EE368 PROJECT PROPOSAL
FAST VIDEO STABILIZATION FOR HAND-HELD DEVICES

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Although modern hand-held devices, such as digital camcorders and smartphones, have enabled everyday users to capture high-quality video sequences, the quality of hand-held videos often suffers from unavoidable shaky camera motion. Video stabilization aims to remove this annoying hand-shaking motion from a video. Existing video stabilization algorithms [1, 2, 3, 4, 5] involve three major stages: camera motion estimation, motion smoothing, and image synthesis. By applying a 2-D affine or projective transformation, the 2-D video stabilization [1, 6] techniques can effectively remove small camera jitters and only require a low-complexity implementation. However, they fail to model parallax induced by a translational shift in a viewpoint. Li and Jin [4] considered a 3-D video stabilization approach by stabilizing the camera view along a 3-D trajectory path. Furthermore, dynamic content are preserved through shape-preserving and content-aware image warping. 3-D video stabilization generally produces a better visual result compared to traditional 2-D stabilization, but comes with an expensive computational cost.

In the industry, several software applications, such as *iMovie'09* [7] and *VReveal* [8] , are developed to stabilize hand-held video sequences on a computer with sufficient computational power. Mobile applications, such as the *iPhone Video Stabilizer* [9], have demonstrated running video stabilization directly on a mobile device, but they do not produce satisfying results. In our project, we propose to design and implement a fast high-quality video stabilization algorithm on the Android platform. A hybrid 2-D/3-D approach to video stabilization will be considered to find the best trade-off between perceived quality and complexity. We will also leverage the availability of the three-axis accelerometer and gyrometer installed on the phone to help estimate camera motion and reduce computation. The video stabilization result will be evaluated subjectively and will be compared against current academic work or industrial applications, such as *VReveal*.

1. REFERENCES

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