Object Detection/Classification

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Introduction

The task is to detect and classify different objects from real time video feed with high accuracy and minimum compute power. The application will work on mobile devices and it uses hardware acceleration due to the limited availability of compute power.

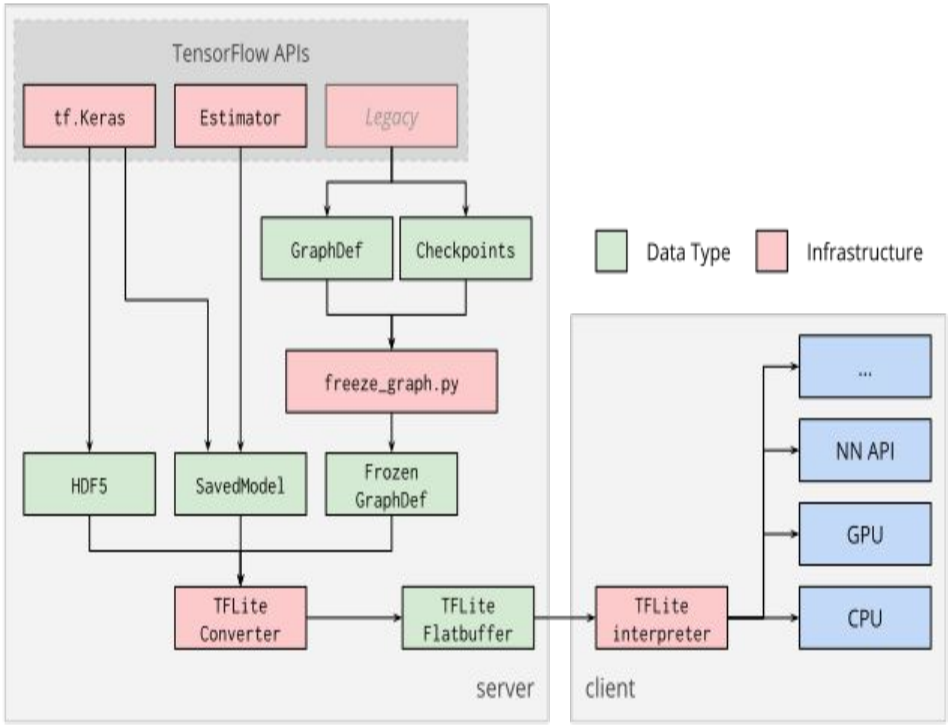
Software/Hardware Requirements

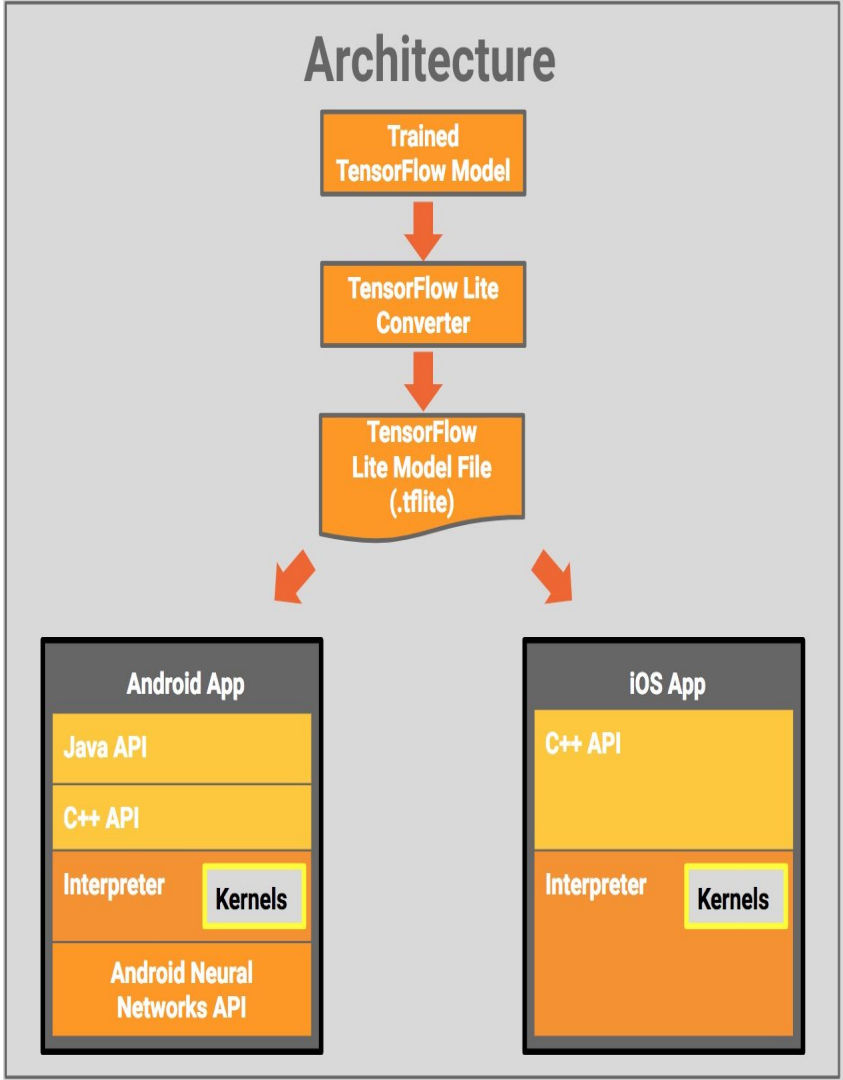
The application will work on android devices and it will require permission for accessing camera. There are no other special permissions required to install the app. It will work on android devices with minimum api level of 21.

