

CS677-004 Deep Learning Programming Assignment 2

Prof. Grace Wang

Topic: Transportation mode classification using CNN

Due time: Nov. 11 2020

Data: Acceleration data of users collected from their smart phones.

Note: The data is the in-house data collected by Prof. Wang's group and is solely used for Prof. Wang's class CS677. The data cannot be disseminated in any way.

The acceleration sampling frequency is 50Hz. There are 50 sampling values generated every second. One sampling acceleration is $\langle x, y, z \rangle$, from three directions. We transfer the data into one dimension by calculating its magnitude. The time series data are divided into segments for every 128 sampling values. One segment is also called one data sample. Every transportation mode (class) has 3000 samples. Every sample has 128 features, corresponding to the sampling values in every segment. We randomly split the data into two parts, 80% for training and 20% for testing.

Output: One of the 7 transportation modes: static, walking, running, driving, bus, subway and train.

Learning Algorithm: Convolutional neural network

Suggested CNN's architecture:

$128*1 \rightarrow 128*16 \rightarrow 64*32 \rightarrow 32*32 \rightarrow 16*32 \rightarrow 8*32 \rightarrow 200*1 \rightarrow 7$

You need to employ any kinds of regularization or optimization techniques at your discretion for better performance.

Evaluation:

We evaluate the predicted results based on accuracy

Submission:

- the .ipynb
- A report which illustrates your network architecture and all the optimization techniques employed in the homework

Instructions

1. Install "jupyter notebook".
2. Open a terminal and type "jupyter notebook" in the terminal. The web browser will be opened.
3. Find the folder that you want to store the code.
4. After writing the code, select the first cell and click "Run" to run the first cell.
5. Click "Run" to run the following cells to get the results.