Release Notes

OF CAFFE PORTING ONTO ACL

2017.05.30

****

Contents

[1、Release Version 2](#_Toc491511548)

[2、Release Notes 2](#_Toc491511549)

[2.1、Directory Structure 2](#_Toc491511550)

[2.2、Compiled Environment Prepared 2](#_Toc491511551)

[2.3、Compile ACL 2](#_Toc491511552)

[2.4、Compile Caffe 3](#_Toc491511553)

[2.5、Compile Unit Tests 3](#_Toc491511554)

[2.6、Run tests 3](#_Toc491511555)

[2.6.1 Reference Caffenet 3](#_Toc491511556)

[2.6.2 Unit test 4](#_Toc491511557)

[2.7、Change lists 4](#_Toc491511558)

[2.7.1 Implemented features 4](#_Toc491511559)

[2.7.2 The details of the changes 5](#_Toc491511560)

[2.8、Issues 7](#_Toc491511561)

[2.8.1 ACL compatibility issues 7](#_Toc491511562)

[2.8.2 Report issues 7](#_Toc491511563)

[2.8.3 ACL direct convolution 7](#_Toc491511564)

# 1、Release Version

The release version is 0.2.0. You can download the source code from <https://github.com/OAID/caffeOnACL>

# 2、Release Notes

## 2.1、Directory Structure

Assume the directory structure of the code on firefly3399 is:

ACL：/home/firefly/ComputeLibrary (git clone <https://github.com/ARM-software/ComputeLibrary.git)> (arm\_compute v17.05)

Caffe：/home/firefly/caffeOnACL (git clone <https://github.com/OAID/caffeOnACL>.git)

Googletest: /home/firefly/googletest (git clone https://github.com/google/googletest.git)

## 2.2、Compiled Environment Prepared

sudo apt-get update -y

sudo apt-get upgrade -y

sudo apt-get install build-essential -y

sudo apt-get install -y pkg-config automake autoconf

sudo apt-get install libprotobuf-dev libleveldb-dev libsnappy-dev libhdf5-serial-dev protobuf-compiler -y

sudo apt-get install libatlas-base-dev -y

sudo apt-get install --no-install-recommends libboost-all-dev -y

sudo apt-get install libgflags-dev libgoogle-glog-dev liblmdb-dev -y

sudo apt-get install libopencv-dev -y

sudo apt-get install python-pip python-dev -y

sudo apt-get install -y python-numpy python-scipy

pip install --upgrade pip

sudo apt-get install scons –y

sudo apt-get install git –y

## 2.3、Compile ACL

cd /home/firefly/ComputeLibrary

# When in the cross compile environment, we maybe need the below command line to compile the libOpenCL.so

#aarch64-linux-gnu-gcc opencl-1.2-stubs/opencl\_stubs.c -Iinclude -shared -o build/libOpenCL.so

# pip install subprocess

scons Werror=1 -j8 debug=0 asserts=1 neon=1 opencl=1 embed\_kernels=1 os=linux arch=arm64-v8a

## 2.4、Compile Caffe

cd /home/firefly/caffeOnACL

cp Makefile.config.acl Makefile.config

make all

make distribute

## 2.5、Compile Unit Tests

# compile the gtest libraries

cd /home/firefly/googletest

cmake CMakeLists.txt

make

sudo make install

#compile the unit tests

cd /home/firefly/caffeOnACL/unit\_tests

make clean

make

## 2.6、Run tests

If the output message of the following two tests is same as the examples, it means Caffe poring is success.

### 2.6.1 Reference Caffenet

cd ./data/ilsvrc12/

sudo chmod +x get\_ilsvrc\_aux.sh

./get\_ilsvrc\_aux.sh

cd ../..

cd ./scripts

./download\_model\_binary.py ../models/bvlc\_reference\_caffenet/

cd ..

export LD\_LIBRARY\_PATH = /home/firefly/caffeOnACL/distribute/lib : /home/firefly/ComputeLibrary/build/arm\_compute: /home/firefly/ComputeLibrary/build

#./distribute/bin/classification.bin models/bvlc\_reference\_caffenet/deploy.prototxt models/bvlc\_reference\_caffenet/bvlc\_reference\_caffenet.caffemodel data/ilsvrc12/imagenet\_mean.binaryproto data/ilsvrc12/synset\_words.txt examples/images/cat.jpg

