Compensating the Effect of Vertical Camera Shake by Tracking of Prominent Horizontal Edges

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Abstract

In this paper, a feature-based stabilization method for tracking of floating targets is proposed. This method matches the prominent edges in subsequent frames to compensate for the vertical camera shakes. Different edge detection operators, and different methods to distinguish the prominent edges are investigated. The prominent edges in subsequent frames are correlated to each other to find the best matches. In a test on 3 sequences of 60 successive frames, a complete vertical stabilization was achieved.

Key words: Image stabilization, Camera shake, Edge detection, Visual tracking, Machine vision.
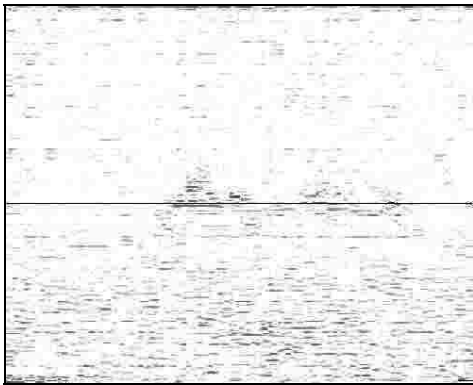
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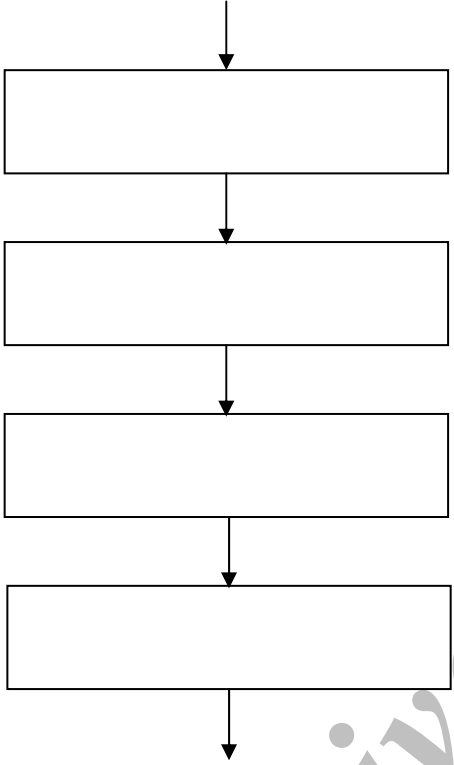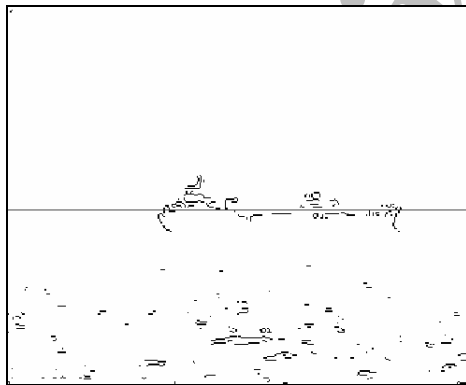
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3- Laplacian of Gaussian
4- Perwitt
5- Canny
6- Matlab

1- Sobel
2- Roberts

[1] http: /www. cfar. umd. edu/ ~yao/ stabilization. html.

[2] http: /www. cfar. umd. edu/~carlos/ stabilization. html.
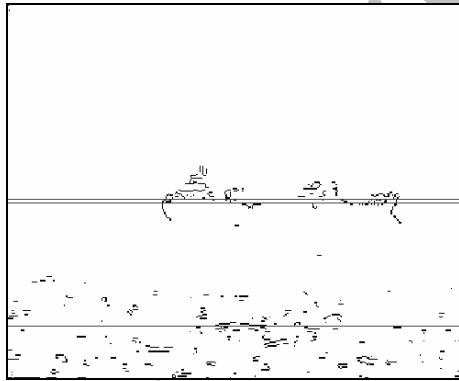
[3] Morimoto, C. and Chellappa, R., "Fast Electronic Digital Image Stabilization", Real-Time Imaging, vol. 2, pp. 258-296, 1996.

[4] http: //solarwww. mtk. nao. ac. jp/ en/ vap. html

[5] Oshima, M., et al., "VHS Camcorder with Electronic Image Stabilizer", IEEE Trans. on Consumer Electronics, vol. 35, no. 4, pp. 749-758, Nov. 1989.

[6] Uomori, K. et al., "Automatic Image Stablizing System by Full Digital Signal Processing", IEEE Trans. on Consumer Electronics, vol. 36, no. 3, pp. 510-519, Aug. 1990.

[7] Paik, J.K., Park, Y.C. and Kim, D.W., "An Adaptive Motion Decision System for Digital Image Stabilizer Based on Edge Pattern Matching", IEEE Trans. on Consumer Electronics, vol. 38, no. 3, Aug. 1992.

[8] Ko, S.K., Lee, S.H. and Lee, K.H., "Digital Image Stabilizing Algorithms Based on Bit-Plane Matching", IEEE Trans. on Consumer Electronics, vol. 44, no. 3, pp. 617-622, Aug. 1998.

[9] Duncan, J.H. and Chou, T.C., "On the Detection of Motion and the Computation of Optical Flow", IEEE Trans. on PAMI, vol. 14, no. 3, pp. 346-352, Mar. 1992.

[10] Singh, A., "Optic Flow Computation, a Unified Perspective", IEEE Computer Society Press, 1991.

[11] Choi, J.W., Kang, M.G. and Park, K.T., "An Algorithm to Extract Camera-Shaking Degree and Noise Variance in the Park-Trace Domain", IEEE Trans. on Consumer Electronics, vol. 44, no. 3, Aug. 1998.

[12] Choi, B.C., Choi, J.W. and Kang, M.G., "Algorithm for Estimating the Degree of Camera Shaking and Noise Corruption", SPIE, vol. 3653, pp. 106-116, Jan. 1999.

[13] Kim, H.T., et al., "Morphological Detection Algorithm of an Event on Board a Ship", 4th

Int. Conf. Signal Processing, ICSP'98, pp. 1241-1244, 1998.

[14] Gonzalez, R.C. and Woods, R.E., Digital Image Processing, Addision–Wesley, 1993.

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