Image Classification
(Version 1.0)

1. Introduction

Image classification is the task of predicting what an image represents. The classification model is trained to predict different types of images. The model accepts the input as an image and produces the output as probability of resemblance of certain object present in image. The image classification model library used here is extracted from Vitis AI Library.

This application can run on machine with Alveo U200 (shell: xilinx_u200_xdma_201830_2).

1.1 Application brief architecture

2. Container Feature Set
- Model used: GoogleNet_v1
- Used JPEG decoder.

3. Full Feature Set
- Model supports: GoogleNet, ResNet50
- Supports with and without JPEG decoder.

4. Application
The inclusion of deep NN made the task of image classification very effective and this leads to a rapid increase in real-time applications. Some of the applications are labeling an image, categorization for websites with large visual databases, visual search for similar products using reference image etc., where the application can be easily run in a few minutes in the Nimbix cloud or on premises.

5. Performance Spec

256.46 fps achieved by running 5K images randomly picked from Imagenet dataset on following platform:
CPU: Intel(R) Core(TM) i7-4770 CPU @ 3.40GHz
FPGA: Alveo-U200

6. Supported platform
Ubuntu
7. **Supported cloud provider**
   Nimbix

8. **Name and Version Information**
   ImageClassification_u200_2020.1_v1.0

9. **Contact Information**

10. **Key Labels / Tag Words**
    Image classification, DNN, Computer vision, Artificial intelligence

11. **Test Result**
    Pass

12. **Tutorial on how to run the application**

   12.1 **On Premises**

   13.1.1 **Prerequisites**
   To run the FPGA application container on a host, Xilinx XRT, driver, and board shell must be installed as well as Docker.

   Xilinx does provide a convenient script to install all dependencies at once: [https://github.com/Xilinx/Xilinx_Base_Runtime](https://github.com/Xilinx/Xilinx_Base_Runtime)

   Docker installation procedures can be found in their documentation: [https://docs.docker.com/engine/install/](https://docs.docker.com/engine/install/)

   Download xbutler_3.0-2.deb using following link: [https://github.com/Xilinx/Vitis-AI/tree/master/alveo/packages/ubuntu](https://github.com/Xilinx/Vitis-AI/tree/master/alveo/packages/ubuntu)

   Type the following command to install
   ```
   sudo apt-get install -y <path to xbutler_3.0-2.deb>
   ```

   Download xplusml-bins using following link:
   ```
   ```

   Type the following command to install
   ```
   sudo apt-get install -y <path to xplusml-bins-18.04.deb>
   ```

   13.1.2 **How to Run Application**
   Clone the Xilinx_Base_Runtime Repository
   ```
   >> git clone [https://github.com/Xilinx/Xilinx_Base_Runtime](https://github.com/Xilinx/Xilinx_Base_Runtime)
Now set up the XRT environment variables like xocl, xclmgmt and the alveo card source the below script for this.

```
source Xilinx_Base_Runtime/utilities/xilinx_docker_setup.sh
```

Now all the setup is done, and you are good to run the docker image using the below command.

```
```

After you run the docker image it will create a new environment that will have all the dependencies installed from the image package after you run it, it will look something like below:

```
>> root@19d4f3182958:/#
```

The transverse to the directory and run the application from there, as shown below:

```
>> root@19d4f3182958:/# cd /opt/xilinx/classification/
>> root@19d4f3182958:/# source run.sh
```

### 12.2 Nimbix

#### 12.2.1 How to Run Application

```
>> root@19d4f3182958:/# cd /opt/xilinx/classification/
>> root@19d4f3182958:/# source run.sh
```