Image panorama using video capturing mode of Android camera phone

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The goal of this project is to create an algorithm that allows the formation of a panorama image from a short video captured by an Android camera phone. With this application, formation of panorama won't need taking multiple images by a professional camera and editing photos by advanced photo software. All the processing will be performed on the phone used to capture the video. Our algorithm will essentially extract a sequence of processed images from the video and then stitch them into a complete panorama image. Figure 1 illustrates the three major phases of this project.

First step is to convert captured video into image sequences. This would involve down-sampling of the video into the proper number of frames and resize of the image for near-real-time image processing. Second step is to perform batch image processing of the images into a sequence of sharp images for merging. Due to the possible motion blur caused by the relative low quality camera and unpredictable movement of the camera-person, dynamic estimation of optical flow is required for motion compensation. Third is to perform panorama image processing from the sharp images from the previous step. This will involve image matching and aligning algorithms, finally adaptive cropping is necessary to form a smooth boarder in the final output image.
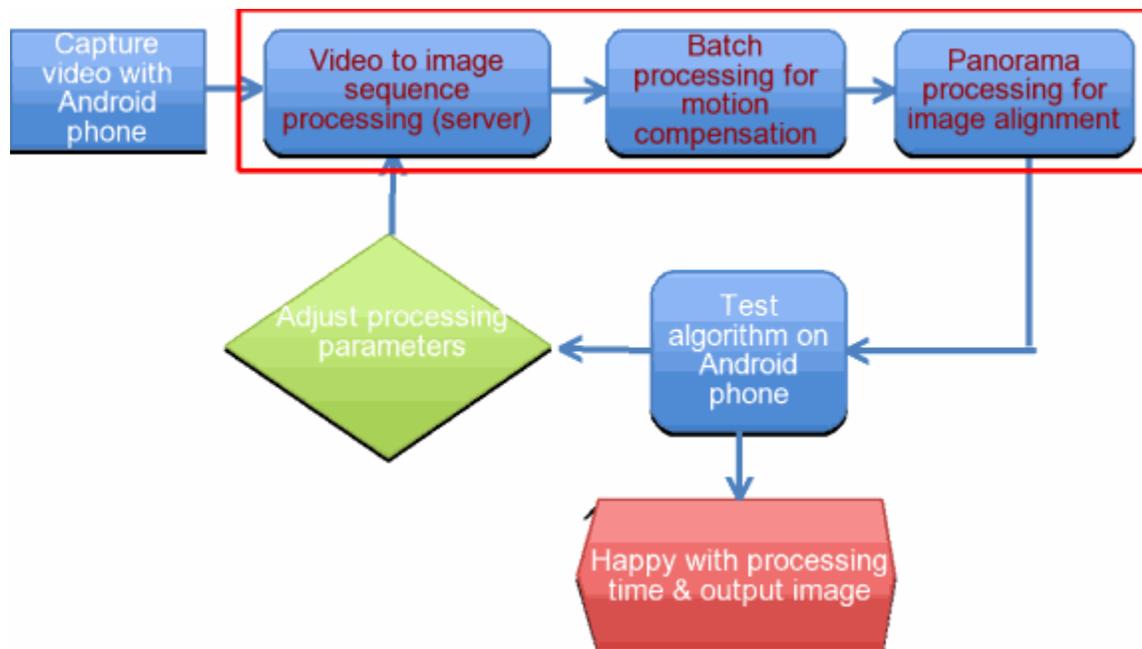

Figure 1: work flow of video panorama project

Once these three steps are successfully tested on a server, the algorithm can be implemented on the Android phone. We will test the bandwidth telemetry as well as the processing time on the hand-held environment; further adjustment will be made to make it a practical Android phone application that ensures satisfactory user-end experience.

Reference

[1] D. Lowe. Distinctive image features from scale-invariant keypoints. ICCV, 60:pp. 91–110, 2004
[2]Y. Xiong, K. Pulli, Fast Panorama Stitching on Mobile Devices, ICCE 2010
[3] K. Pulli, M. Tico, Y. Xiong, X. Wang, C-K. Liang, Panoramic Imaging System for Camera Phones, ICCE 2010