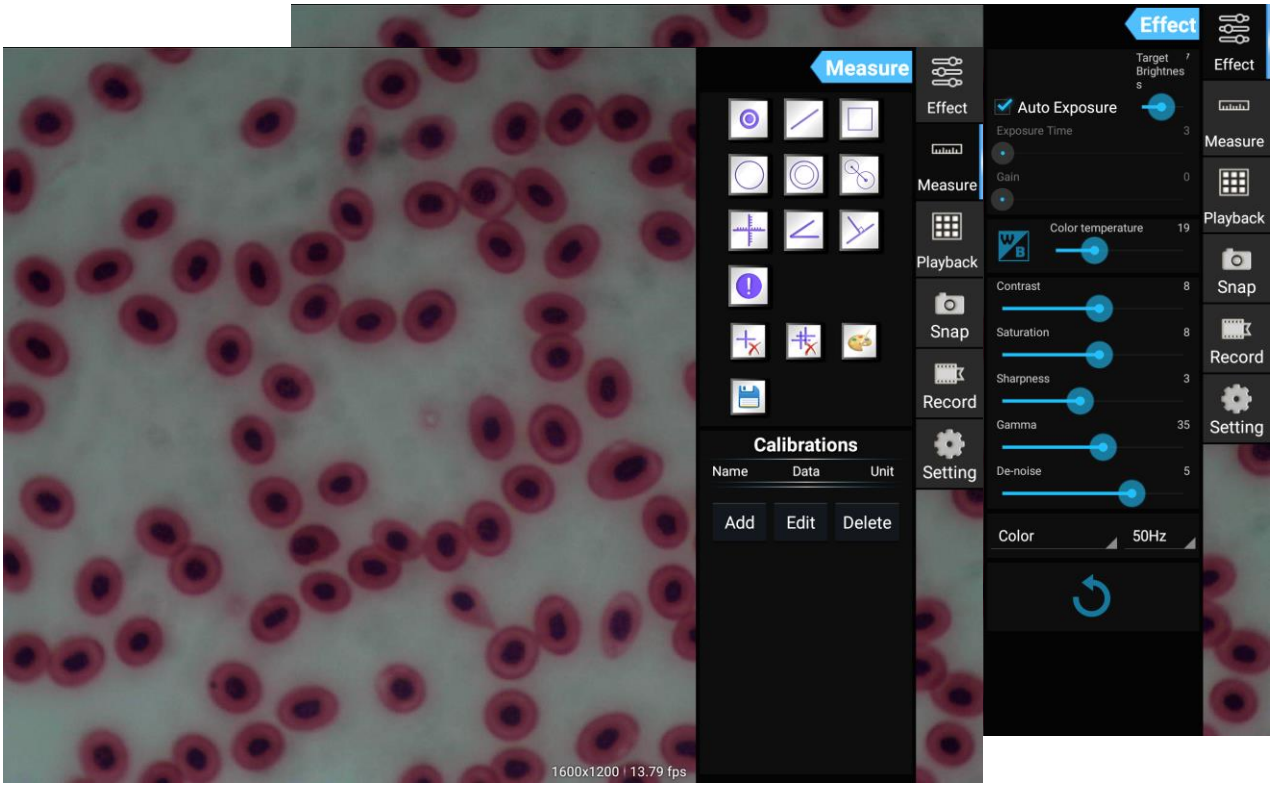
User Manual

Real-Time Measurement Software for Android



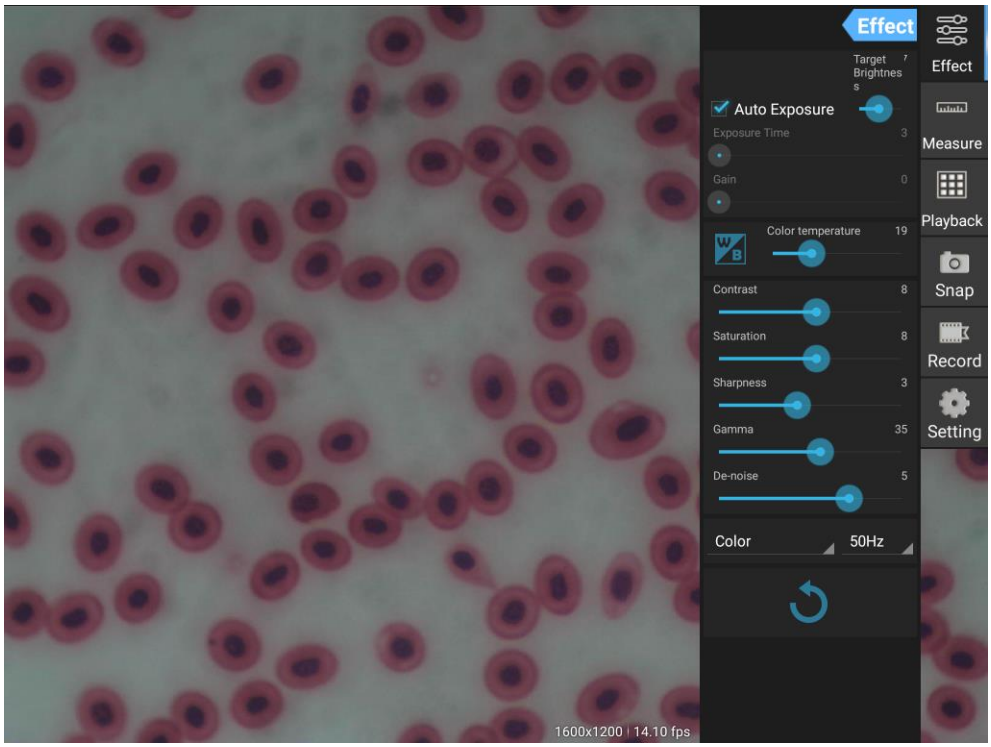
v1.6 2016.08.02

1. Introduction

This APP is a camera application for android device. This APP can adjust image parameter, measure the objects, and capture image and video from the camera.

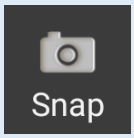
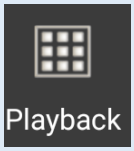
This APP also provided simple image processing feature for particles analysis.

2. Camera User Interface



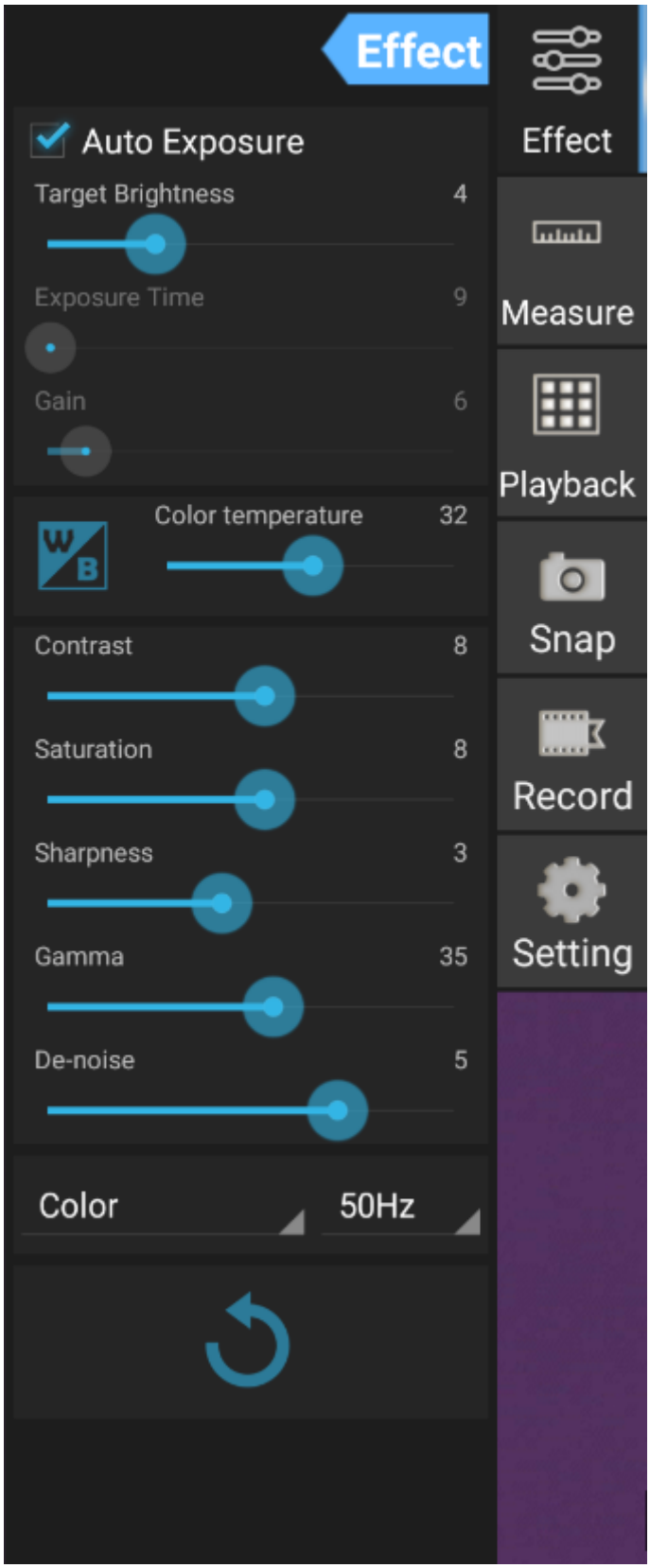
1. Preview Image – show live video of the camera.
2. Tool Panel – Control panels, capture, adjust parameter, measurement, etc.
   2.1 Camera parameter adjustment.
   2.2 Measurement
   2.3 Image and video playback.
   2.4 Take pictures and record video.
   2.5 Setting

3. Capture and Playback

	Click “Snap” button to take a picture. Select picture size in the setting interface.
	Click “Record” button to start video recording, click again to stop video recording. If preview size is smaller than 1080p, the video size is same as preview size. If preview size is bigger than 1080p, the video size will down to a size smaller than 1080p.
	Show picture just captured. Play video file which just saved. The picture will be opened in **Image Analysis** interface.

