머신러닝/딥러닝 참고자료

*기계학습 입문하기
http://t-robotics.blogspot.kr/2015/10/machine-learning.html

*테리의 딥러닝톡
https://www.youtube.com/playlist?list=PL0oFI08O71gKEXITQ7OG2SCCXkrtid7Fq

- 머신러닝 종류
  http://t-robotics.blogspot.kr/2017/01/8910.html#.WvVW8dOFNHQ
  (https://www.facebook.com/terryum.io/posts/518577148267476
  https://youtu.be/KSGldBhKf4E https://youtu.be/enHDA9JBlOI https://youtu.be/-PC3VVOImjw)
  http://overface.tistory.com/29
- 딥러닝과 머신러닝의 관계
  https://youtu.be/mH3w-OmHQK0

* 김성 교수님 모두의딥러닝 강의
강의 웹사이트: http://hunkim.github.io/ml/
유튜브:
https://www.youtube.com/watch?v=BS6O0zOGX4E&list=PLlMkM4tgfjnLSOjrEJN31gZATbcj_MpUm
코드 예제: http://github.com/hunkim/DeepLearningZeroToAll

* TensorFlowKR
Facebook: https://www.facebook.com/groups/TensorFlowKR/

1. Anaconda 설치 또는 업데이트
  conda update --all
2. Virtual environment 확인 및 설치
  conda info --envs
  (ex) C:\Users\me180a6wnp002\AppData\Local\conda\conda\envs\...
  (ex)

```
# conda environments:
#
base                  *  /Users/TGIL/anaconda2
alldeep                  /Users/TGIL/anaconda2/envs/alldeep
deeprlbootcamp           /Users/TGIL/anaconda2/envs/deeprlbootcamp
my-r-env                 /Users/TGIL/anaconda2/envs/my-r-env
py27                     /Users/TGIL/anaconda2/envs/py27
py36                     /Users/TGIL/anaconda2/envs/py36
```

https://conda.io/docs/user-guide/tasks/manage-environments.html

```
$ conda create -n alldeep python=3.6 numpy scipy matplotlib spyder pandas seaborn scikit-
learn h5py
Solving environment: done


==> WARNING: A newer version of conda exists. <==
  current version: 4.4.10
  latest version: 4.5.2

Please update conda by running

    $ conda update -n base conda



## Package Plan ##

  environment location: /Users/TGIL/anaconda3/envs/alldeep

  added / updated specs:
    - h5py
    - matplotlib
    - numpy
    - pandas
    - python=3.6
    - scikit-learn
    - scipy
    - seaborn
    - spyder


The following packages will be downloaded:

    package                    |            build
    ---------------------------|-----------------
    python-dateutil-2.7.2      |          py36_0        256 KB
    python.app-2               |          py36_8        1.3 MB
    scipy-1.1.0                |   py36hcaad992_0       15.4 MB
    pexpect-4.5.0              |          py36_0         75 KB
    imagesize-1.0.0            |          py36_0          8 KB
    psutil-5.4.5               |   py36h1de35cc_0        315 KB
    certifi-2018.4.16          |          py36_0        142 KB
    typing-3.6.4               |          py36_0         44 KB
    cffi-1.11.5                |   py36h342bebf_0        204 KB
    tornado-5.0.2              |          py36_0        646 KB
    pyqt-5.9.2                 |   py36h11d3b92_0        4.6 MB
    pytz-2018.4                |          py36_0        212 KB
    mkl_fft-1.0.1              |   py36h917ab60_0        125 KB
    pip-10.0.1                 |          py36_0        1.8 MB
```

```
    pycodestyle-2.4.0       |        py36_0         59 KB
    spyder-3.2.8            |        py36_0        2.6 MB
    sphinx-1.7.4            |        py36_0        1.6 MB
    jedi-0.12.0             |        py36_1        223 KB
    astroid-1.6.3           |        py36_0        476 KB
    decorator-4.3.0         |        py36_0         15 KB
    pyzmq-17.0.0            |  py36h1de35cc_1       405 KB
    numpy-1.14.2            |  py36ha9ae307_1        4.0 MB
    numpydoc-0.8.0          |        py36_0         42 KB
    ipykernel-4.8.2         |        py36_0        145 KB
    mistune-0.8.3           |  py36h1de35cc_1       244 KB
    matplotlib-2.2.2        |  py36ha7267d0_0        6.7 MB
    sip-4.19.8              |  py36h0a44026_0       252 KB
    mkl_random-1.0.1        |   py36h78cc56f_0        346 KB
    python-3.6.5            |   hc167b69_1         15.4 MB
    packaging-17.1          |        py36_0         33 KB
    wheel-0.31.0            |        py36_0         62 KB
    isort-4.3.4             |        py36_0         58 KB
    bleach-2.1.3            |        py36_0         32 KB
    setuptools-39.1.0       |        py36_0        549 KB
    pylint-1.8.4            |        py36_0        748 KB
    qtpy-1.4.1              |        py36_0         44 KB
