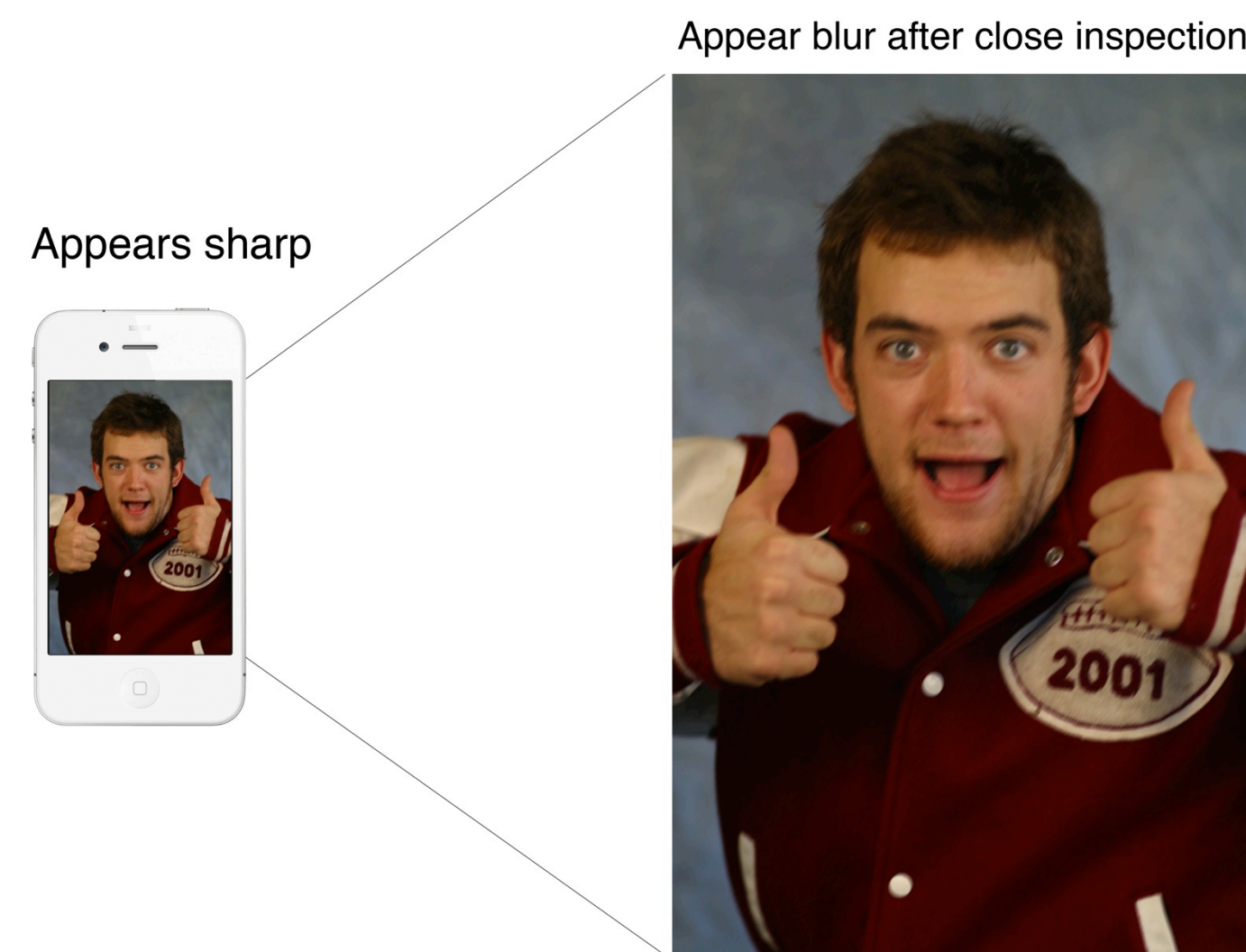


GPU-Accelerated Motion Blur Detection on Mobile Phone

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Motivation



This necessitates a motion blur detection system that is fast enough to run on mobile phone¹