4. Adjust image parameter of camera

When the color of image is not very good, adjust the effect of image by “Effect” panel.



Exposure:

Auto mode: Brightness of the image will be automatically adjusted, you can also adjust the target brightness.

Manual mode: Manually adjust exposure time and gain.

White Balance:

Once AWB: Click  icon to trigger once auto white balance.
Manual WB: Manually adjust color temperature.

Color Adjustment

Contrast, Saturation, sharpness and gamma of the image can be adjusted too.

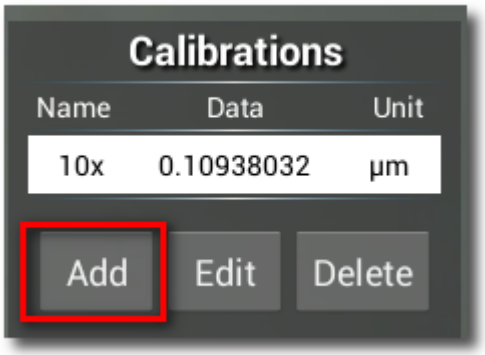
Click the reset button  to restore the paramters.

5. Measurement

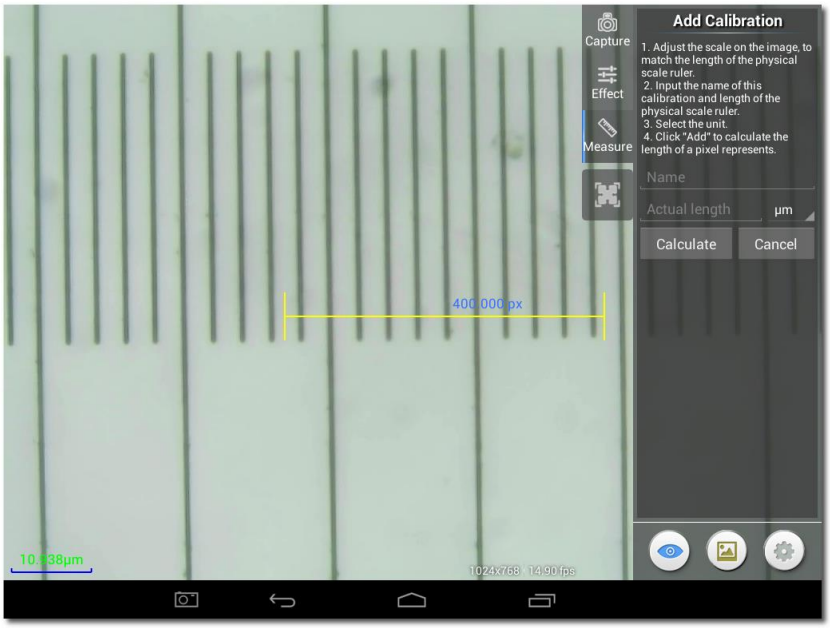
5.1 Calibration

We need calibrate the ruler before measurement, Specific combination of magnification of microscope and the preview size of camera need specific calibration.

Swap the tool pane to measurement, click “Add” to add a new calibration, Click “Edit” to recalibrate the exist calibration.