    kiwisolver-1.0.1        |  py36h792292d_0        56 KB
    cryptography-2.2.2      |  py36h1de35cc_0       554 KB
    jupyter_client-5.2.3    |        py36_0        124 KB
    ipython-6.3.1           |        py36_0        1.0 MB
    parso-0.2.0             |        py36_0        116 KB
    backcall-0.1.0          |        py36_0         19 KB
    pysocks-1.6.8           |        py36_0         22 KB
    ------------------------------------------------------------
                              Total:      60.8 MB

The following NEW packages will be INSTALLED:

    alabaster:          0.7.10-py36h174008c_0
    appnope:            0.1.0-py36hf537a9a_0
    asn1crypto:         0.24.0-py36_0
    astroid:            1.6.3-py36_0
    babel:              2.5.3-py36_0
    backcall:           0.1.0-py36_0
    bleach:             2.1.3-py36_0
    ca-certificates:    2018.03.07-0
    certifi:            2018.4.16-py36_0
    cffi:               1.11.5-py36h342bebf_0
    chardet:            3.0.4-py36h96c241c_1
    cloudpickle:        0.5.2-py36_1
    cryptography:       2.2.2-py36h1de35cc_0
    cycler:             0.10.0-py36hfc81398_0
    dbus:               1.13.2-h760590f_1
    decorator:          4.3.0-py36_0
```

```
docutils:            0.14-py36hbfde631_0
entrypoints:          0.2.3-py36hd81d71f_2
expat:               2.2.5-hb8e80ba_0
freetype:            2.8-h12048fb_1
gettext:             0.19.8.1-h15daf44_3
glib:                2.56.1-h35bc53a_0
h5py:                 2.7.1-py36h39cdac5_0
hdf5:                 1.10.1-ha036c08_1
html5lib:             1.0.1-py36h2f9c1c0_0
icu:                 58.2-h4b95b61_1
idna:                 2.6-py36h8628d0a_1
imagesize:            1.0.0-py36_0
intel-openmp:         2018.0.0-8
ipykernel:           4.8.2-py36_0
ipython:             6.3.1-py36_0
ipython_genutils:     0.2.0-py36h241746c_0
isort:               4.3.4-py36_0
jedi:                0.12.0-py36_1
jinja2:              2.10-py36hd36f9c5_0
jpeg:                9b-he5867d9_2
jsonschema:           2.6.0-py36hb385e00_0
jupyter_client:       5.2.3-py36_0
jupyter_core:         4.4.0-py36h79cf704_0
kiwisolver:           1.0.1-py36h792292d_0
lazy-object-proxy:    1.3.1-py36h2fbbe47_0
libcxx:              4.0.1-h579ed51_0
libcxxabi:            4.0.1-hebd6815_0
libedit:             3.1.20170329-hb402a30_2
libffi:              3.2.1-h475c297_4
libgfortran:          3.0.1-h93005f0_2
libiconv:            1.15-hdd342a3_7
libpng:              1.6.34-he12f830_0
libsodium:            1.0.16-h3efe00b_0
markupsafe:           1.0-py36h3a1e703_1
matplotlib:          2.2.2-py36ha7267d0_0
mccabe:              0.6.1-py36hdaeb55d_0
mistune:             0.8.3-py36h1de35cc_1
mkl:                 2018.0.2-1
mkl_fft:             1.0.1-py36h917ab60_0
mkl_random:           1.0.1-py36h78cc56f_0
nbconvert:            5.3.1-py36h810822e_0
nbformat:            4.4.0-py36h827af21_0
ncurses:             6.1-h0a44026_0
numpy:               1.14.2-py36ha9ae307_1
numpydoc:             0.8.0-py36_0
openssl:             1.0.2o-h26aff7b_0
packaging:            17.1-py36_0
pandas:              0.22.0-py36h0a44026_0
pandoc:              1.19.2.1-ha5e8f32_1
pandocfilters:        1.4.2-py36h3b0b094_1
```

```
parso:               0.2.0-py36_0
patsy:               0.5.0-py36_0
pcre:                8.42-h378b8a2_0
pexpect:             4.5.0-py36_0
pickleshare:         0.7.4-py36hf512f8e_0
pip:                 10.0.1-py36_0
prompt_toolkit:      1.0.15-py36haeda067_0
psutil:              5.4.5-py36h1de35cc_0
ptyprocess:          0.5.2-py36he6521c3_0
pycodestyle:         2.4.0-py36_0
pycparser:           2.18-py36h724b2fc_1
pyflakes:            1.6.0-py36hea45e83_0
pygments:            2.2.0-py36h240cd3f_0
pylint:              1.8.4-py36_0
pyopenssl:           17.5.0-py36h51e4350_0
pyparsing:           2.2.0-py36hb281f35_0
pyqt:                5.9.2-py36h11d3b92_0
pysocks:             1.6.8-py36_0
python:              3.6.5-hc167b69_1
python-dateutil:     2.7.2-py36_0
python.app:          2-py36_8
pytz:                2018.4-py36_0
pyzmq:               17.0.0-py36h1de35cc_1
qt:                  5.9.5-h02808f3_0
qtawesome:           0.4.4-py36h468c6fb_0
qtconsole:           4.3.1-py36hd96c0ff_0
