# TrackerGoturn

Performance Report

2017-10-20

OPEN AI LAB

# Revision Record

| Date | Rev | Change Description | Author |
|---|---|---|---|
| 2017-10-20 | 0.1.0 | Initial version | 乐毅 |
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# catalog

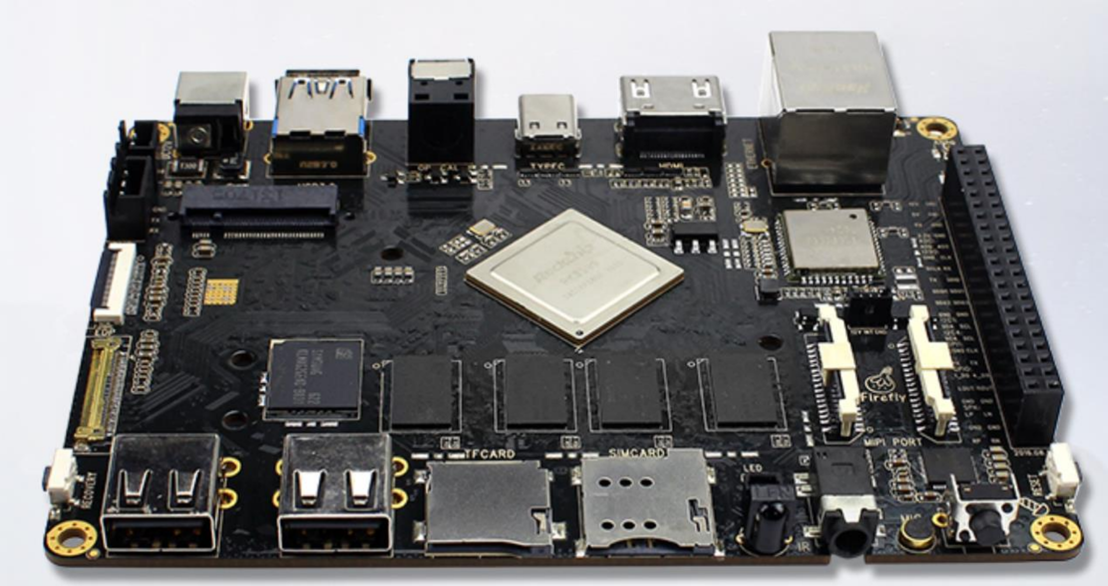
# 1 Purpose

This Report is tested on RK3399 platform ,the Arm Compute Library is version 17.10 and the CaffeOnACL is version 0.4.0.

# 2 Test Environment

## 2.1 Hardware SoC : Rockchip RK3399

- GPU: Mali T864 (800MHz)
- CPU: Dual-core Cortex-A72 up to 2.0GHz (real frequency is 1.8GHz); Quad-core Cortex-A53 up to 1.5GHz (real frequency is 1.4GHz)
- Camera:1080P USB Camera



## 2.2 Software Environment: Ubuntu 16.04

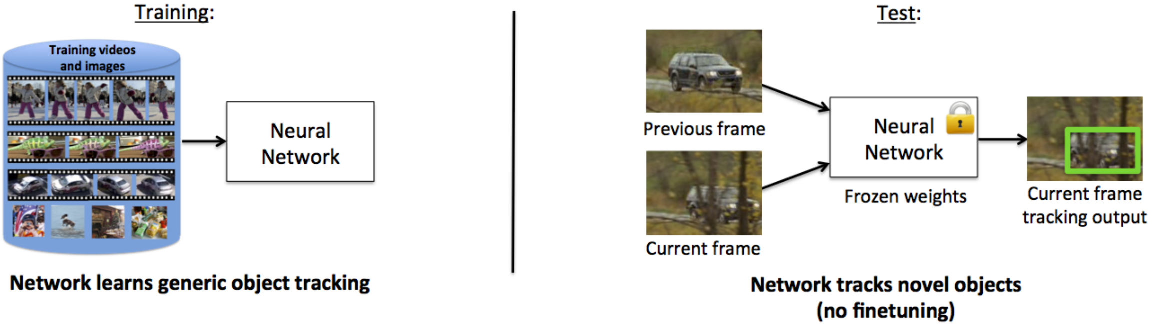
- Operating System : Ubuntu 16.04 SMP
- Arm Compute Library(ACL): 17.10
- CaffeOnACL: 0.4.0
- OpenCV: 3.3.0
- Trax: 1.2.0

# 3 Principle of TrackerGoturn

TrackerGoturn is a tracker using SqueezeNet based GOTURN: Generic Object Tracking Using Regression Networks. GOTURN appeared in “Learning to Track at 100 FPS with Deep Regression Networks, David Held, Sebastian Thrun, Silvio Savarese”, release on European Conference on Computer Vision (ECCV 2106).