Enter calibration mode

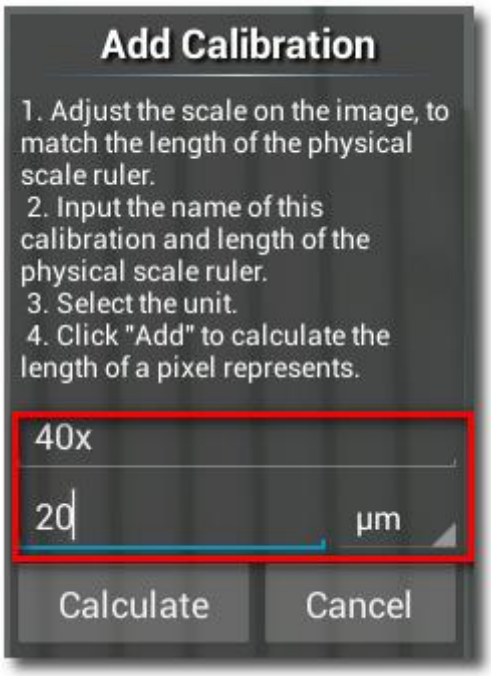


Follow the Tips：

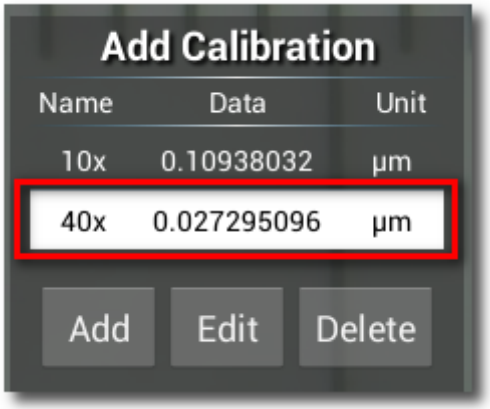
1. Drag the yellow ruler, let endpoints of the ruler close to physical ruler's scale. We use the 0.01mm physical ruler, each big grid is 10 μ m, we pick two grid, that's 20 μ m.

2. Input the name of the calibration and the physical length of the ruler. We input 40x for the name, that means the magnification of objective is 40X,

Then input the physical length of the ruler, that is 20 μ m.



3. Click “Calculate” to calculate the calibration value for current objective and preview size, and save to list.



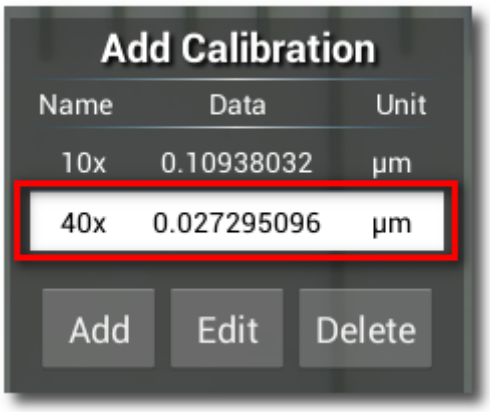
5.2 Measure tool

ICON	Function	Description
	point counting	Add a point counting marker on the image.

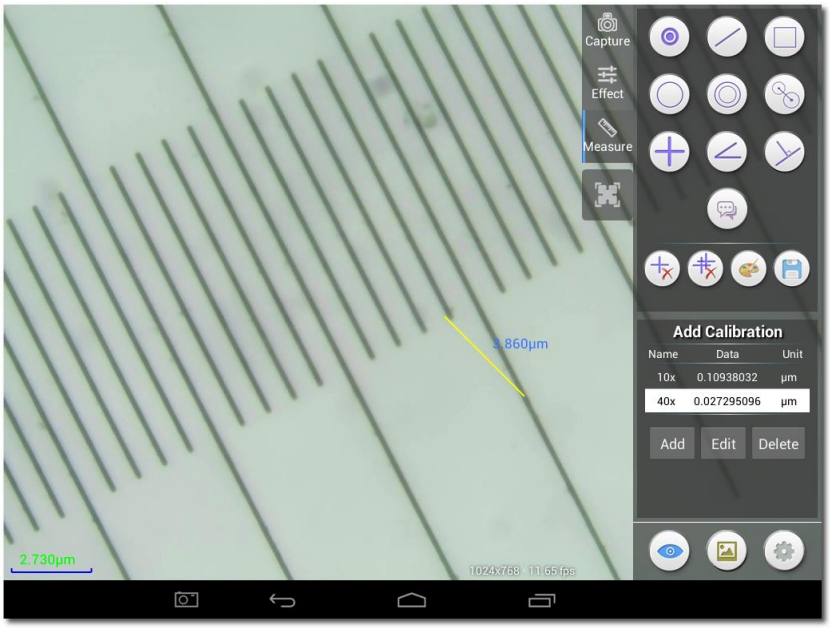
	Line	Measure distance of two points.
	Rectangle	Measure width, length and area of rectangle
	Circle	Measure area of circle
	Cross	Cross hair
	Angle	Angle measurement
	TwoCircles	Measure distance of two circle.
	Perpendicular	Measure length of perpendicular
	Concentric	Measure radius of two circles.
	Text Annotation	Draw text annotation on the image.
	Option	Change stroke width and color of rulers, and the size and color of the text.
	export	Export the image with measurement rulers.
	Delete	Delete the selected ruler
	Delete	Delete all