qtpy:                1.4.1-py36_0
readline:            7.0-hc1231fa_4
requests:            2.18.4-py36h4516966_1
rope:                0.10.7-py36h68959ac_0
scikit-learn:        0.19.1-py36hffbff8c_0
scipy:               1.1.0-py36hcaad992_0
seaborn:             0.8.1-py36h595ecd9_0
setuptools:          39.1.0-py36_0
simplegeneric:       0.8.1-py36_2
sip:                 4.19.8-py36h0a44026_0
six:                 1.11.0-py36h0e22d5e_1
snowballstemmer:     1.2.1-py36h6c7b616_0
sphinx:              1.7.4-py36_0
sphinxcontrib:       1.0-py36h9364dc8_1
sphinxcontrib-websupport: 1.0.1-py36h92f4a7a_1
spyder:              3.2.8-py36_0
sqlite:              3.23.1-hf1716c9_0
statsmodels:         0.8.0-py36h9c68fc9_0
testpath:            0.3.1-py36h625a49b_0
tk:                  8.6.7-h35a86e2_3
tornado:             5.0.2-py36_0
traitlets:           4.3.2-py36h65bd3ce_0
typing:              3.6.4-py36_0
urllib3:             1.22-py36h68b9469_0
```

```
    wcwidth:          0.1.7-py36h8c6ec74_0
    webencodings:       0.5.1-py36h3b9701d_1
    wheel:            0.31.0-py36_0
    wrapt:            1.10.11-py36hc29e774_0
    xz:              5.2.3-h727817e_4
    zeromq:            4.2.5-h378b8a2_0
    zlib:             1.2.11-hf3cbc9b_2


Proceed ([y]/n)? y



Downloading and Extracting Packages
python-dateutil 2.7.2: ############################################### | 100%
python.app 2: ############################################################ |
100%
scipy 1.1.0: ############################################################# | 100%
pexpect 4.5.0: ########################################################### | 100%
imagesize 1.0.0: ######################################################### | 100%
psutil 5.4.5: ############################################################# | 100%
certifi 2018.4.16: ####################################################### | 100%
typing 3.6.4: ############################################################# | 100%
cffi 1.11.5: ############################################################## | 100%
tornado 5.0.2: ########################################################### | 100%
pyqt 5.9.2: ############################################################### |
100%
pytz 2018.4: ############################################################## |
100%
mkl_fft 1.0.1: ########################################################### | 100%
pip 10.0.1: ############################################################### |
100%
pycodestyle 2.4.0: ####################################################### | 100%
spyder 3.2.8: ############################################################# |
100%
sphinx 1.7.4: ############################################################# | 100%
jedi 0.12.0: ############################################################## | 100%
astroid 1.6.3: ########################################################### | 100%
decorator 4.3.0: ######################################################### | 100%
pyzmq 17.0.0: ############################################################ |
100%
numpy 1.14.2: ############################################################ |
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numpydoc 0.8.0: ########################################################## |
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ipykernel 4.8.2: ######################################################### | 100%
mistune 0.8.3: ########################################################### | 100%
matplotlib 2.2.2: ######################################################### | 100%
sip 4.19.8: ############################################################### | 100%
mkl_random 1.0.1: ######################################################## |
100%
python 3.6.5: ############################################################# |
```

```
100%
packaging 17.1: ####################################################### |
100%
wheel 0.31.0: ####################################################### |
100%
isort 4.3.4: ####################################################### | 100%
bleach 2.1.3: ####################################################### | 100%
setuptools 39.1.0: ####################################################### | 100%