GOTURN addresses the problem of single target tracking: given a bounding box label of an object in the first frame of the video, we track that object through the rest of the video.

Note that our current method does not handle occlusions; however, it is fairly robust to viewpoint changes, lighting changes, and deformations. Here is a brief overview of how our system works:


Training:
Training videos and images
Neural Network
Network learns generic object tracking
Test:
Previous frame
Current frame
Neural Network
Frozen weights
Current frame tracking output
Network tracks novel objects (no finetuning)

Using a collection of videos and images with bounding box labels (but no class information), we train a neural network to track generic objects. At test time, the network is able to track novel objects without any fine-tuning. By avoiding fine-tuning, our network is able to track at 100 fps(GPU).

# 4 Download and Compile

TrackerGoturn source code: https://github.com/OAID/TrackerGoturn

Enter “git https://github.com/OAID/TrackerGoturn” command to clone the source code on RK3399 Linux Terminal.

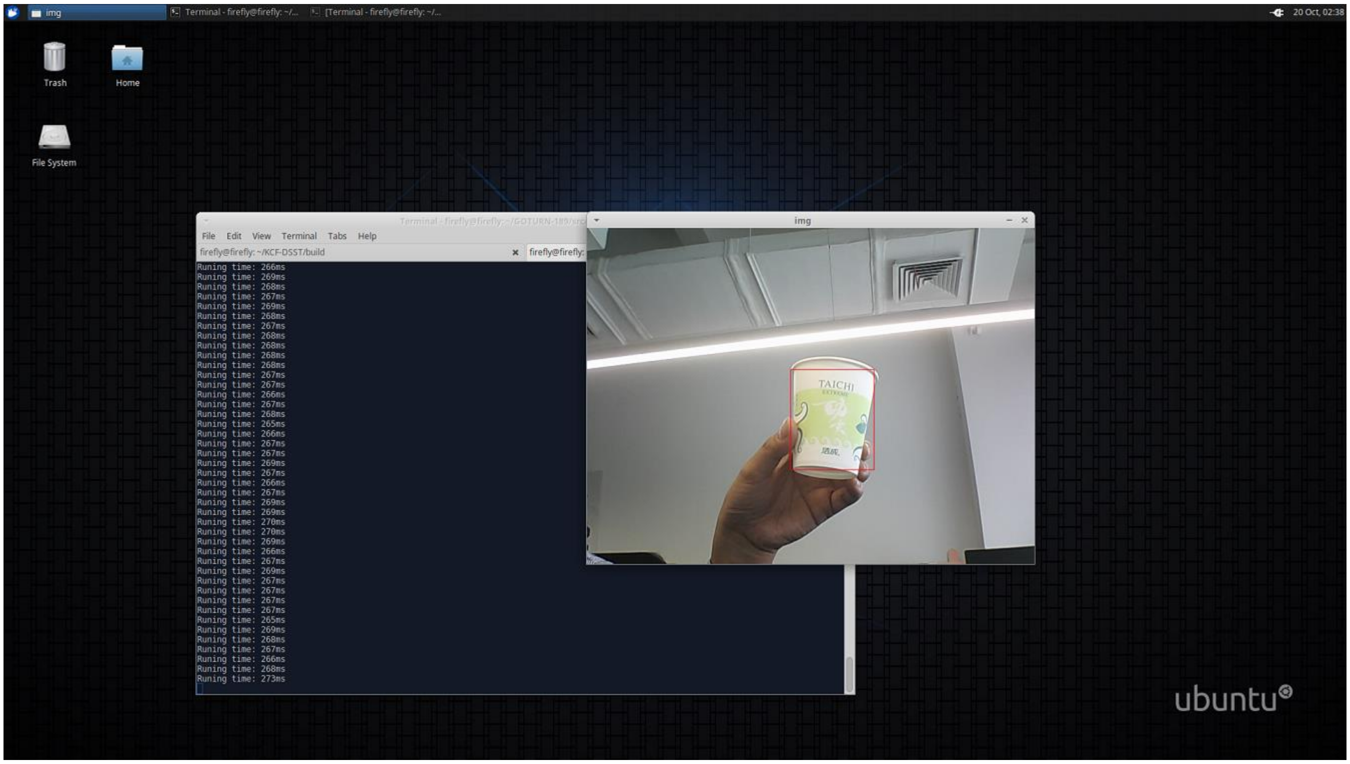
Installation Guide is here:

https://github.com/OAID/TrackerGoturn/blob/master/TrackerGoturnDemo/INSTALL.md

# 5 Performance

The result of TrakerGoturn running on RK3399 as following picture:

