Monocular Visual Features for Fast Flight Through Forests

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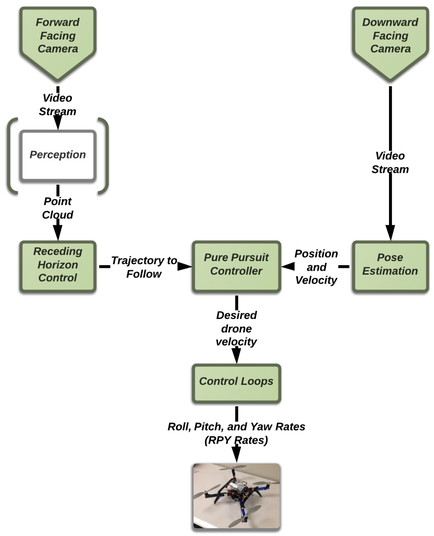
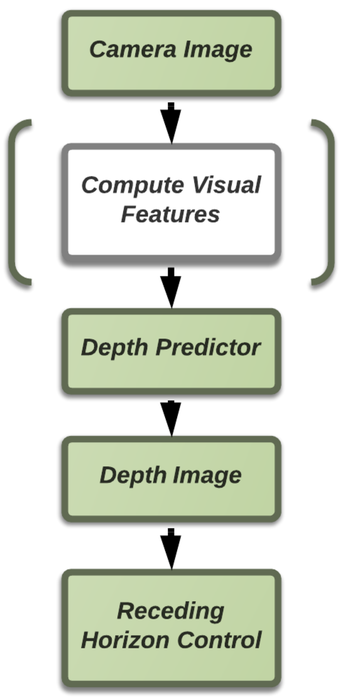
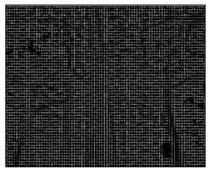
Motivation



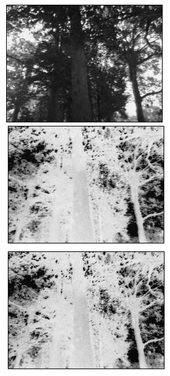
Perception Pipeline



Monocular Features for Depth Prediction



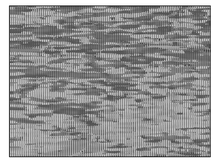
Histogram of Oriented Gradients (texture)



Law's masks (texture intensities – level, edge, spot)

Radon features (strong edges)

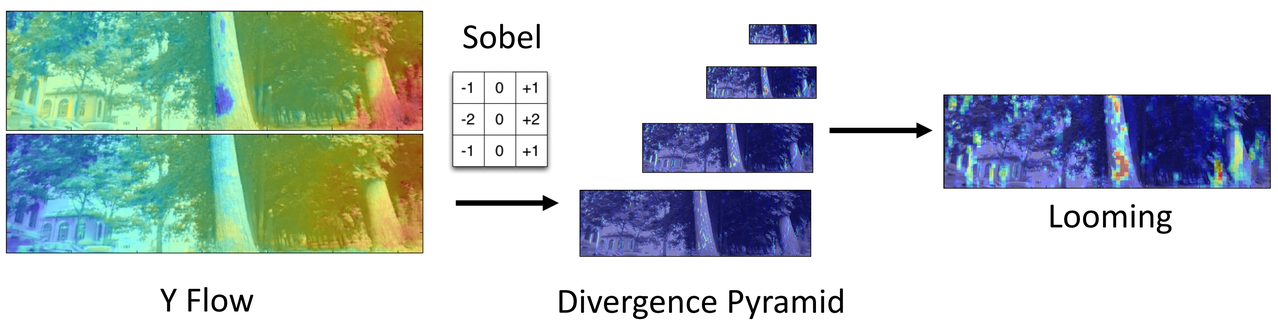
Harris corners (texture gradients)



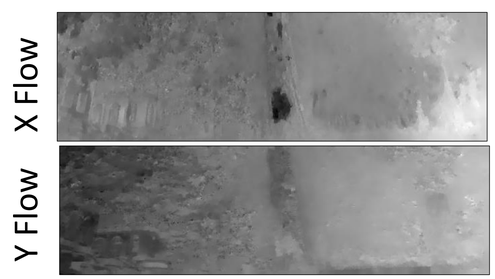
Custom per pixel tree detector*

*(C. Li, K. Kitani. Pixel-level Hand Detection in Ego-Centric Videos)

Optical Flow and Looming

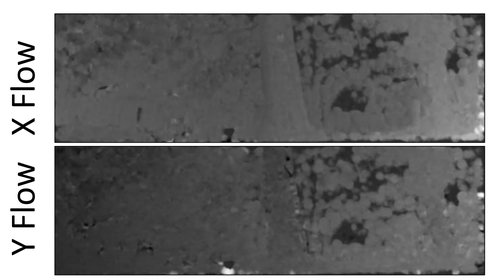


High Fidelity Optical Flow



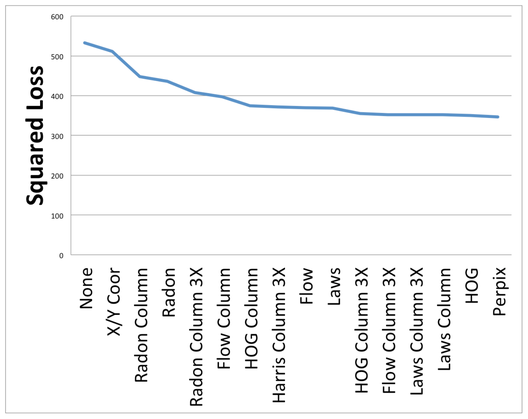
TV regularization flow (M. Werlberger. Convex Approaches for High Performance Video Processing, 2012)

V.S.

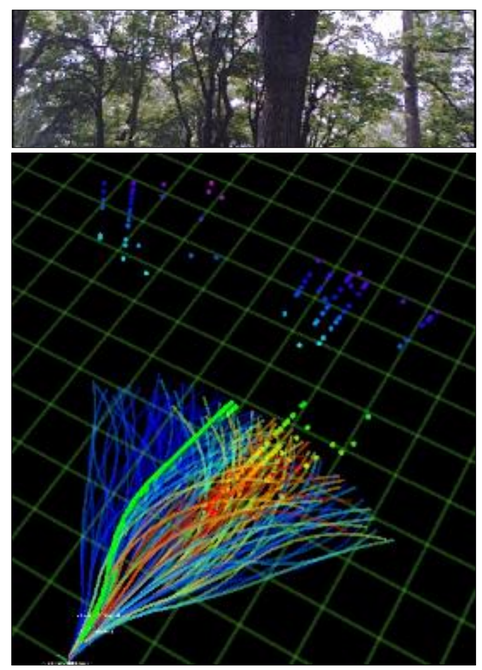


OpenCV Farneback flow (G. Farneback. Two-Frame Motion Estimation Based on Polynomial Expansion, 2003)

Feature Selection Using SpeedBoost**



- Each feature has a non-trivial computational cost
- Given a total computational budget, what is the correct set of features to use?

**(A. Grubb. Anytime Prediction: Efficient Ensemble Methods for Any Computational Budget, 2014)

Preliminary Results