pylint 1.8.4: ####################################################### | 100%
qtpy 1.4.1: ####################################################### |
100%
kiwisolver 1.0.1: ####################################################### | 100%
cryptography 2.2.2: ####################################################### | 100%
jupyter_client 5.2.3: ####################################################### | 100%
ipython 6.3.1: ####################################################### | 100%
parso 0.2.0: ####################################################### |
100%
backcall 0.1.0: ####################################################### | 100%
pysocks 1.6.8: ####################################################### |
100%
Preparing transaction: done
Verifying transaction: done
Executing transaction: done
#
# To activate this environment, use
#
#     $ conda activate alldeep
#
# To deactivate an active environment, use
#
#     $ conda deactivate
```

```
(alldeep) Adminui-MacBook:~ TGIL$ pip install tensorflow
Collecting tensorflow
  Using cached
https://files.pythonhosted.org/packages/82/89/a7934203bccbcab5d0298b4b20fc7ac8ea5fe72
cfe5ed2dc7e9a14559c7c/tensorflow-1.8.0-cp35-cp35m-macosx_10_11_x86_64.whl
Collecting absl-py>=0.1.6 (from tensorflow)
Collecting grpcio>=1.8.6 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/65/b9/5418fceb22dc26546e2e1249cee0bc12537cbe2
cf3ec33b51de27ac29a28/grpcio-1.11.0-cp35-cp35m-macosx_10_7_intel.whl
Requirement already satisfied: numpy>=1.13.3 in ./anaconda3/envs/alldeep/lib/python3.5/site-
packages (from tensorflow) (1.14.2)
Collecting tensorboard<1.9.0,>=1.8.0 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/59/a6/0ae6092b7542cfedba6b2a1c9b8dceaf278238c
39484f3ba03b03f07803c/tensorboard-1.8.0-py3-none-any.whl
```

```
Requirement already satisfied: wheel>=0.26 in ./anaconda3/envs/alldeep/lib/python3.5/site-
packages (from tensorflow) (0.31.0)
Collecting termcolor>=1.1.0 (from tensorflow)
Collecting astor>=0.6.0 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/b2/91/cc9805f1ff7b49f620136b3a7ca26f6a1be2ed42
4606804b0fbcf499f712/astor-0.6.2-py2.py3-none-any.whl
Collecting protobuf>=3.4.0 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/c8/7e/9b976743d1cb994439c8951492ed7c7ebc079b
695c4a89c1873572754f7e/protobuf-3.5.2.post1-cp35-cp35m-
macosx_10_6_intel.macosx_10_9_intel.macosx_10_9_x86_64.macosx_10_10_intel.macosx_
10_10_x86_64.whl
Requirement already satisfied: six>=1.10.0 in ./anaconda3/envs/alldeep/lib/python3.5/site-
packages (from tensorflow) (1.11.0)
Collecting gast>=0.2.0 (from tensorflow)
Collecting markdown>=2.6.8 (from tensorboard<1.9.0,>=1.8.0->tensorflow)
  Using cached
https://files.pythonhosted.org/packages/6d/7d/488b90f470b96531a3f5788cf12a93332f543dba
b13c423a5e7ce96a0493/Markdown-2.6.11-py2.py3-none-any.whl
Collecting werkzeug>=0.11.10 (from tensorboard<1.9.0,>=1.8.0->tensorflow)
  Using cached
https://files.pythonhosted.org/packages/20/c4/12e3e56473e52375aa29c4764e70d1b8f3efa66
82bef8d0aae04fe335243/Werkzeug-0.14.1-py2.py3-none-any.whl
Collecting bleach==1.5.0 (from tensorboard<1.9.0,>=1.8.0->tensorflow)
  Using cached
https://files.pythonhosted.org/packages/33/70/86c5fec937ea4964184d4d6c4f0b9551564f821
e1c3575907639036d9b90/bleach-1.5.0-py2.py3-none-any.whl
Collecting html5lib==0.9999999 (from tensorboard<1.9.0,>=1.8.0->tensorflow)
Requirement already satisfied: setuptools in ./anaconda3/envs/alldeep/lib/python3.5/site-
packages (from protobuf>=3.4.0->tensorflow) (39.1.0)
mkl-random 1.0.1 requires cython, which is not installed.
mkl-fft 1.0.0 requires cython, which is not installed.
Installing collected packages: absl-py, protobuf, grpcio, markdown, werkzeug, html5lib,
bleach, tensorboard, termcolor, astor, gast, tensorflow
  Found existing installation: html5lib 1.0.1
    Uninstalling html5lib-1.0.1:
      Successfully uninstalled html5lib-1.0.1
  Found existing installation: bleach 2.1.3
    Uninstalling bleach-2.1.3:
      Successfully uninstalled bleach-2.1.3
Successfully installed absl-py-0.2.0 astor-0.6.2 bleach-1.5.0 gast-0.2.0 grpcio-1.11.0 html5lib-
0.9999999 markdown-2.6.11 protobuf-3.5.2.post1 tensorboard-1.8.0 tensorflow-1.8.0
termcolor-1.1.0 werkzeug-0.14.1
```

```
$ conda activate alldeep