./distribute/bin/classification.bin models/bvlc\_alexnet/deploy.prototxt models/bvlc\_alexnet/bvlc\_alexnet.caffemodel data/ilsvrc12/imagenet\_mean.binaryproto data/ilsvrc12/synset\_words.txt examples/images/cat.jpg

**output message** --

*---------- Prediction for examples/images/cat.jpg ----------*

*0.3094 - "n02124075 Egyptian cat"*

*0.1761 - "n02123159 tiger cat"*

*0.1221 - "n02123045 tabby, tabby cat"*

*0.1132 - "n02119022 red fox, Vulpes vulpes"*

*0.0421 - "n02085620 Chihuahua"*

### 2.6.2 Unit test

cd /home/firefly/caffeOnACL/unit\_tests

export LD\_LIBRARY\_PATH = /home/firefly/caffeOnACL/distribute/lib : /home/firefly/ComputeLibrary/build/arm\_compute: /home/firefly/ComputeLibrary/build

./test\_caffe\_main

**output message**:

*[==========] 29 tests from 6 test cases ran. (1236 ms total)  
 [ PASSED ] 29 tests.*

## 2.7、Change lists

### 2.7.1 Implemented features

There are 10 Layers accelerated by ACL layers

* ConvolutionLayer
* PoolingLayer
* LRNLayer
* ReLULayer
* SigmoidLayer
* SoftmaxLayer
* TanHLayer
* AbsValLayer
* BNLLLayer
* InnerProductLayer

