

Title: Omnidirectional Hyperlapse

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Abstract: The prohibitive amounts of time required to review the large amounts of data captured by surveillance and other cameras has progressively brought into question the very utility of large scale video logging of everyday situations. Yet, one recognizes that such logging and subsequent analysis are indispensable to security and safety applications. The only way out of this paradox is to devise expedited browsing, by the creation of hyperlapse summaries of the content. We address here the hyperlapse problem for the very challenging category of intensive egomotion video content. The excessive motion inherent to such content makes the hyperlapse summary highly jerky and discontinuous. Past hyperlapse algorithms for this purpose do produce excellent summaries, using SLAM like techniques for reconstruction of the actual camera trajectory and substitute it by a smooth path that is more amenable to significant hyperlapse reduction. Some previous work proposes a more economical approach for trajectory estimation based on Visual Odometry (VO) and implement cost functions to penalize path deviation, pose change, velocity deviation from the target speed up and acceleration. In this work, we attempt to implement this on data produced by an omnidirectional camera, so that the viewer can opt to observe any direction of the omni-scene while browsing. This requires many innovations, including handling the massive radial distortions inherent to omni captures and implementing multiple layers of scene stabilization that need to be operated upon the least distorted regions of the omni view. Later we introduce inertial sensors based method for creating hyperlapse summaries which turn out to be better than the VO based summaries in terms of time computation and quality of hyperlapse.

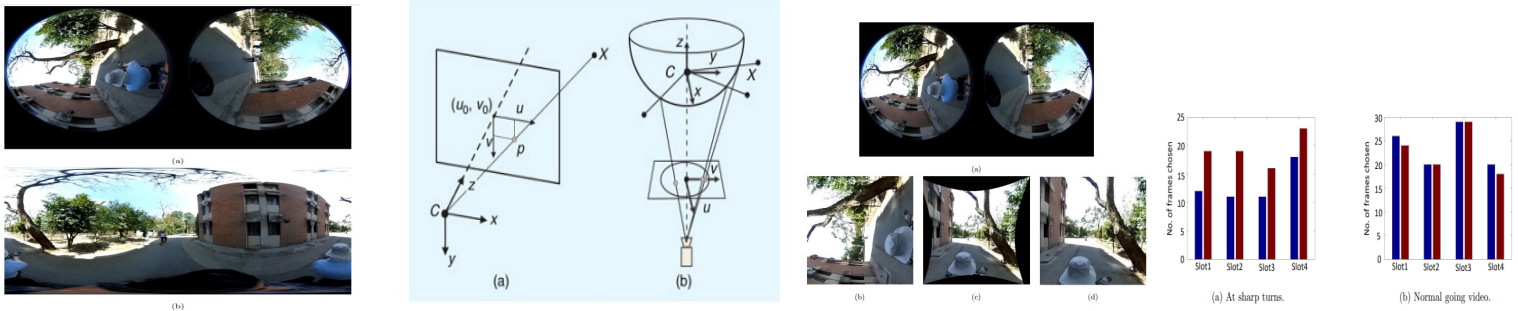


Figure 6.4: Number of frames chosen at 4x speed up.

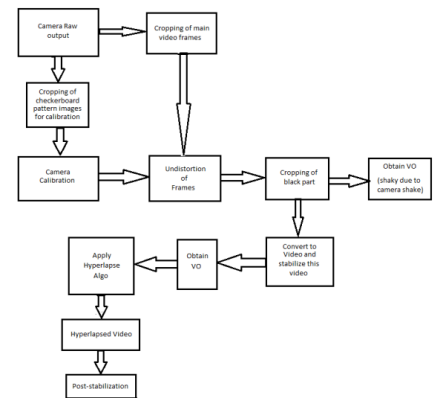
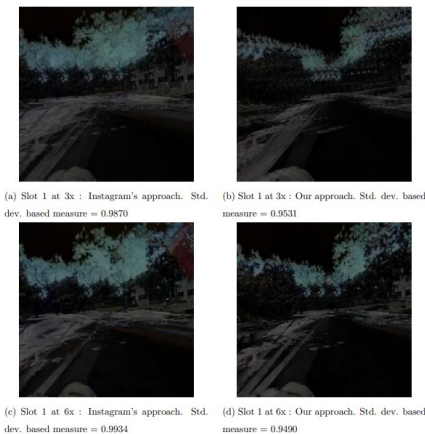


Figure 4.6: Block diagram of omni-directional hyperlapse process.