Fruit-size mobile app instruction (V1.0)

1. The Fruit-size app is an android mobile phone or tablet based application, developed by the CQU Sensors in Ag research group. This app uses a simple yellow circle marker as reference and utilises image processing techniques (mainly based on OpenCV) and the thin lens theorem to estimate fruit (on-tree or off-tree) size (length and width), with mango, avocado, apple and citrus trialled. The app also reads geolocation data from the phone so that the fruit size information can be presented on the website www.fruitmaps.com, with display by farm block (average and frequency distribution).

2. Phone requirements: We recommend the following configurations:
   (i)   Android based mobile phone or tablet;
   (ii)   5 inch or bigger screen size;
   (iii) rear camera video resolution of 2M pixels or larger (1920x1080 pixels, 16:9 ratio aspect preferable)

   Note: this app itself doesn't need access a 3G connection unless you want to upload the fruit size information to our website.

3. Installation:
   i)   Connect mobile phone to a computer using a mini-usb cable. Copy the fruitsize.apk to mobile phone storage;
   ii)   Double click the app and install it as prompt
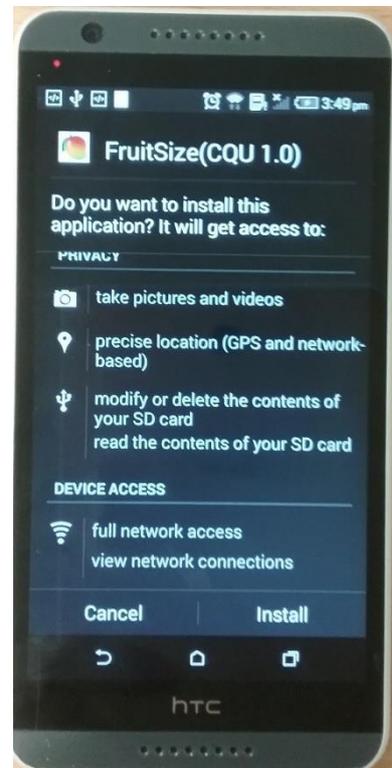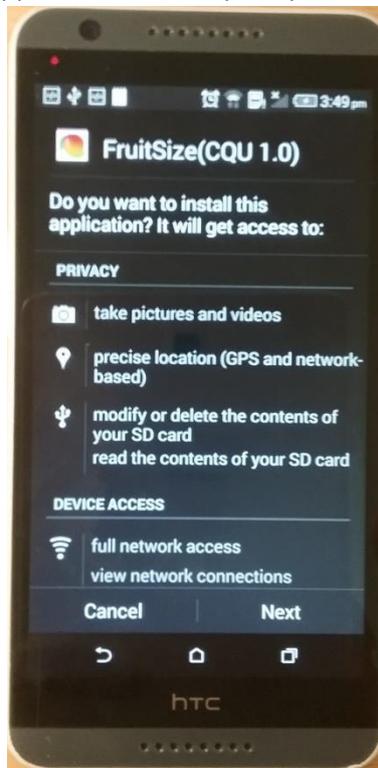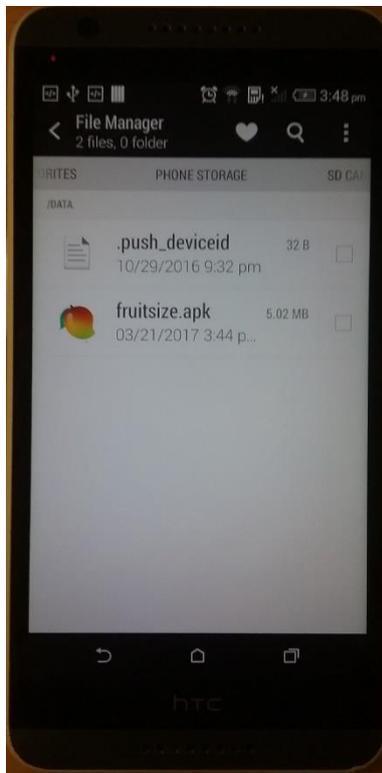
iii) After installation, run or open the app, and it will prompt to install OpenCV manager (OpenCV dynamic library) for a 32 bit mobile phone. This is not required for a 64 bit system.

