Efficient Video Stabilization Using Dual-Tree Complex Wavelet Transform

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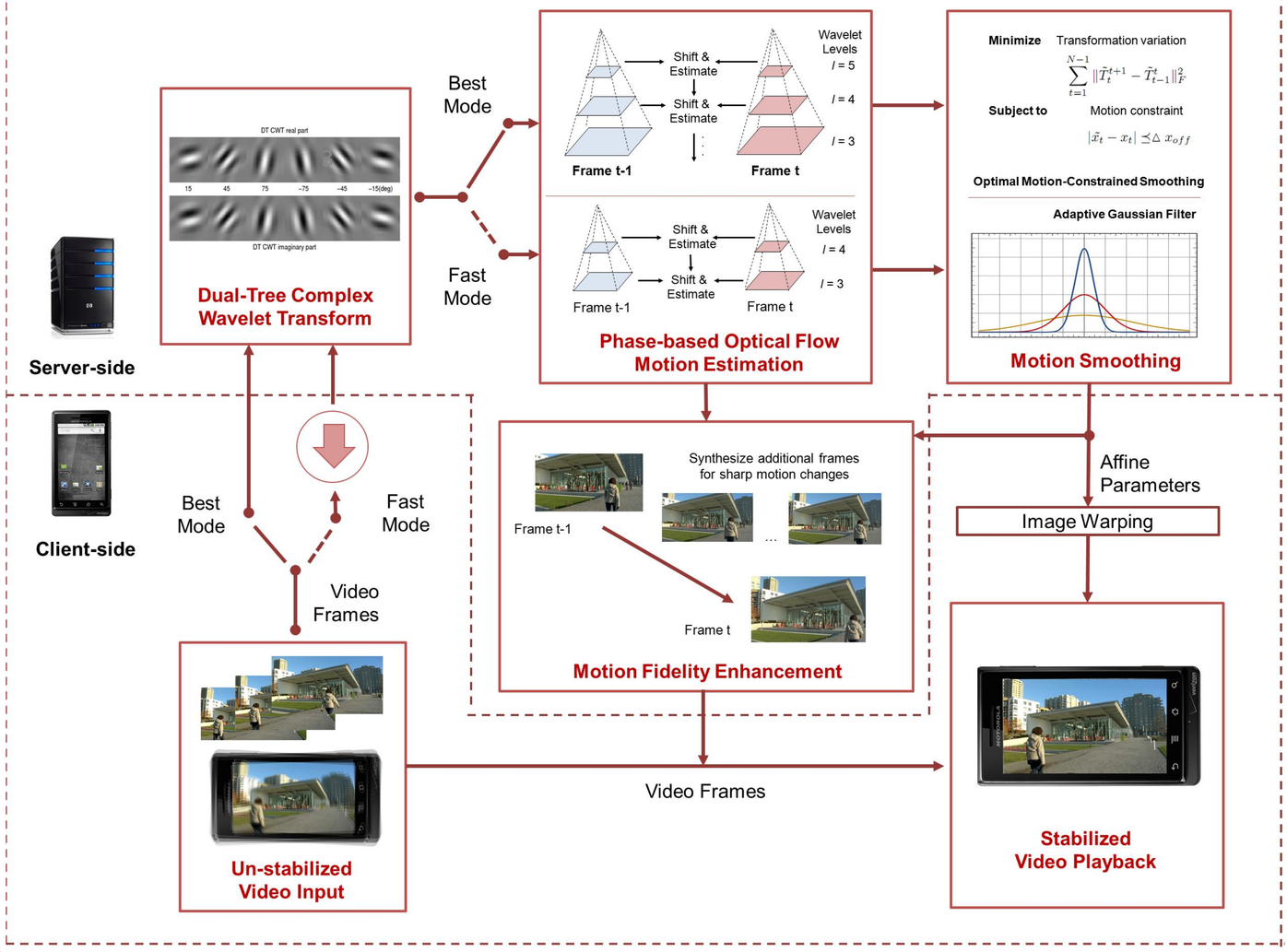
Motivation

Advantages

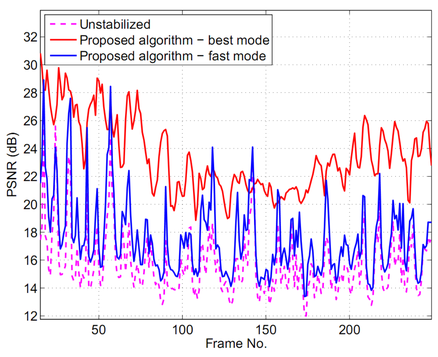
- Robust stabilization at efficient computational cost
- Scalable in complexity
- Insensitive to illumination changes and noises
- Optimal motion smoothing
- Motion fidelity enhancement for sharp motion changes

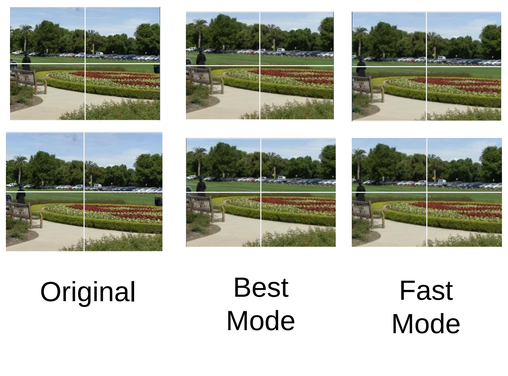
System Overview



Experimental Results

PSNR between current frames and their respective previous frames





Matlab Implementation (320x240 Input)	Best Mode (per frame)	Fast Mode (per frame)
Wavelet Transformation	47.2 ms	7.0 ms
Motion Estimation	23.2 ms	1.4 ms
Motion Smoothing	2.5 ms	0.2 ms
Other	16.4 ms	5.0 ms
Total	**89.3 ms (11.2 fps)**	**13.6 ms (73.5 fps)**

Related Work

N G Kingsbury, "Complex wavelets for shift invariant analysis and filtering of signals", Journal of Applied and Computational Harmonic Analysis, May 2001.
Y Matsushita , E Ofek, W Ge, X Tang; H Y Shum; , "Full-frame video stabilization with motion inpainting", *IEEE Transactions on Pattern Analysis and Machine Intelligence* , July 2006.
F Liu, M Gleicher, H Jin and A Agarwala. "Content-Preserving Warps for 3D Video Stabilization", ACM Transactions on Graphics. 2009.