 # machine-learning-starter-code
Starter code in C++ and Python for Machine Learning

For Python on a public machine, create an environment for your account
python -m venv ~/code

After creation, be sure to enter that Python environment "code":
source bin/activate

Pip install packages needed:

E.g.,

- **python3 -m pip install --upgrade matplotlib**
- **python3 -m pip install --upgrade tensorflow** -- this one is big, so check space with "quota -s" first
- **python3 -m pip install --upgrade jupyterlab** -- this one is big too

(code) sbsiewert@ecc-linux2:~/public_html/csci581/code/pycv_demo$ **python3 -m pip install --upgrade opencv-python**

```
Collecting opencv-python
  Downloading opencv_python-4.11.0.86-cp37-abi3-
manylinux_2_17_x86_64.manylinux2014_x86_64.whl (63.0 MB)
---------------------------- 63.0/63.0 MB 20.6 MB/s eta 0:00:00
Requirement already satisfied: numpy>=1.21.2 in
/var/www/sbsiewert/csci581/code/lib/python3.10/site-packages (from
opencv-python) (2.0.2)
Installing collected packages: opencv-python
Successfully installed opencv-python-4.11.0.86
(code) sbsiewert@ecc-linux2:~/public_html/csci581/code/pycv_demo$
```

Run Python examples:

Simple OpenCV Python program:
python3 demo.py

Simple TensorFlow CNN program:

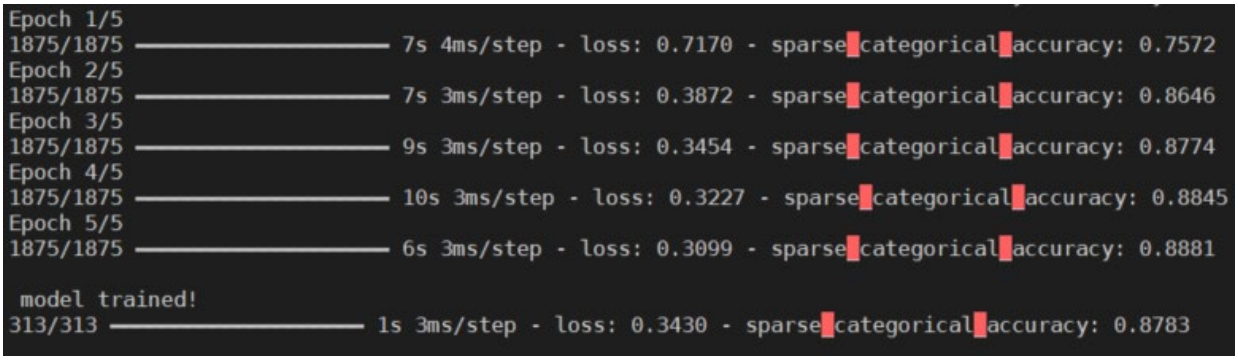
(code) sbsiewert@ecc-linux2:~/public_html/csci581/code/testtf$ **python3 basic.py**

```
Installing dependencies for Colab environment
2025-02-05 11:40:26.488569: I
external/local_xla/xla/tsl/cuda/cudart_stub.cc:32] Could not find cuda
drivers on your machine, GPU will not be used.
2025-02-05 11:40:26.496925: I
external/local_xla/xla/tsl/cuda/cudart_stub.cc:32] Could not find cuda
drivers on your machine, GPU will not be used.
2025-02-05 11:40:26.516070: E
external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:477] Unable to
register                                                    cuFFT
```

```
factory: Attempting to register factory for plugin cuFFT when one has
already been registered
WARNING: All log messages before absl::InitializeLog() is called are
written to STDERR
E0000 00:00:1738784426.547229 1030433 cuda_dnn.cc:8310] Unable to
register cuDNN factory: Attempting to regist
er factory for plugin cuDNN when one has already been registered
E0000 00:00:1738784426.556006 1030433 cuda_blas.cc:1418] Unable to
register cuBLAS factory: Attempting to regi
ster factory for plugin cuBLAS when one has already been registered
2025-02-05 11:40:26.590161: I
tensorflow/core/platform/cpu_feature_guard.cc:210] This TensorFlow binary
is opt                                                    imized to
use available CPU instructions in performance-critical operations.
To enable the following instructions: AVX2 FMA, in other operations,
rebuild TensorFlow with the appropriate c
ompiler flags.

TensorFlow version: 2.18.0

Getting Fashion MNIST dataset

train_images.shape: (60000, 28, 28, 1), of float64
test_images.shape: (10000, 28, 28, 1), of float64

Creating Keras model
/user/home/sbsiewert/public_html/csci581/code/lib/python3.10/site-
packages/keras/src/layers/convolutional/base
_conv.py:107: UserWarning: Do not pass an `input_shape`/`input_dim`
argument to a layer. When using Sequential
models, prefer using an `Input(shape)` object as the first layer in the
model instead.
  super().__init__(activity_regularizer=activity_regularizer, **kwargs)
2025-02-05 11:40:34.802332: E
external/local_xla/xla/stream_executor/cuda/cuda_driver.cc:152] failed
call to c                                                 uInit:
INTERNAL: CUDA error: Failed call to cuInit: UNKNOWN ERROR (303)
Model: "sequential"
```

Layer (type)	Output Shape	Param #
Conv1 (Conv2D)	(None, 13, 13, 8)	80
flatten (Flatten)	(None, 1352)	0
Dense (Dense)	(None, 10)	13,530

```
Total params: 13,610 (53.16 KB)
 Trainable params: 13,610 (53.16 KB)
 Non-trainable params: 0 (0.00 B)

 model compiled!
2025-02-05 11:40:35.447122: W
external/local_xla/xla/tsl/framework/cpu_allocator_impl.cc:83] Allocation
of 188160000 exceeds 10% of free system memory.
```




```
Test accuracy: 0.8758999705314636

 model tested!
export_path = /tmp/basic.keras


Saved model as /tmp/basic.keras

Saved model has been reloaded
(code) sbsiewert@ecc-linux2:~/public_html/csci581/code/testtf$
```