iv) Click "yes" and it will redirect to the google play to install OpenCV manager (Be aware: the OpenCV app will cost your around 31MB of internet data – do this when on a wireless network).
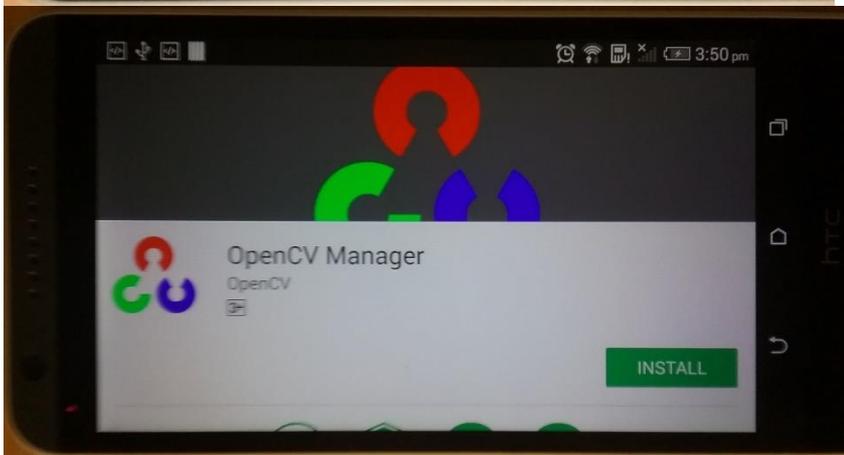
v) After installation of OpenCV, click return symbol to return the fruitsize app.
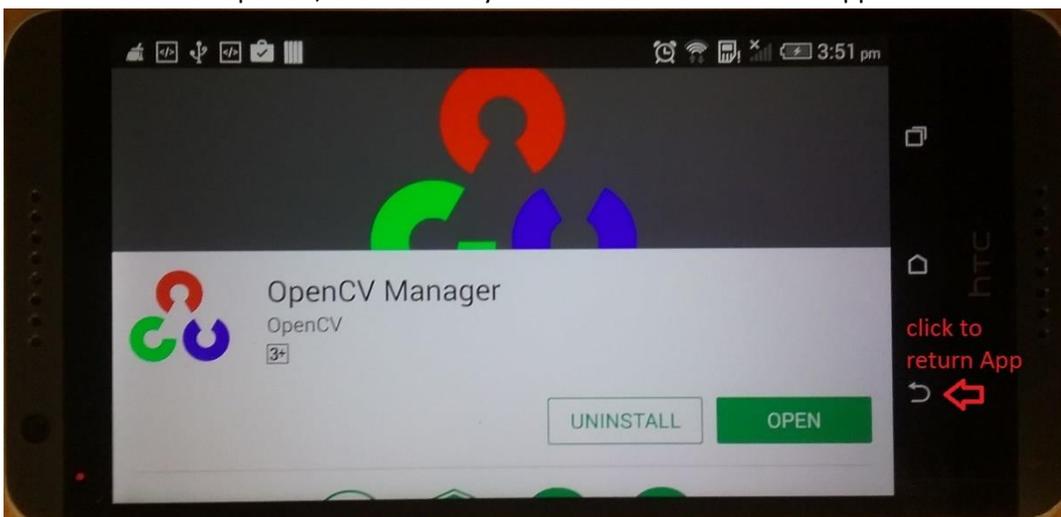