OpenBLAS Mode means all layer running with OpenBLAS, BYPASSACL=0xFFFF, Mix Mode means BYPASSACL is set to 0xFFC7, the layer of FC, LRN and POOLING running with ACL and others running with OpenBLAS.


img
Terminal - firefly@firefly: ~/...
[Terminal - firefly@firefly: ~/...
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Trash
Home
File System
File
Edit
View
Terminal
Tabs
Help
firefly@firefly: ~/KCF-DSST/build
firefly@firefly:
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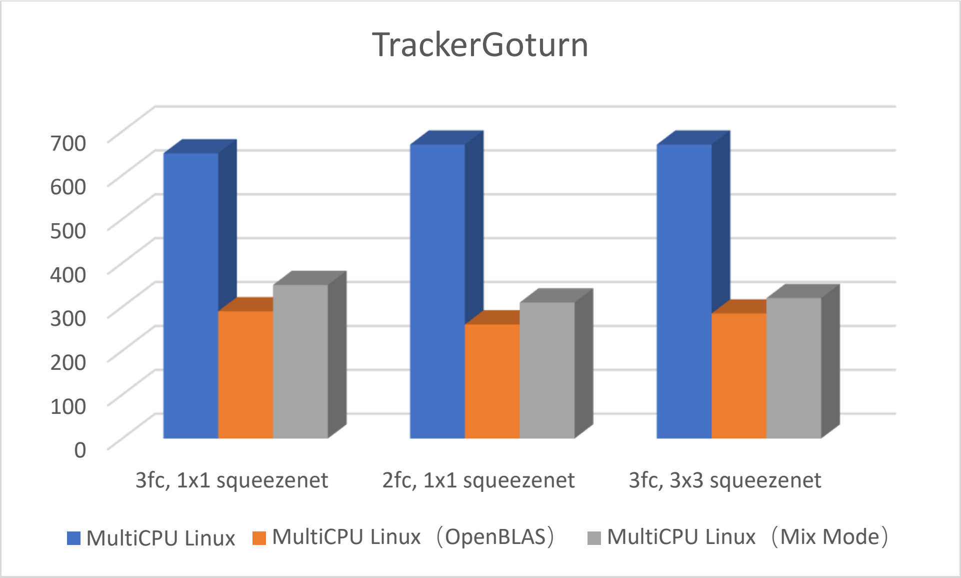
Runing time: 273ms
```

## 5.1 Multi-CPU performance

Multi-CPU scheduled by Linux kernel without any CPU binding. The input video is 480P(640x480), format is YUYV(YUV422).

The SqueezeNet convolutional kernel can be 1x1 and 3x3 sizes, and the end of SqueezeNet can be 3 full connection layers or 2 full connection layers, the CPU performance as following table.

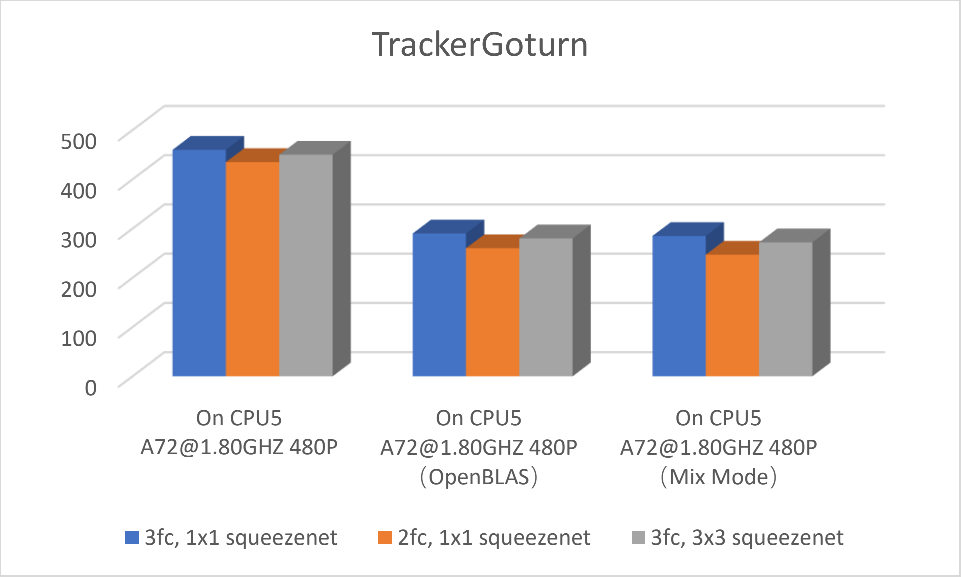
| | 3fc, 1x1 squeezenet | 2fc, 1x1 squeezenet | 3fc, 3x3 squeezenet |
|---|---|---|---|
| MultiCPU Linux | 650ms/frame | 670ms/frame | 670ms/frame |
| MultiCPU Linux（OpenBLAS） | 290ms/frame | 260ms/frame | 285ms/frame |