### 2.7.2 The details of the changes

\* The base caffe version is 793bd96351749cb8df16f1581baf3e7d8036ac37

|  |  |  |  |
| --- | --- | --- | --- |
| File | Action | lines added | lines removed |
| Makefile | Modified | 45 | 4 |
| Makefile.config.acl | Added | 140 | 0 |
| cmake/Dependencies.cmake | Modified | 15 | 0 |
| cmake/Modules/FindACL.cmake | Added | 37 | 0 |
| examples/cpp\_classification/classification\_profiling.cpp | Added | 546 | 0 |
| examples/cpp\_classification/classification\_profiling\_gpu.cpp | Added | 546 | 0 |
| include/caffe/acl\_layer.hpp | Added | 246 | 0 |
| include/caffe/caffe.hpp | Modified | 6 | 0 |
| include/caffe/common.hpp | Modified | 10 | 2 |
| include/caffe/layer.hpp | Modified | 91 | 1 |
| include/caffe/layers/acl\_absval\_layer.hpp | Added | 57 | 0 |
| include/caffe/layers/acl\_base\_activation\_layer.hpp | Added | 56 | 0 |
| include/caffe/layers/acl\_bnll\_layer.hpp | Added | 57 | 0 |
| include/caffe/layers/acl\_conv\_layer.hpp | Added | 56 | 0 |
| include/caffe/layers/acl\_inner\_product\_layer.hpp | Added | 54 | 0 |
| include/caffe/layers/acl\_lrn\_layer.hpp | Added | 54 | 0 |
| include/caffe/layers/acl\_pooling\_layer.hpp | Added | 54 | 0 |
| include/caffe/layers/acl\_relu\_layer.hpp | Added | 56 | 0 |
| include/caffe/layers/acl\_sigmoid\_layer.hpp | Added | 55 | 0 |
| include/caffe/layers/acl\_softmax\_layer.hpp | Added | 54 | 0 |
| include/caffe/layers/acl\_tanh\_layer.hpp | Added | 56 | 0 |
| include/caffe/util/device\_alternate.hpp | Modified | 4 | 0 |
| include/caffe/util/hdf5.hpp | Modified | 2 | 0 |
| models/SqueezeNet/README.md | Added | 4 | 0 |
| models/SqueezeNet/SqueezeNet\_v1.1/squeezenet.1.1.deploy.prototxt | Added | 556 | 0 |
| src/caffe/acl\_layer.cpp | Added | 274 | 0 |
| src/caffe/common.cpp | Modified | 10 | 2 |
| src/caffe/layer.cpp | Modified | 74 | 0 |
| src/caffe/layer\_factory.cpp | Modified | 61 | 1 |
| src/caffe/layers/absval\_layer.cpp | Modified | 2 | 0 |
| src/caffe/layers/acl\_absval\_layer.cpp | Added | 64 | 0 |
| src/caffe/layers/acl\_base\_activation\_layer.cpp | Added | 97 | 0 |
| src/caffe/layers/acl\_bnll\_layer.cpp | Added | 61 | 0 |
| src/caffe/layers/acl\_conv\_layer.cpp | Added | 218 | 0 |
| src/caffe/layers/acl\_inner\_product\_layer.cpp | Added | 131 | 0 |
| src/caffe/layers/acl\_lrn\_layer.cpp | Added | 144 | 0 |
| src/caffe/layers/acl\_pooling\_layer.cpp | Added | 150 | 0 |
| src/caffe/layers/acl\_relu\_layer.cpp | Added | 70 | 0 |
| src/caffe/layers/acl\_sigmoid\_layer.cpp | Added | 61 | 0 |
| src/caffe/layers/acl\_softmax\_layer.cpp | Added | 117 | 0 |
| src/caffe/layers/acl\_tanh\_layer.cpp | Added | 63 | 0 |
| src/caffe/layers/bnll\_layer.cpp | Modified | 2 | 0 |
| src/caffe/layers/hdf5\_data\_layer.cpp | Modified | 2 | 0 |
| src/caffe/layers/hdf5\_data\_layer.cu | Modified | 2 | 0 |
| src/caffe/layers/hdf5\_output\_layer.cpp | Modified | 2 | 0 |
| src/caffe/layers/hdf5\_output\_layer.cu | Modified | 2 | 0 |
| src/caffe/layers/inner\_product\_layer.cpp | Modified | 2 | 0 |
| src/caffe/net.cpp | Modified | 16 | 0 |
| src/caffe/solvers/sgd\_solver.cpp | Modified | 10 | 0 |
| src/caffe/syncedmem.cpp | Modified | 19 | 0 |
| src/caffe/test/test\_hdf5\_output\_layer.cpp | Modified | 2 | 0 |
| src/caffe/test/test\_hdf5data\_layer.cpp | Modified | 2 | 0 |
| src/caffe/util/hdf5.cpp | Modified | 2 | 0 |
| src/caffe/util/math\_functions.cpp | Modified | 4 | 0 |
| unit\_tests/Makefile | Added | 87 | 0 |
| unit\_tests/pmu.c | Added | 376 | 0 |
| unit\_tests/pmu.h | Added | 130 | 0 |
| unit\_tests/prof\_convolution\_layer.cpp | Added | 302 | 0 |
| unit\_tests/sgemm.cpp | Added | 74 | 0 |
| unit\_tests/test.cpp | Added | 37 | 0 |
| unit\_tests/test\_caffe\_main.cpp | Added | 34 | 0 |
| unit\_tests/test\_common.cpp | Added | 64 | 0 |
| unit\_tests/test\_convolution\_layer.cpp | Added | 888 | 0 |
| unit\_tests/test\_fail.cpp | Added | 419 | 0 |
| unit\_tests/test\_inner\_product\_layer.cpp | Added | 295 | 0 |
| unit\_tests/test\_lrn\_layer.cpp | Added | 344 | 0 |
| unit\_tests/test\_neuron\_layer.cpp | Added | 358 | 0 |
| unit\_tests/test\_pooling\_layer.cpp | Added | 652 | 0 |
| unit\_tests/test\_softmax\_layer.cpp | Added | 99 | 0 |
| unit\_tests/testbed.c | Added | 146 | 0 |
| unit\_tests/testbed.h | Added | 10 | 0 |

## 2.8、Issues

### ACL compatibility issues

There are some compatibility issues between ACL and caffe Layers, we bypass it to Caffe’s original layer class as the workaround solution for the below issues

* Normalization in-channel issue
* Tanh issue
* Even Kernel size
* Softmax supporting multi-dimension issue
* Group issue
* Performance need be fine turned in the future

### Report issues

If you encounter any issue, you could input issues into <https://github.com/OAID/caffeOnACL/issues> with the details description about how to duplicate the issue.

### ACL direct convolution

In ACL v17.06, ACL support 1x1 and 3x3 convolution which is named as direct convolution for NEON. It can be enabled by the below command:

export DIRECTCONV=1

in console, the message is shown

DIRECTCONV<1>

DIRECTCONV: 1