Fast Motion Blur Detection Technique

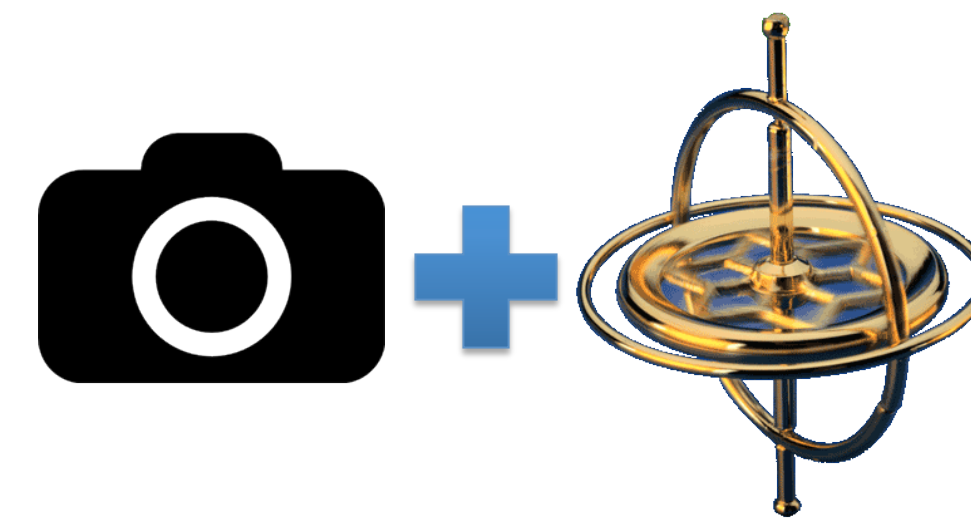
Data Acquisition

Gradient Calculation

Estimate Magnitude of Gradients

Detection

Take picture along with direction of motion info from gyroscope

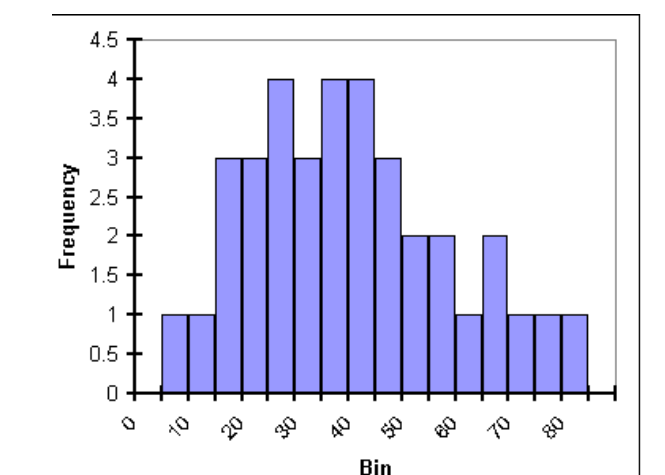


GPU calculates gradient in direction of motion and the orthogonal direction



Find sum square magnitude of each processed gradient picture. This can be done on GPU, but due to limited time, I implement this on CPU instead.

Calculate the threshold between the two directions and compare to the learned threshold



Related Work

- Alpha-channel (foreground-background separation)
 - Accurate but very expensive
- Gradient magnitude and variance of size of the magnitude
 - Not suited for motion blur
 - Discard direction information of the gradient
- Most work only rely on information from the image only

Experimental Results

- 50 test images ~ 79% accuracy
- 0.7-0.8 sec @ 8MP on iPhone 4S, real time for 640x480 video frame
- 0.5-0.6 sec on MATLAB
- Some memory problem @ full resolution (8MP)

Future Direction

- Use GPU for the entire process.
- Integrate acceleration from the gyro to get more accurate velocity profile of the camera
- Smarter thresholding (e.g. assign less blur probability if the velocity is small)

¹Photo from <http://www.slymf.com/forum/ello-derrrrrrr-16985.html>