Barcode Distance Finder

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Technologies

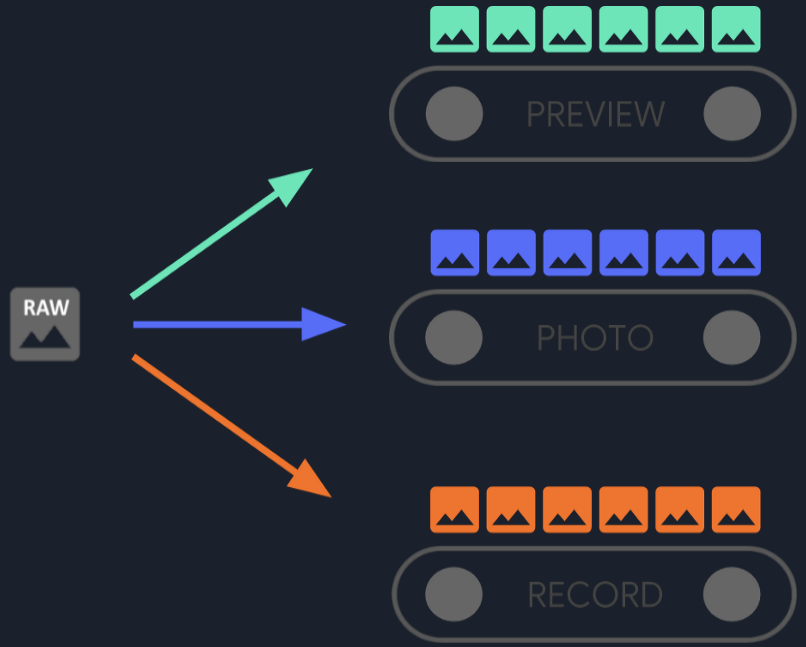
Android

Camera2
API

Mobile
Vision API

Camera2 API

Camera Capture Sessions allow to create different streams from the camera.



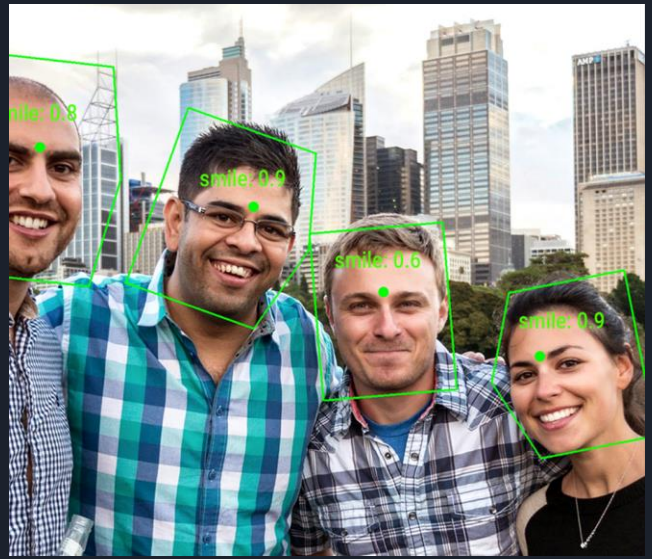
We need two streams:

- **A Preview Stream**: to visualize the actual picture on the screen.
- **A Detector Stream**: to send the real time image to the detector of barcodes.

https://developer.android.com/reference/android/hardware/camera2/package-summary

Mobile Vision API

- A Framework by Google for Mobile without cloud
- Capability to find object in photos and videos
- What all you can detect from this API
  - Face
  - Barcode
  - Text



https://developers.google.com/vision

Use cases

- Image sentiment analysis
- Organise photos based on the content
- Convert books into Text for your phone
- Scan multiple codes on live camera
- Read business cards
- React if people winks and smile
- Data entry jobs can be easier
- Gaming

Find distance from an object through image

To capture the distance from an object we need:

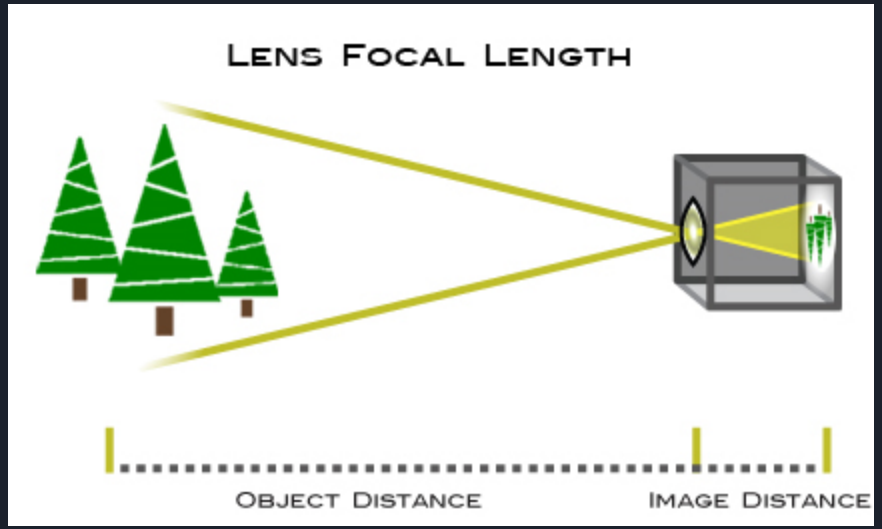
- The real height of the object
- The focal lenght of the camera
- The resolution of the camera
- The resolution size of the object in the image captured by the camera
- The size of the camera’s sensor

How does a camera works?

Let's suppose that an object totally fill the height of the image captured.

