44 (actual)
Steering angle: -2.8396584045087945 (pred)
                                                   -4.24 (actual)
Steering angle: -2.7607782573316095 (pred)
                                                   -4.24 (actual)
Steering angle: -3.1046270556229767 (pred)
Steering angle: -3.7677487777983583 (pred)
                                                   -4.13 (actual)
                                                   -4.13 (actual)
```

Summary:

- 1. Dataset is split into train and test in 70:30 ratio.
- 2. As discussed over mail, I have kept the learning rate of adam optimizer to be 1e-4.
- 3. Dropout rate is 0.5.
- 4. Final layer is linear.
- 5. There are many points where the model is performing good but overall the results are not as good as the previous model.