vi) Camera video should then be seen within the app desktop:
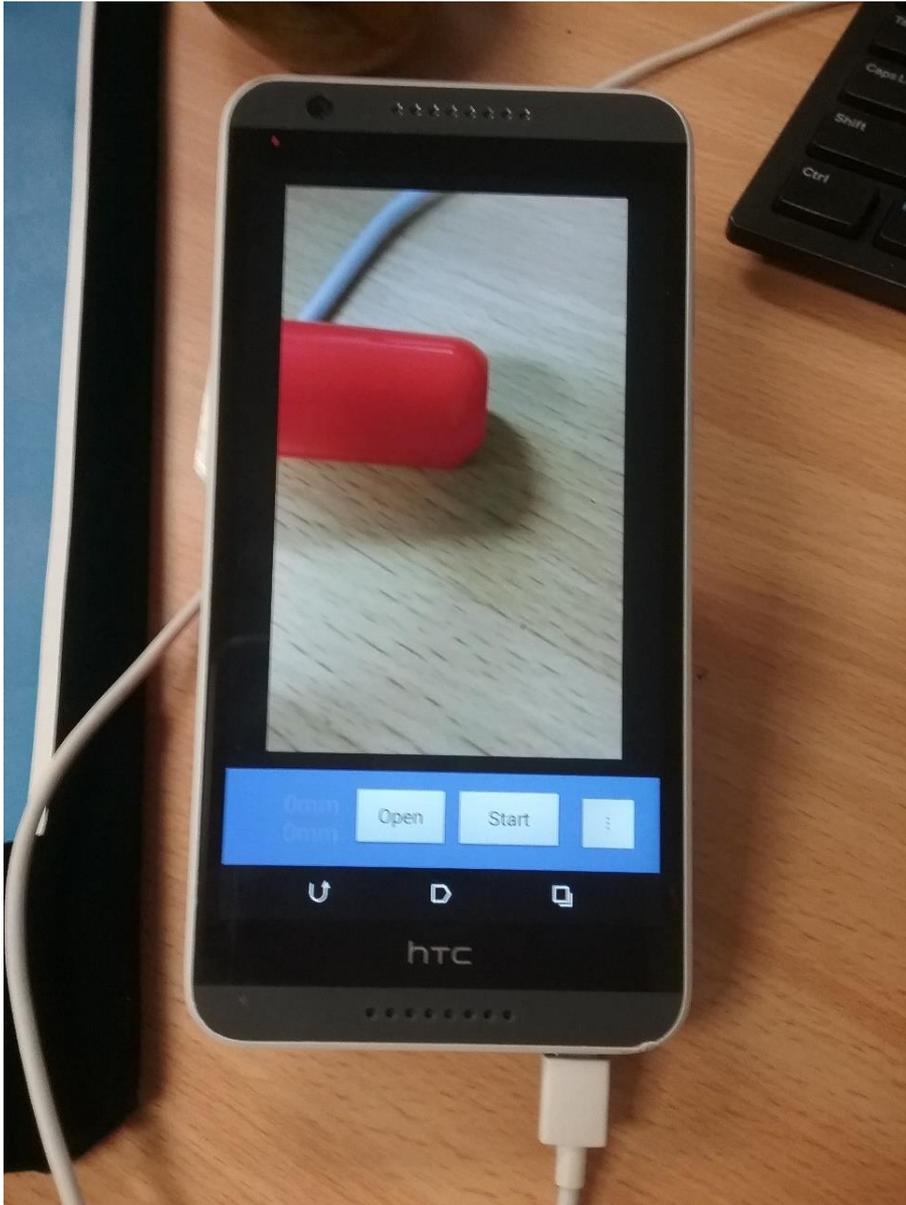
Open: open a fruit image from your photo collection and estimate its size. Click open, it will prompt a dialogue to ask you to select a image. Then the app will analyse the image and return a estimation of size. Notice, please select gallery → camera → target image; images at other paths will cause errors.