(alldeep) Adminui-MacBook:envs TGIL$ pip install tensorflow
```

```
Collecting tensorflow
  Downloading
https://files.pythonhosted.org/packages/03/ad/d732a5d9d50bfcd8aeb6e4a266065a88688293
88e4e2b529ff689f1fc923/tensorflow-1.8.0-cp36-cp36m-macosx_10_11_x86_64.whl (46.5MB)
    100% |████████████████████████████████| 46.5MB 327kB/s
Collecting protobuf>=3.4.0 (from tensorflow)
  Downloading
https://files.pythonhosted.org/packages/eb/a7/042722bc48082f6b02498ebdf4e64a6d1b45432
71d4f2f495641f429c56d/protobuf-3.5.2.post1-cp36-cp36m-
macosx_10_6_intel.macosx_10_9_intel.macosx_10_9_x86_64.macosx_10_10_intel.macosx_
10_10_x86_64.whl (1.2MB)
    100% |████████████████████████████████| 1.2MB 3.3MB/s
Collecting termcolor>=1.1.0 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/8a/48/a76be51647d0eb9f10e2a4511bf3ffb8cc1e6b14
e9e4fab46173aa79f981/termcolor-1.1.0.tar.gz
Collecting grpcio>=1.8.6 (from tensorflow)
  Downloading
https://files.pythonhosted.org/packages/b9/43/4914451df9fe1acd8e75ecc395bce7fbcf09f8768
9b2bc4ae3b78b0ddc0f/grpcio-1.11.0-cp36-cp36m-macosx_10_11_x86_64.whl (1.6MB)
    100% |████████████████████████████████| 1.6MB 595kB/s
Requirement already satisfied: wheel>=0.26 in ./alldeep/lib/python3.6/site-packages (from
tensorflow) (0.31.0)
Requirement already satisfied: numpy>=1.13.3 in ./alldeep/lib/python3.6/site-packages (from
tensorflow) (1.14.2)
Collecting astor>=0.6.0 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/b2/91/cc9805f1ff7b49f620136b3a7ca26f6a1be2ed42
4606804b0fbcf499f712/astor-0.6.2-py2.py3-none-any.whl
Collecting absl-py>=0.1.6 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/90/6b/ba04a9fe6aefa56adafa6b9e0557b959e423c49
950527139cb8651b0480b/absl-py-0.2.0.tar.gz
Collecting tensorboard<1.9.0,>=1.8.0 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/59/a6/0ae6092b7542cfedba6b2a1c9b8dceaf278238c
39484f3ba03b03f07803c/tensorboard-1.8.0-py3-none-any.whl
Collecting gast>=0.2.0 (from tensorflow)
  Using cached
https://files.pythonhosted.org/packages/5c/78/ff794fcae2ce8aa6323e789d1f8b3b7765f601e7
702726f430e814822b96/gast-0.2.0.tar.gz
Requirement already satisfied: six>=1.10.0 in ./alldeep/lib/python3.6/site-packages (from
tensorflow) (1.11.0)
Requirement already satisfied: setuptools in ./alldeep/lib/python3.6/site-packages (from
protobuf>=3.4.0->tensorflow) (39.1.0)
Collecting html5lib==0.9999999 (from tensorboard<1.9.0,>=1.8.0->tensorflow)
  Using cached
https://files.pythonhosted.org/packages/ae/ae/bcb60402c60932b32dfaf19bb53870b29eda2cd
17551ba5639219fb5ebf9/html5lib-0.9999999.tar.gz
Collecting werkzeug>=0.11.10 (from tensorboard<1.9.0,>=1.8.0->tensorflow)
```

```
  Using cached
https://files.pythonhosted.org/packages/20/c4/12e3e56473e52375aa29c4764e70d1b8f3efa66
82bef8d0aae04fe335243/Werkzeug-0.14.1-py2.py3-none-any.whl
Collecting bleach==1.5.0 (from tensorboard<1.9.0,>=1.8.0->tensorflow)
  Using cached
https://files.pythonhosted.org/packages/33/70/86c5fec937ea4964184d4d6c4f0b9551564f821
e1c3575907639036d9b90/bleach-1.5.0-py2.py3-none-any.whl
Collecting markdown>=2.6.8 (from tensorboard<1.9.0,>=1.8.0->tensorflow)
  Using cached
https://files.pythonhosted.org/packages/6d/7d/488b90f470b96531a3f5788cf12a93332f543dba
b13c423a5e7ce96a0493/Markdown-2.6.11-py2.py3-none-any.whl
Building wheels for collected packages: termcolor, absl-py, gast, html5lib
  Running setup.py bdist_wheel for termcolor ... done
  Stored in directory:
/Users/TGIL/Library/Caches/pip/wheels/7c/06/54/bc84598ba1daf8f970247f550b175aaaee85f
68b4b0c5ab2c6
  Running setup.py bdist_wheel for absl-py ... done
  Stored in directory:
/Users/TGIL/Library/Caches/pip/wheels/23/35/1d/48c0a173ca38690dd8dfccfa47ffc750db48f8
989ed898455c
  Running setup.py bdist_wheel for gast ... done
  Stored in directory:
/Users/TGIL/Library/Caches/pip/wheels/9a/1f/0e/3cde98113222b853e98fc0a8e9924480a3e2
5f1b4008cedb4f
  Running setup.py bdist_wheel for html5lib ... done
  Stored in directory:
/Users/TGIL/Library/Caches/pip/wheels/50/ae/f9/d2b189788efcf61d1ee0e36045476735c8388
98eef1cad6e29
Successfully built termcolor absl-py gast html5lib
mkl-random 1.0.1 requires cython, which is not installed.
mkl-fft 1.0.0 requires cython, which is not installed.