This means that the whole height of the object is projected to the total height of the camera's sensor.

Now, if we consider the lens as pivot, and we know the focal lenght (distance between sensor and lens), the distance of the object is easily reachable with a proportion.



$$\frac{DistanceObjectToLens}{FocalLenght} = \frac{ObjectRealSize}{SensorSize}$$

Real Equation

Since the object could be smaller in the image, we need to add a proportion between the size of the object.

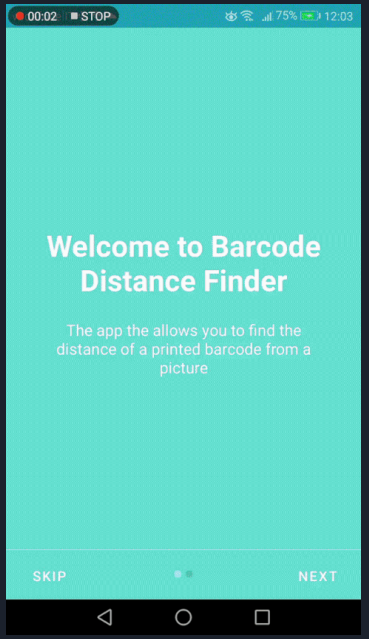
So the whole equation becomes:

$$Distance(mm) = \mathbf{c} * \frac{RealSize_{object}(mm) * F(mm)}{Size_{Sensor}(mm)} * \frac{Size_{image}(px)}{Size_{object}(px)}$$

The c constant is a ratio between the resolution of the screen and the resolution of image, that could be different.

Welcome Frame - The Application (i)

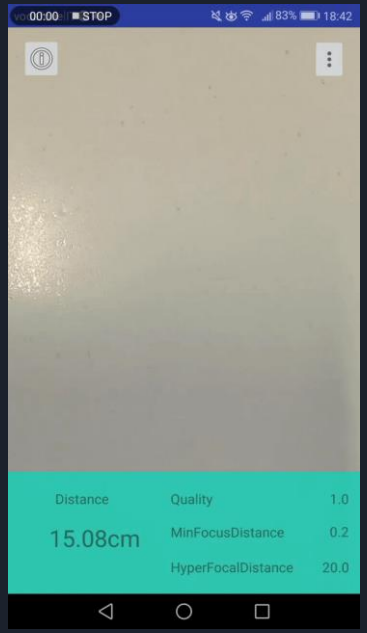
Welcome frame with a little introduction



Detection Frame - The Application (ii)

The frame shows:

- **Distance**
- **Quality**: Reliability of the detection based on the calibration of the camera
- **HyperFocal Distance and Min Focus Distance:** Max and min distance reliable detected (in diopters)

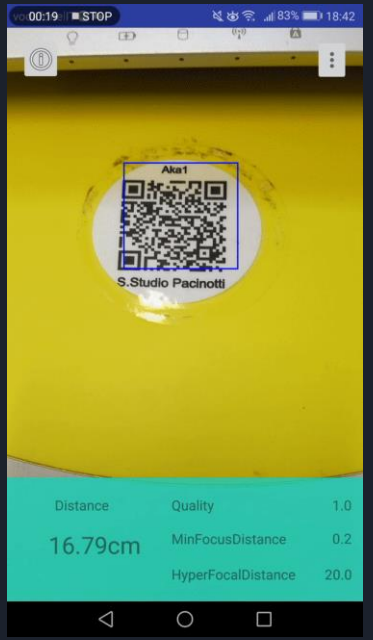


Settings Frame - The Application (iii)

Barcode real size change

It’s possible to change the object real size of the barcode.

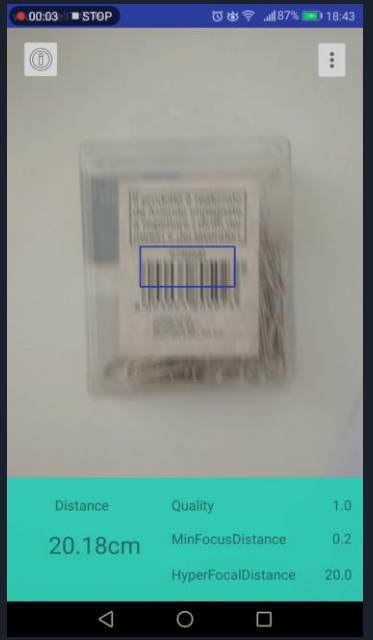
As consequence the distance will change.



Settings Frame - The Application (iv)

Warning Distance changing and alert

It’s possible to change the distance from which an alert is sent.



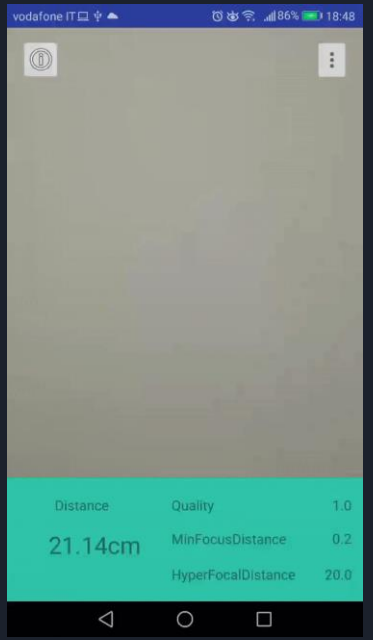
Statistics - The Application (iv)

Visualize history of the user's behaviour

The history of the sampled distances is saved.

If the user passes above a certain threshold of the time too close to the tags, a signal of this behaviour is set.

The threshold is the percentage of the below danger distance respect to the total time.



THANK YOU