Start: capture video and auto-focus on the fruit. Once you see a clear image for fruit, click start button to capture a still image. Then, the app will analyse the image and return a estimation of size.

...: setting menu. This allows selection of fruit type, e.g. mango, avocado, apple and citrus. Users who have an account on www.fruitmaps.com can also upload the fruit size information to the website through here.

0mm(text box): return size estimation in millimeters or fault messages.

vii) Test a fruit. Place the fruit on our specific blue background with a yellow circle marker. (Print the attached marker paper with colour printer.)
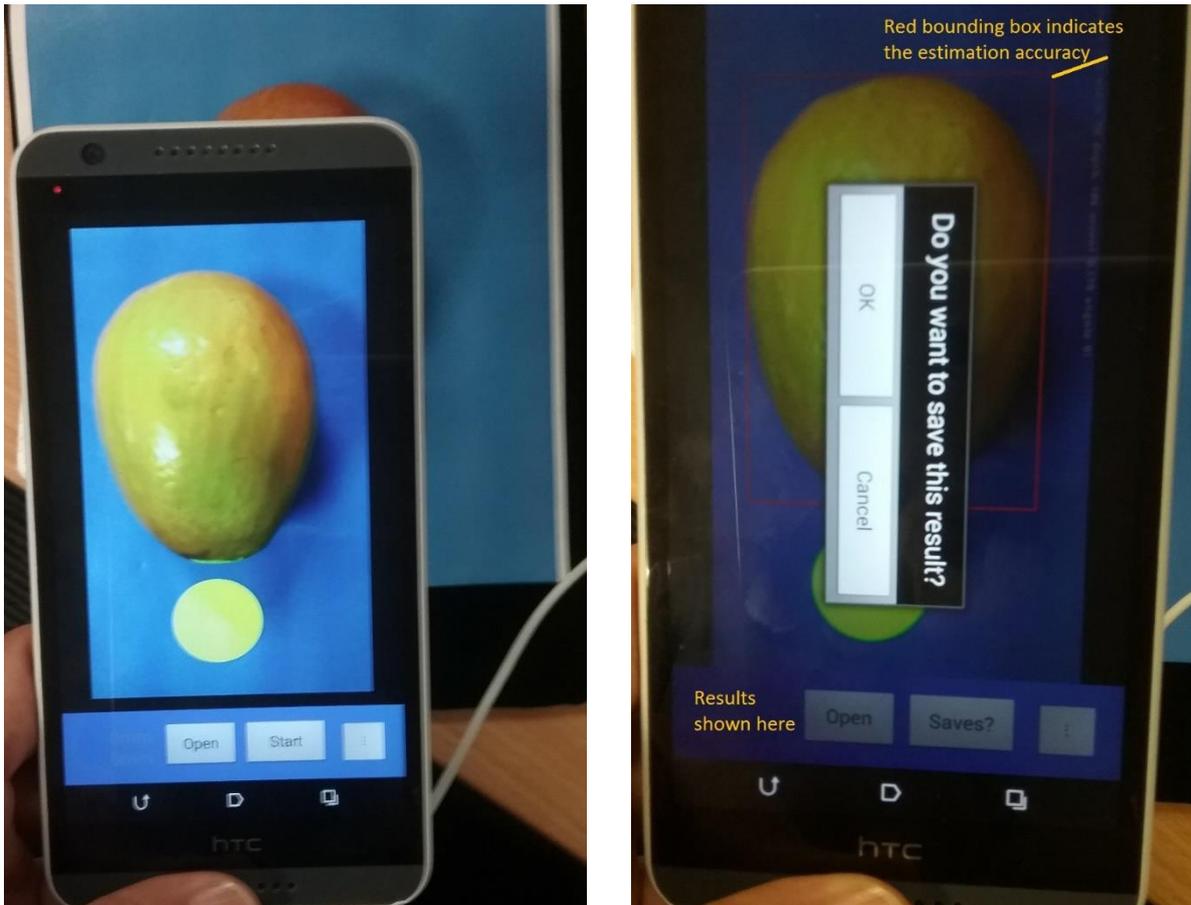
viii) Wrong messages

No file	Fail to read a specific file through "Open" button. Usually, file path is not under gallery/camera
No mark	No yellow circle mark or part of it outside the image
Not level	The circle mark in the image should be quite close to a circle unless your phone is tilted (not level to the mark)
Too close	Distance between camera to circle is smaller than 150 mm
Too far	Distance between camera to circle is bigger than 300 mm
No fruit	No fruit or part of fruit outside the image or selection of a wrong fruit type (e.g., select apple in setting menu but image a mango)
Slant fruit	The fruit is not vertically placed. A slanted fruit will cause a wrong length and width estimation. This message is only for mango and avocado.
Failed	Uncertain reasons