Installing collected packages: protobuf, termcolor, grpcio, astor, absl-py, html5lib, werkzeug,
bleach, markdown, tensorboard, gast, tensorflow
  Found existing installation: html5lib 1.0.1
    Uninstalling html5lib-1.0.1:
      Successfully uninstalled html5lib-1.0.1
  Found existing installation: bleach 2.1.3
    Uninstalling bleach-2.1.3:
      Successfully uninstalled bleach-2.1.3
Successfully installed absl-py-0.2.0 astor-0.6.2 bleach-1.5.0 gast-0.2.0 grpcio-1.11.0 html5lib-
0.9999999 markdown-2.6.11 protobuf-3.5.2.post1 tensorboard-1.8.0 tensorflow-1.8.0
termcolor-1.1.0 werkzeug-0.14.1
```

```
(alldeep) Adminui-MacBook:envs TGIL$ python
Python 3.6.5 |Anaconda, Inc.| (default, Apr 26 2018, 08:42:37)
[GCC 4.2.1 Compatible Clang 4.0.1 (tags/RELEASE_401/final)] on darwin
Type "help", "copyright", "credits" or "license" for more information.
```

```
>>> import tensorflow as tf
/Users/TGIL/anaconda3/envs/alldeep/lib/python3.6/site-packages/h5py/__init__.py:36:
FutureWarning: Conversion of the second argument of issubdtype from `float` to `np.floating`
is deprecated. In future, it will be treated as `np.float64 == np.dtype(float).type`.
  from ._conv import register_converters as _register_converters
>>> print(tf.__version__)
1.8.0
```

https://www.facebook.com/groups/TensorFlowKR/permalink/616046162069779/ 참고

```
(alldeep) Adminui-MacBook:envs TGIL$ pip install keras
Collecting keras
  Using cached
https://files.pythonhosted.org/packages/54/e8/eaff7a09349ae9bd40d3ebaf028b49f5e2392c77
1f294910f75bb608b241/Keras-2.1.6-py2.py3-none-any.whl
Requirement already satisfied: six>=1.9.0 in ./alldeep/lib/python3.6/site-packages (from keras)
(1.11.0)
Requirement already satisfied: scipy>=0.14 in ./alldeep/lib/python3.6/site-packages (from
keras) (1.1.0)
Requirement already satisfied: h5py in ./alldeep/lib/python3.6/site-packages (from keras)
(2.7.1)
Collecting pyyaml (from keras)
  Using cached
https://files.pythonhosted.org/packages/4a/85/db5a2df477072b2902b0eb892feb37d88ac635d
36245a72a6a69b23b383a/PyYAML-3.12.tar.gz
Requirement already satisfied: numpy>=1.9.1 in ./alldeep/lib/python3.6/site-packages (from
keras) (1.14.2)
Building wheels for collected packages: pyyaml
  Running setup.py bdist_wheel for pyyaml ... done
  Stored in directory:
/Users/TGIL/Library/Caches/pip/wheels/03/05/65/bdc14f2c6e09e82ae3e0f13d021e1b6b2481
437ea2f207df3f
Successfully built pyyaml
mkl-random 1.0.1 requires cython, which is not installed.
mkl-fft 1.0.0 requires cython, which is not installed.
Installing collected packages: pyyaml, keras
Successfully installed keras-2.1.6 pyyaml-3.12
```

```
>>> import keras
/Users/TGIL/anaconda3/envs/alldeep/lib/python3.6/site-packages/h5py/__init__.py:36:
FutureWarning: Conversion of the second argument of issubdtype from `float` to `np.floating`
is deprecated. In future, it will be treated as `np.float64 == np.dtype(float).type`.
  from ._conv import register_converters as _register_converters
Using TensorFlow backend.
>>> print(keras.__version__)
```

```
2.1.6
```

git clone https://github.com/gilbutITbook/006958.git
mv 006958/deeplearning/* ~/PycharmProjects/alldeep/
rm -rf 006958

```
/Users/TGIL/anaconda3/envs/alldeep/bin/python
/Users/TGIL/PycharmProjects/alldeep/deep_code/01_My_First_Deeplearning.py
/Users/TGIL/anaconda3/envs/alldeep/lib/python3.6/site-packages/h5py/__init__.py:36:
FutureWarning: Conversion of the second argument of issubdtype from `float` to `np.floating`
is deprecated. In future, it will be treated as `np.float64 == np.dtype(float).type`.
  from ._conv import register_converters as _register_converters
Using TensorFlow backend.