5.3 Measure with line ruler

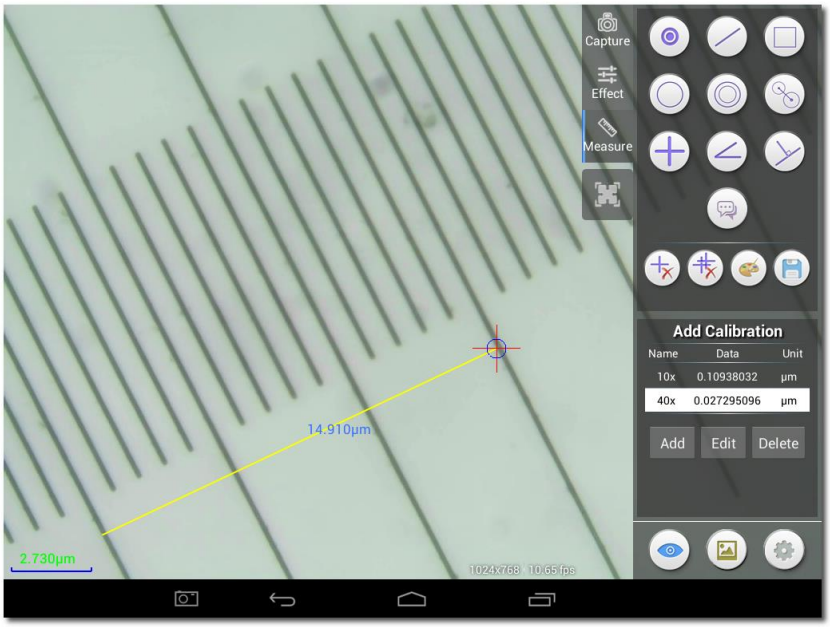
Choose an calibration, the selected item will show with white background and black text.



Choose line ruler from right side bar. There will be an line ruler show on the image.



Use the line ruler to measure the physical ruler.



We measured 1.5 big grid, the line ruler show 14.910 µ m, that represent the result is right.

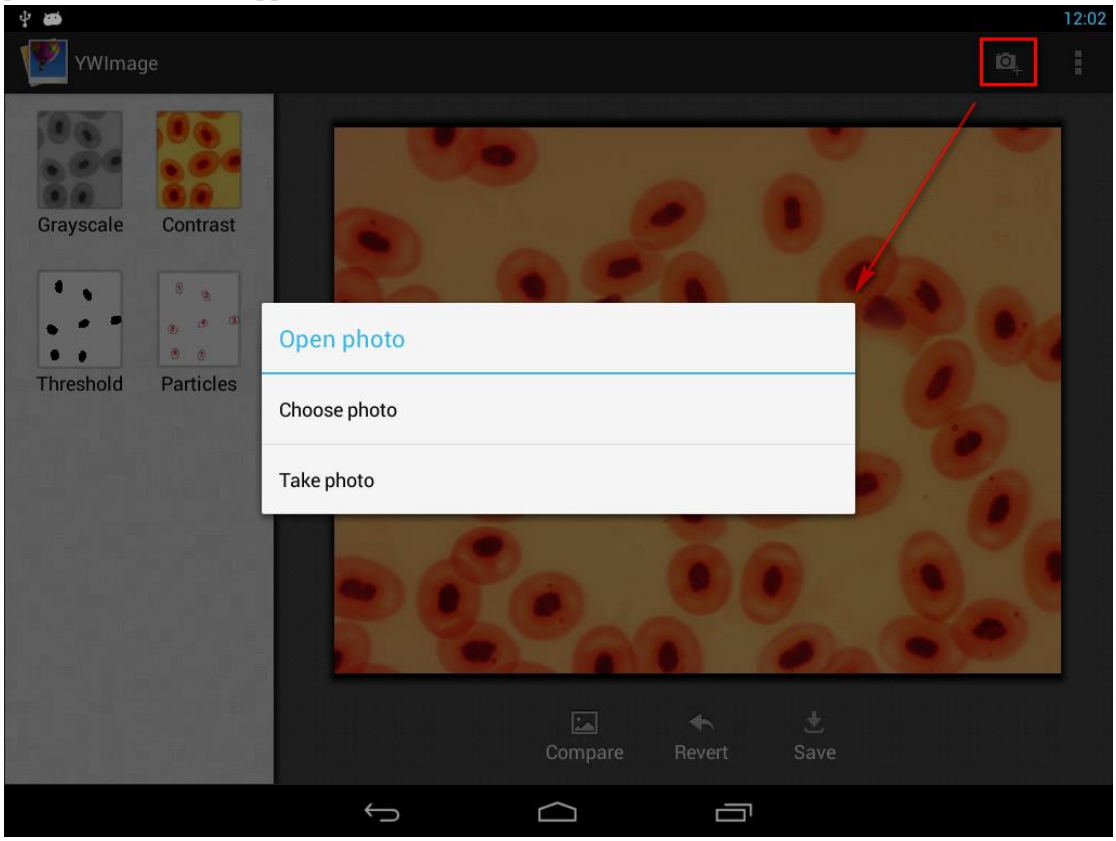
6. Image Analysis

Image is an application which used to process microscopic images on Android devices. It depends on computer vision library OpenCV.
Currently, version 1.0 of Image provides functions like gray scale, contrast, binarization and particles analysis.