The target Sdk version is 26 and BuildToolsVersion is 27.0.1. The android app can be compiled in Android studio with version 3.2.1 or above. The Native Development Kit(NDK) with version 16 or above should also be installed to compile the app.

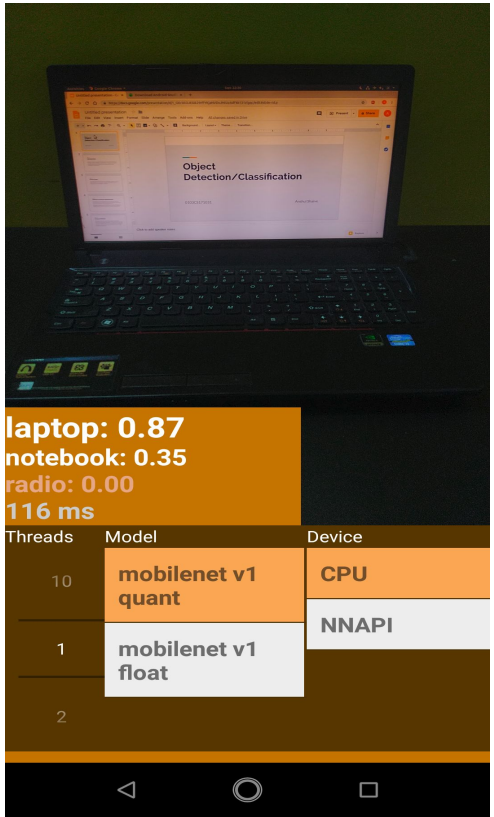
Proposed Method

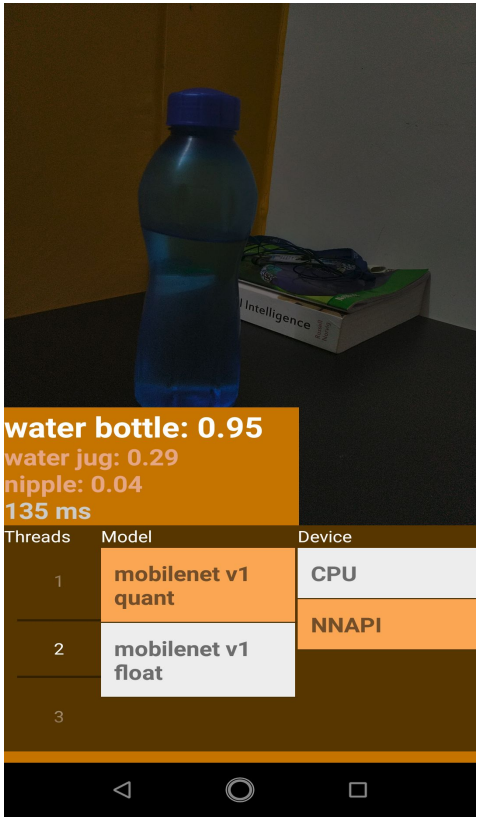
The app uses a quantized model of the mobilenet neural network architecture, created with TensorflowLite. The model has been trained on a dataset containing images of 1000 different categories. The model is then converted to a .tflite file which is used in the app. The app uses NNAPI for hardware acceleration and can run upto 10 threads at a time for faster detection and classification.

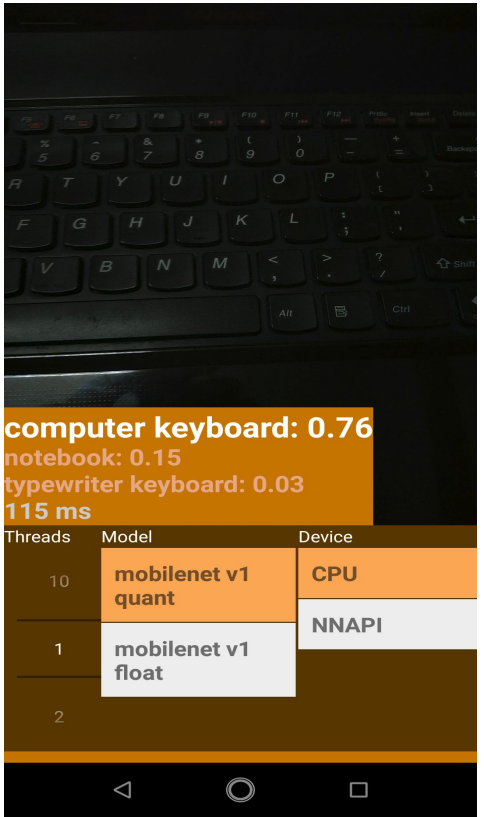

TensorFlow APIs
tf.Keras
Estimator
Legacy
GraphDef
Checkpoints
freeze_graph.py
HDF5
SavedModel
Frozen GraphDef
TFLite Converter
TFLite Flatbuffer
server
Data Type
Infrastructure
TFLite interpreter
...
NN API
GPU
CPU
client


Architecture
Trained TensorFlow Model
TensorFlow Lite Converter
TensorFlow Lite Model File (.tflite)
Android App
Java API
C++ API
Interpreter
Kernels
Android Neural Networks API
iOS App
C++ API
Interpreter
Kernels

Result/Working Model







Future Scope

The application can be integrated and used in other tasks such as target recognition and tracking. It can also be integrated with security cameras for automated intelligent surveillance. Object detection is also a major task in robotics and this model can be used in a robot and other computer vision applications.