Epoch 1/30
2018-05-11 12:19:16.810991: I tensorflow/core/platform/cpu_feature_guard.cc:140] Your
CPU supports instructions that this TensorFlow binary was not compiled to use: AVX2 FMA

 10/470 [..............................] - ETA: 11s - loss: 1.0000 - acc: 0.0000e+00
300/470 [==================>...........] - ETA: 0s - loss: 0.7905 - acc: 0.1833
470/470 [==============================] - 0s 691us/step - loss: 0.6614 - acc: 0.3149
Epoch 2/30

 10/470 [..............................] - ETA: 0s - loss: 0.0994 - acc: 0.9000
380/470 [========================>......] - ETA: 0s - loss: 0.1578 - acc: 0.8421
470/470 [==============================] - 0s 137us/step - loss: 0.1488 - acc: 0.8511
Epoch 3/30

 10/470 [..............................] - ETA: 0s - loss: 0.1000 - acc: 0.9000
360/470 [=====================>........] - ETA: 0s - loss: 0.1470 - acc: 0.8528
470/470 [==============================] - 0s 141us/step - loss: 0.1488 - acc: 0.8511
Epoch 4/30

 10/470 [..............................] - ETA: 0s - loss: 0.3980 - acc: 0.6000
270/470 [================>.............] - ETA: 0s - loss: 0.1479 - acc: 0.8519
470/470 [==============================] - 0s 202us/step - loss: 0.1488 - acc: 0.8511
Epoch 5/30

 10/470 [..............................] - ETA: 0s - loss: 2.1699e-12 - acc: 1.0000
340/470 [====================>.........] - ETA: 0s - loss: 0.1468 - acc: 0.8529
470/470 [==============================] - 0s 149us/step - loss: 0.1488 - acc: 0.8511
Epoch 6/30

 10/470 [..............................] - ETA: 0s - loss: 0.2000 - acc: 0.8000
370/470 [=====================>.......] - ETA: 0s - loss: 0.1483 - acc: 0.8514
470/470 [==============================] - 0s 167us/step - loss: 0.1487 - acc: 0.8511
Epoch 7/30
```

```
 10/470 [..............................] - ETA: 0s - loss: 0.1000 - acc: 0.9000
160/470 [=========>....................] - ETA: 0s - loss: 0.1501 - acc: 0.8500
440/470 [============================>..] - ETA: 0s - loss: 0.1453 - acc: 0.8545
470/470 [==============================] - 0s 229us/step - loss: 0.1487 - acc: 0.8511
Epoch 8/30

 10/470 [..............................] - ETA: 0s - loss: 0.2000 - acc: 0.8000
430/470 [===========================>...] - ETA: 0s - loss: 0.1530 - acc: 0.8465
470/470 [==============================] - 0s 120us/step - loss: 0.1487 - acc: 0.8511
Epoch 9/30

 10/470 [..............................] - ETA: 0s - loss: 4.9155e-07 - acc: 1.0000
290/470 [==================>...........] - ETA: 0s - loss: 0.1310 - acc: 0.8690
470/470 [==============================] - 0s 194us/step - loss: 0.1487 - acc: 0.8511
Epoch 10/30

 10/470 [..............................] - ETA: 0s - loss: 0.1000 - acc: 0.9000
300/470 [==================>...........] - ETA: 0s - loss: 0.1236 - acc: 0.8767
470/470 [==============================] - 0s 155us/step - loss: 0.1486 - acc: 0.8511
Epoch 11/30

 10/470 [..............................] - ETA: 0s - loss: 0.2000 - acc: 0.8000
420/470 [==========================>....] - ETA: 0s - loss: 0.1463 - acc: 0.8476
470/470 [==============================] - 0s 122us/step - loss: 0.1498 - acc: 0.8447
Epoch 12/30

 10/470 [..............................] - ETA: 0s - loss: 0.2000 - acc: 0.8000
360/470 [=====================>........] - ETA: 0s - loss: 0.1387 - acc: 0.8611
470/470 [==============================] - 0s 155us/step - loss: 0.1486 - acc: 0.8511
Epoch 13/30

 10/470 [..............................] - ETA: 0s - loss: 0.1000 - acc: 0.9000
280/470 [=================>.............] - ETA: 0s - loss: 0.1214 - acc: 0.8786
470/470 [==============================] - 0s 198us/step - loss: 0.1485 - acc: 0.8511
Epoch 14/30

 10/470 [..............................] - ETA: 0s - loss: 0.2000 - acc: 0.8000
350/470 [=====================>........] - ETA: 0s - loss: 0.1510 - acc: 0.8486
470/470 [==============================] - 0s 140us/step - loss: 0.1483 - acc: 0.8511
Epoch 15/30

 10/470 [..............................] - ETA: 0s - loss: 0.1000 - acc: 0.9000
330/470 [=====================>.........] - ETA: 0s - loss: 0.1662 - acc: 0.8333
470/470 [==============================] - 0s 166us/step - loss: 0.1485 - acc: 0.8511
Epoch 16/30

 10/470 [..............................] - ETA: 0s - loss: 0.1014 - acc: 0.9000
240/470 [==============>...............] - ETA: 0s - loss: 0.1605 - acc: 0.8375