6.1 Examples of particle analysis

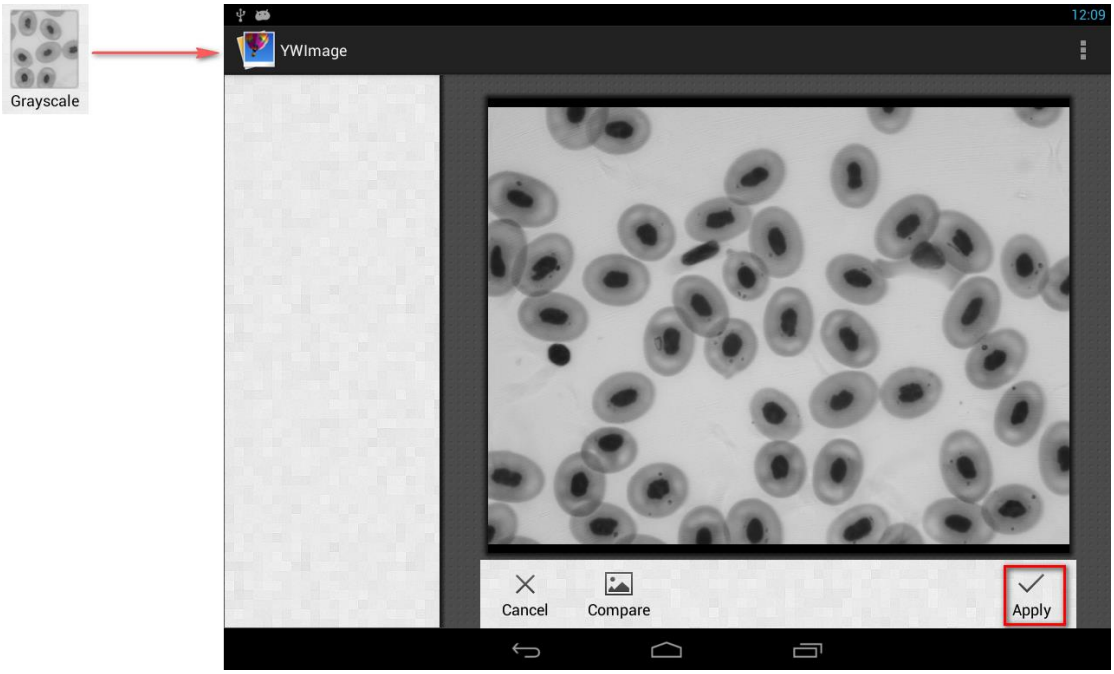
6.1.1 Load image file

Click the camera icon to the upper right corner of the screen, you can choose a picture or take picture from Camera application.



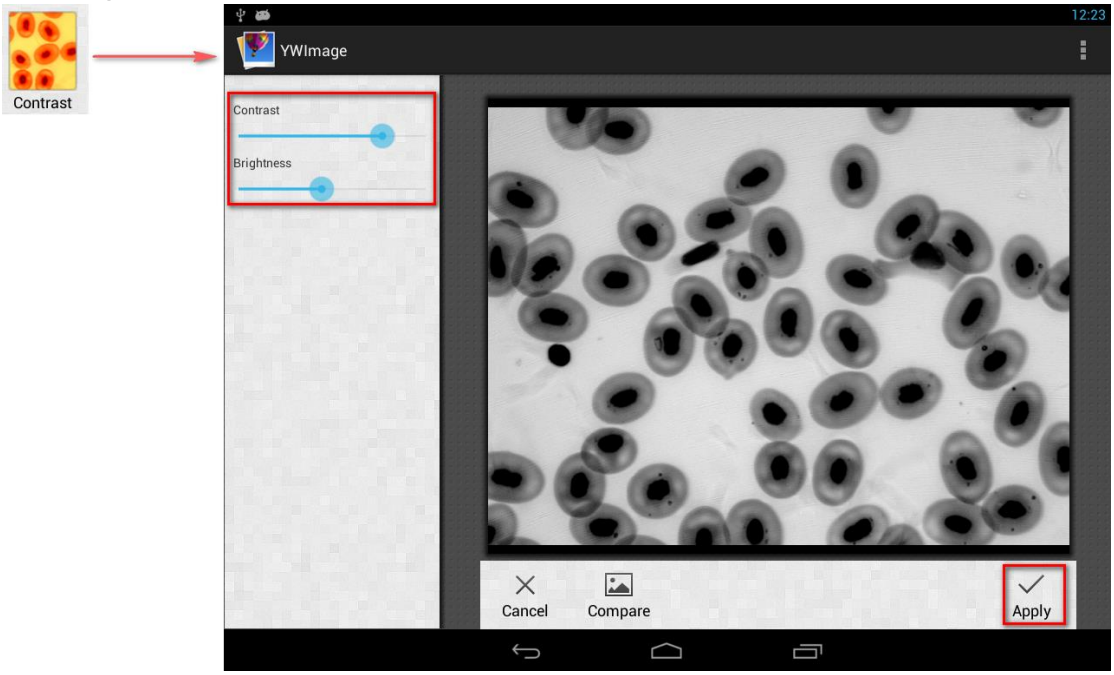
6.1.2 Convert the image into grayscale

Choose “Grayscale” function from left sidebar, click “Apply” button to confirm conversion.