| MultiCPU Linux（Mix Mode） | 350ms/frame | 310ms/frame | 320ms/frame |



## 5.2 Single CPU performance

### 5.2.1 Single A72 CPU performance

| | 3fc, 1x1 squeezenet | 2fc, 1x1 squeezenet | 3fc, 3x3 squeezenet |
|---|---|---|---|
| On CPU5 A72@1.80GHZ 480P | 460ms/frame | 435ms/frame | 450ms/frame |
| On CPU5 A72@1.80GHZ 480P （OpenBLAS） | 290ms/frame | 260ms/frame | 280ms/frame |
| On CPU5 A72@1.80GHZ 480P （Mix Mode） | 285ms/frame | 247ms/frame | 272ms/frame |



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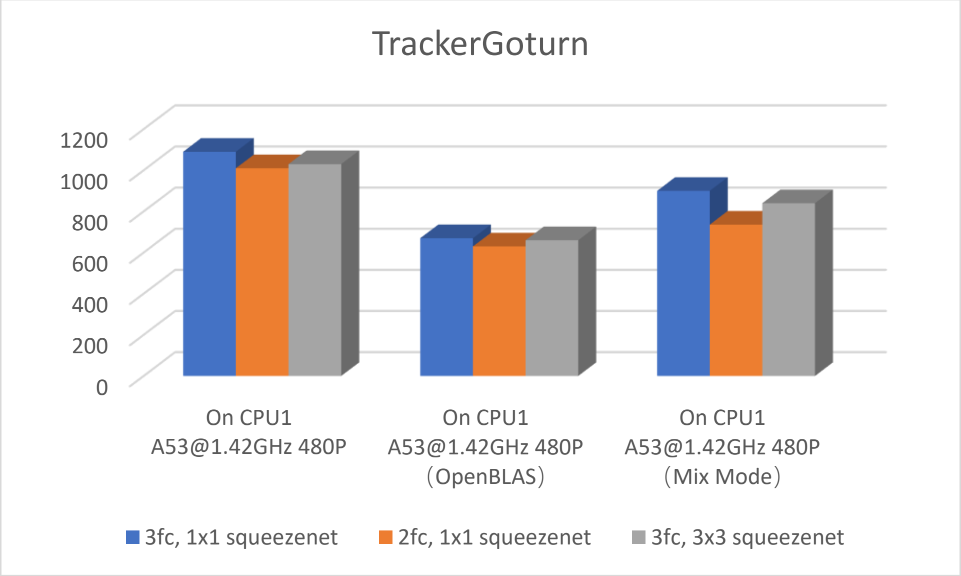
### 5.2.2 Single A53 CPU performance

| | 3fc, 1x1 squeezenet | 2fc, 1x1 squeezenet | 3fc, 3x3 squeezenet |
|---|---|---|---|
| On CPU1 A53@1.42GHz 480P | 1090ms/frame | 1010ms/frame | 1030ms/frame |
| On CPU1 A53@1.42GHz 480P （OpenBLAS） | 670ms/frame | 630ms/frame | 660ms/frame |
| On CPU1 A53@1.42GHz 480P （Mix Mode） | 900ms/frame | 736ms/frame | 840ms/frame |


TrackerGoturn
On CPU1 A53@1.42GHz 480P
On CPU1 A53@1.42GHz 480P （OpenBLAS）
On CPU1 A53@1.42GHz 480P （Mix Mode）
■ 3fc, 1x1 squeezenet
■ 2fc, 1x1 squeezenet
■ 3fc, 3x3 squeezenet