470/470 [==============================] - 0s 187us/step - loss: 0.1490 - acc: 0.8447
Epoch 17/30
```

```
  10/470 [..............................] - ETA: 0s - loss: 1.7889e-15 - acc: 1.0000
440/470 [============================>..] - ETA: 0s - loss: 0.1510 - acc: 0.8455
470/470 [==============================] - 0s 123us/step - loss: 0.1479 - acc: 0.8489
Epoch 18/30

  10/470 [..............................] - ETA: 0s - loss: 0.2000 - acc: 0.8000
390/470 [=========================>......] - ETA: 0s - loss: 0.1389 - acc: 0.8564
470/470 [==============================] - 0s 138us/step - loss: 0.1482 - acc: 0.8468
Epoch 19/30

  10/470 [..............................] - ETA: 0s - loss: 0.3000 - acc: 0.7000
250/470 [===============>..............] - ETA: 0s - loss: 0.1780 - acc: 0.8200
470/470 [==============================] - 0s 207us/step - loss: 0.1476 - acc: 0.8511
Epoch 20/30

  10/470 [..............................] - ETA: 0s - loss: 0.1000 - acc: 0.9000
410/470 [==========================>....] - ETA: 0s - loss: 0.1470 - acc: 0.8512
470/470 [==============================] - 0s 136us/step - loss: 0.1480 - acc: 0.8511
Epoch 21/30

  10/470 [..............................] - ETA: 0s - loss: 0.2997 - acc: 0.7000
350/470 [======================>........] - ETA: 0s - loss: 0.1503 - acc: 0.8486
470/470 [==============================] - 0s 160us/step - loss: 0.1474 - acc: 0.8511
Epoch 22/30

  10/470 [..............................] - ETA: 0s - loss: 0.1000 - acc: 0.9000
230/470 [=============>................] - ETA: 0s - loss: 0.1208 - acc: 0.8739
470/470 [==============================] - 0s 194us/step - loss: 0.1469 - acc: 0.8511
Epoch 23/30

  10/470 [..............................] - ETA: 0s - loss: 0.1000 - acc: 0.9000
420/470 [===========================>....] - ETA: 0s - loss: 0.1485 - acc: 0.8500
470/470 [==============================] - 0s 122us/step - loss: 0.1466 - acc: 0.8511
Epoch 24/30

  10/470 [..............................] - ETA: 0s - loss: 0.2082 - acc: 0.8000
400/470 [=========================>.....] - ETA: 0s - loss: 0.1470 - acc: 0.8500
470/470 [==============================] - 0s 140us/step - loss: 0.1475 - acc: 0.8489
Epoch 25/30

  10/470 [..............................] - ETA: 0s - loss: 0.2996 - acc: 0.7000
230/470 [=============>................] - ETA: 0s - loss: 0.1564 - acc: 0.8435
470/470 [==============================] - 0s 214us/step - loss: 0.1470 - acc: 0.8511
Epoch 26/30

  10/470 [..............................] - ETA: 0s - loss: 2.0794e-05 - acc: 1.0000
300/470 [===================>..........] - ETA: 0s - loss: 0.1499 - acc: 0.8467
470/470 [==============================] - 0s 168us/step - loss: 0.1466 - acc: 0.8511
Epoch 27/30
```

```
 10/470 [..............................] - ETA: 0s - loss: 0.3000 - acc: 0.7000
230/470 [==============>...............] - ETA: 0s - loss: 0.1658 - acc: 0.8304
420/470 [==========================>....] - ETA: 0s - loss: 0.1432 - acc: 0.8548
470/470 [==============================] - 0s 242us/step - loss: 0.1472 - acc: 0.8511
Epoch 28/30

 10/470 [..............................] - ETA: 0s - loss: 0.2000 - acc: 0.8000
360/470 [=====================>........] - ETA: 0s - loss: 0.1430 - acc: 0.8556
470/470 [==============================] - 0s 145us/step - loss: 0.1471 - acc: 0.8511
Epoch 29/30

 10/470 [..............................] - ETA: 0s - loss: 0.1991 - acc: 0.8000
280/470 [================>.............] - ETA: 0s - loss: 0.1548 - acc: 0.8429
470/470 [==============================] - 0s 170us/step - loss: 0.1470 - acc: 0.8489
Epoch 30/30

 10/470 [..............................] - ETA: 0s - loss: 7.8057e-07 - acc: 1.0000
200/470 [==========>..................] - ETA: 0s - loss: 0.1951 - acc: 0.8050
420/470 [==========================>....] - ETA: 0s - loss: 0.1421 - acc: 0.8571
470/470 [==============================] - 0s 267us/step - loss: 0.1461 - acc: 0.8532

 32/470 [=>............................] - ETA: 0s
470/470 [==============================] - 0s 71us/step

 Accuracy: 0.8511

Process finished with exit code 0
```

딥러닝 용어

Training / Test / Validation Set : 오버피팅을 피하는 방법
https://www.youtube.com/watch?v=GtLe9Z2No28

Accuracy, Precision, Recall
https://ko.wikipedia.org/wiki/%EC%A0%95%EB%B0%80%EB%8F%84%EC%99%80_%EC%9E%AC%ED%98%84%EC%9C%A8
https://www.youtube.com/watch?v=1jboC7nWnfM

Epoch http://crmn.tistory.com/8