6.1.3 Adjust contrast and brightness

Adjust contrast and brightness of the grayscale image, increase the difference between the objects and background

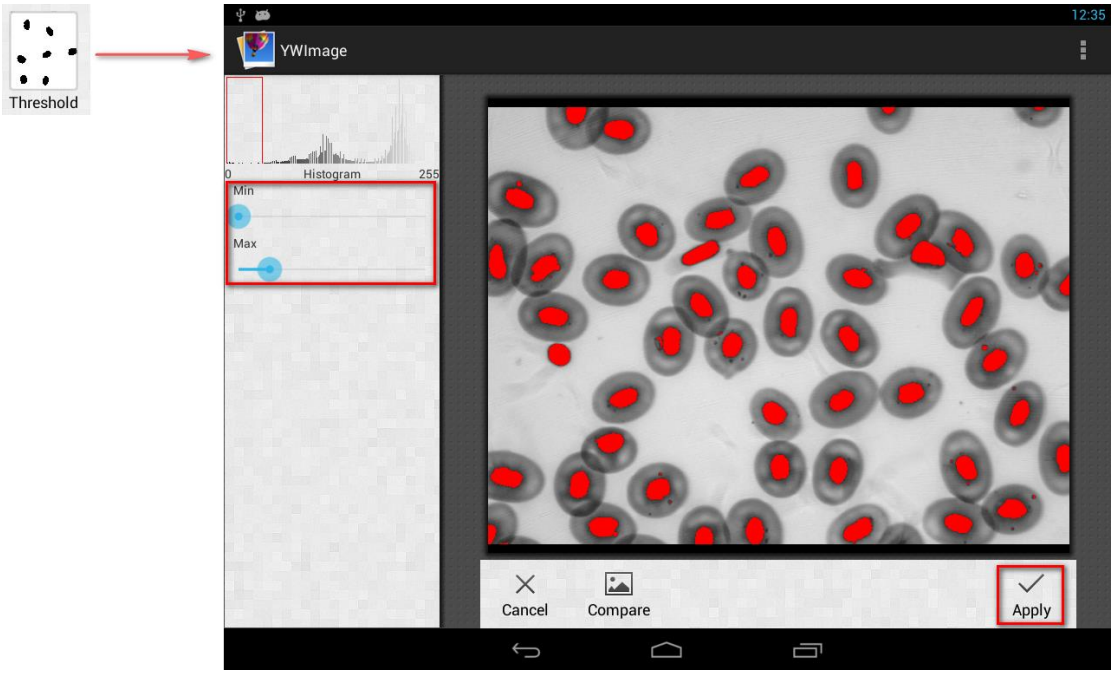


6.1.4 Binarization

With the binarization tool, you can change the minium and maxum value of threshold.

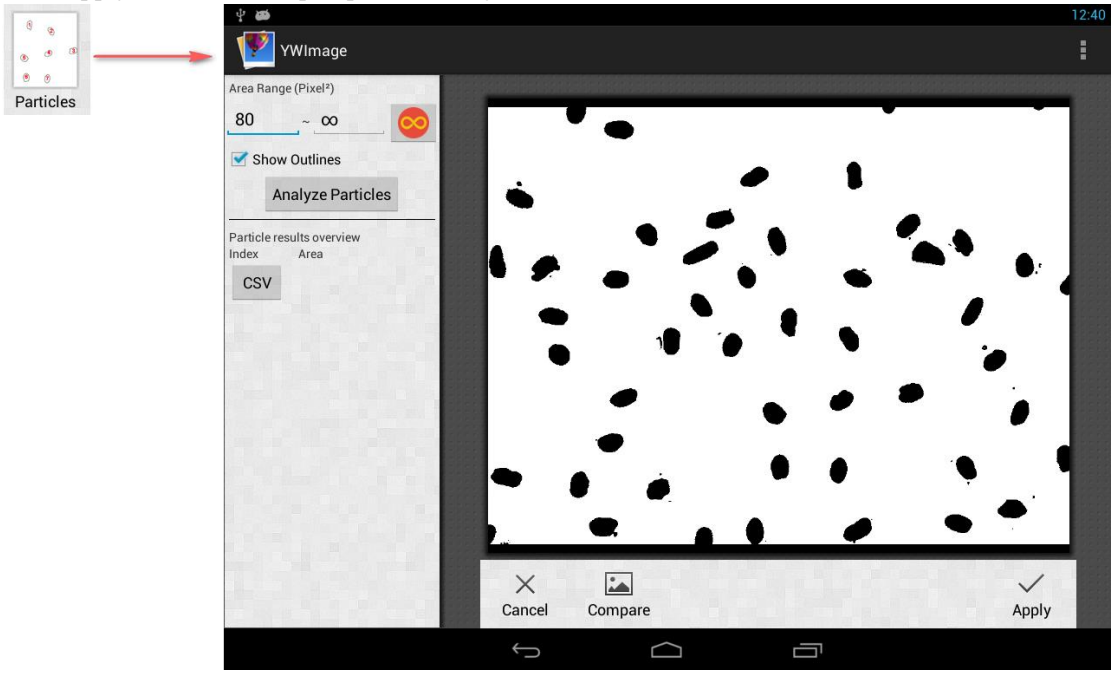
The intensity of all the pixels within the threshold range will be set to red. After apply binarization, the red area's RGB value will set to (0, 0, 0), the other area's RGB value will set to (255, 255, 255).

