How to use computer codes

########## Environment ##########
Ubuntu: 16.04 (or 14.04)
Python: 2.7.12
naoqi: 2.1.4
opencv: 2.4.9
##################################

`Experiment' folder consists of programs used to train S-CTRNN model (in the `/learning/') and those used in the robot experiment (in the `/nao/').

Learning
Recurrent neural network package for problems of learning target time-series is in the `/learning/'

=== Installation ===
First, type `./autogen.sh' in the `/learning/' to create configure file.
Next, type `./configure' and when it finishes, type `make'. This will create `rnn-learn', `rnn-generate' and other utility programs.
Run them with the argument `-h' to show the usages of them.
=== Requirements ===
Building this package requires a C compiler supporting C99 and Autotools (GNU Autoconf, Automake and Libtool).
In addition, utility scripts in the `src/python' directory require python version 2.5 or later (but not python-3.x).
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1) Set distribution of bias (intrinsic neuronal excitability)
   Modify `rnn.c' in the `/learning/src/common/', then type `make clean' and `make' in the `/learning/'.
   Line 60: #define K 10 //variance of bias
   Line 63: #define MEAN 0 //mean of bias

2) Start learning
   Type `./start.sh &' in the `/learning/example/tst/seed1/', then wait until finish. Optimized parameters will be saved in `rnn.dat'.
3) Making graph of learning result (reproduced temporal sequences by RNN)
   Type `python ./bin/each_print_open.py' in the `/learning/example/tst/seed1/', then python type `python ./bin/plot_rnn.py -f open_orbitXXXXXX.log'. ` open_orbitXXXXXX.pdf' will be created. Gnuplot is also needed.

Robot experiment

Programs for robot experiment is in the `/nao/'. Recurrent neural network package for problems of time-series prediction and generation is in the `nao/rnn_pb_assign_threshold/'.

=== Installation ===
First, type `./autogen.sh' in the `nao/rnn_pb_assign_threshold/' to create configure file.
Next, type `./configure' and when it finishes, type `make'. This will create `rnn-learn', `rnn-generate' and other utility programs.
Run them with the argument `-h' to show the usages of them.
=== Requirements ===
Building this package requires a C compiler supporting C99 and Autotools (GNU Autoconf, Automake and Libtool).
In addition, utility scripts in the `src/python' directory require python version 2.5 or later (but not python-3.x).
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1) Put `rnn.dat' (optimized parameters) in the `/nao/'.
2) Start
   Type “python nao_rnn_runner2_2.1.4.py IPAdressOfNao” in the `/nao/’. You will see an image window on the computer display which corresponds to vision of Nao, and at that time, Nao will not move. Right-click on the image will trigger the real-time interaction task of Nao controlled by S-CTRNN.

Right-click on the image window again will stop Nao.

3) Making graph of generated time-series by RNN
   Type `python ./bin/plot.py -f generateXXXXXX.log' in the `/nao/'. `generateXXXXXX.pdf' will be created.