Note: Try to make the red area do not overlap each other.



6.1.5 Particle analysis

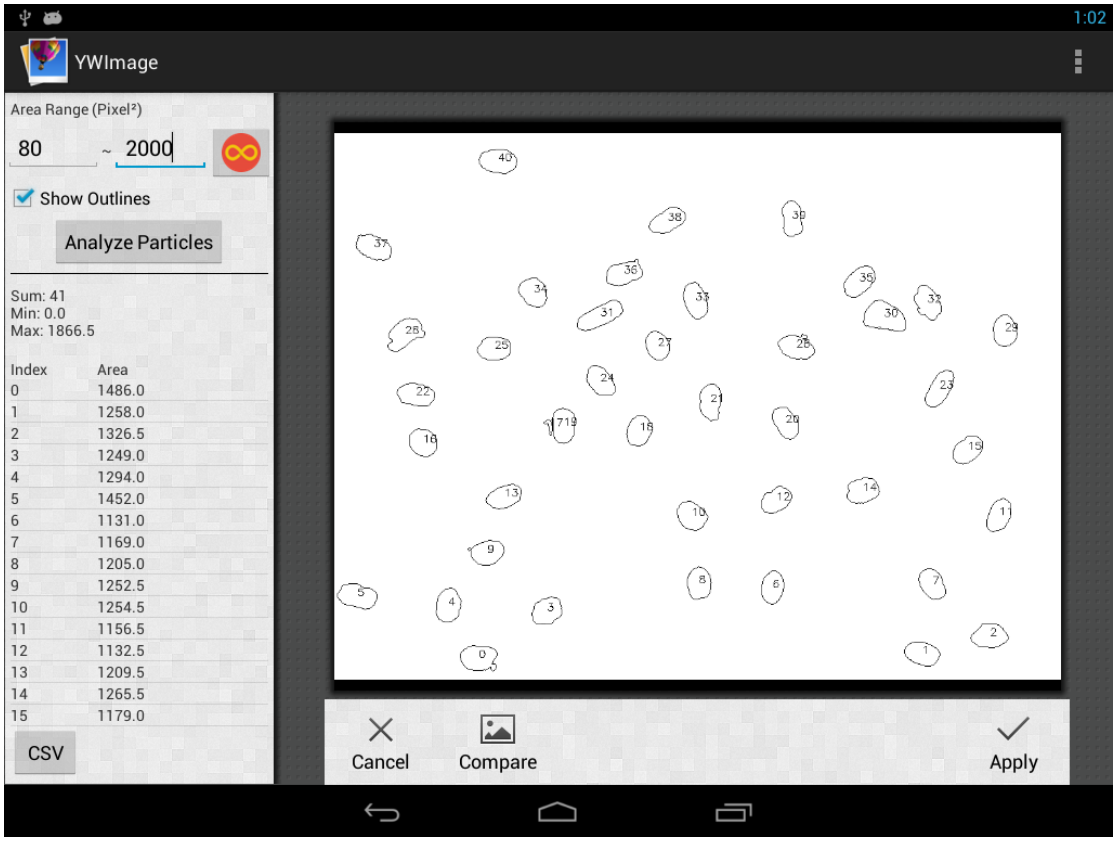
After apply binarization, open particle analysis tool:



First of all, Because some noise or dirty point was not clear by binarization. You need set the range of particle's size. Reduce the range of particle's size will make the result much more precision.

To restore the maximum value to infinity, Click the  button.

Check the "Show Outlines" checkbox to show border and number of particles after analysis. Click "Analyze Particles" button to start analysis, the result will show blow.



Click “CSV” button to export to data to report file, the default path is: /mnt/sdcard/Image/Reports