Specific Sign Identification and Retrieval in Video Frames

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ABSTRACT

In the study, the major is tachograph video screen analysis, its purpose is helping the driver to identify the signs in real-time. First, in order to determine whether have the target graphic in the view, use the space and color traits to find electable signs, and finish the target graphic detection. Second, find into the sign ’ s non-frame color pixels, and do again to look for non-background pixels. After twice finding we can get and separate of the internal graphics. Finally, use sign ’ s color and shape traits to track and compare the target graphic. According to the distance to reduce the identifiable range, and output the results of identification. This study also identify the sign ’ s obliquity. Use a variety of angles in 3D simulation and order to trait of sign ’ s datebase beforehand. When determine the shape, also determine the angle of inclination than consistent information on the database. In study, the film taken by the tachograph ’ s simulation tests, and determine the location of sign in experiment. The experimental results show that the effect of determine signs can higher than 90% with right determine.

Keywords : Video analysis、consecutive frames identifies the tracking、skew sign recognition

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REFERENCES

一、中文文獻 交通安全入口網 http://168.motc.gov.tw/GIPSite/wSite/mp 二、西文文獻 Boltz, S., Debreuve, E. & Barlaud, M. (2009). High-dimensional statistical measure for region-of-interest tracking. IEEE Transactions on Image Processing, 18(6), 1266-1283. Fanga, C.Y., Fuhb, C.S., Yena, P.S., Cherngc, S., Chend, S.W. (2004). An automatic road sign recognition system based on a computational model of human recognition processing. Computer Vision and Image Understanding 96237 – 268. Fei Qin, Bin Fang, Hengjun Zhao, (2010). Traffic Sign Segmentation and Recognition in Scene Images. Pattern Recognition (CCPR), 2010 Chinese Conference on, 1 – 5. Fleyeh ,H., Davami, E. (2011). Eigen-based traf?c sign recognition, Intelligent Transport Systems, IET, 5 , Issue: 3, 190 - 196. Gao, X., Yang, Y., Tao, D., & Li, X. (2009). Discriminative optical flow tensor for video semantic analysis. Computer Vision and Image Understanding, 113(3), 372-383. Ge, J., Luo, Y. & Tei, G. (2009). Real-time pedestrian detection and tracking at nighttime for driver-assistance systems. IEEE Transactions on Intelligent Transportation Systems, 10(2), 283-298. ? Gomez-Moreno, H., Maldonado-Bascon, S., Gil-Jimenez, P., Lafuente-Arroyo, S. (2010). Goal Evaluation of Segmentation Algorithms for Traffic Sign Recognition. Intelligent Transportation Systems. IEEE Transactions on , 917 – 930. Guo, Y., Yang, B., Ming, Y. & Men, A. (2010). An effective background subtraction under the mixture of multiple varying illuminations. Computer Modeling and Simulation, ICCMS '10. Second International Conference, 202-206. Kanhere, N. K. & Birchfield, S. T. (2008). Real-time incremental segmentation and tracking of vehicles at low camera angles using stable features. IEEE Transactions on Intelligent Transportation Systems, 9(1), 148-160. Kiran, C.G., Prabhu, L.V., Abdu, R.V., Rajeev, K. (2009). Traf?c Sign Detection and Pattern Recognitionusing Support Vector Machine. Advances in Pattern Recognition, 2009. ICAPR '09. Seventh International Conference on, 87 – 90. Kumaraswamy, R., Prabhu, L. V., Suchithra, K. & Sreejith Pai , P. S. (2011). SVM Based Classi?cation of Traffic Signs for Realtime Embedded Platform. A. Abraham et al. (Eds.): ACC 2011, Part IV, CCIS 193, pp. 339 – 348. Lafuente-Arroyo, S., Garcia-Diaz, P., Acevedo-Rodriguez, F.J., Gil-Jimenez P. & Maldonado-Bascon, S. (2004). Traffic sign classification invariant to rotations using supportvector machines. ACIVS ’ 04, Brussels, Belgium, August. Lim King Hann, Seng Kah Phooi, Ang Li Minn. (2010). Intra color-shape classification for traffic sign recognition. Computer Symposium (ICS), 2010 International ,642 – 647. ? Maldonado-Bascon, S., Lafuente-Arroyo, S., Gil-Jimenez, P., Gomez-Moreno, H., Lopez-Ferreras, F. (2007). Road-Sign Detection and Recognition Based on Support Vector Machines. Intelligent Transportation Systems, IEEE Transactions, 264 – 278. Mohamed, S. S. , Tahir, N. M. & Adnan, R. (2010). Background modelling and background subtraction performance for object detection. Signal Processing and Its Applications (CSPA), 1-6. Qin, F., Fang, B. & Zhao, H. (2010). Traffic Sign Segmentation and Recognition in SceneImages," Chinese Conference on Pattern Recognition, Chongqing, pp. 1-5, 21-23 Oct. Shen, S., Tong, M., Deng, H., Liu, Y., Wu, X., Wakabayashi, K. &Koike, H. (2008). Model based human motion tracking using probability evolutionary algorithm. Pattern Recognition Letters, 29(13), 1877-1886. Sundaramoorthi, G., Yezzi, A. & Mennucci, A. C. (2008). Coarse-to-Fine segmentation and tracking using sobolev active contours. IEEE Transactions on Pattern Analysis and Machine Intelligence, 30(5), 851-864. Tsai, D. M. & Lai, S. C. (2009). Independent component analysis-based background subtraction for indoor surveillance. IEEE Transactions on Image Processing, 18(1), 158-167. Vavilin, A. & Jo, K. (2006). Automatic Detection and Recognition of Traffic Signs usingGeometric Structure Analysis. SICE-ICASE International Joint Conference, Busan,pp. 1451-1456, 18-21. Wang, Y., Liu, L. & Zhao, Y. (2009). Traffic sign detection based on fixed colorcombination and intensity restraint. International Symposium on Computer Networkand Multimedia Technology, Wuhan, pp. 1-5, 18-20. ? Wang, J., Yagi, Y. (2008). Integrating color and shape-texture features for adaptive real-time object tracking. IEEE Transactions on Image Processing, 17(2), 235-240. Wei, S., Chen, Z. & Dong, H. (2009). Motion detection based on temporal difference method and optical flow field. ISECS '09 Proceedings of the 2009 Second International Symposium on Electronic Commerce and Security, 2 , 85-88. Xu, S. (2009). Robust traffic sign shape recognition using geometric matching. Intelligent Transport Systems, IET, 3 , Issue: 1, 10 – 18. Yanlei Gu, Yendo, T., Tehrani, M.P., Fujii, T., Tanimoto, M. (2010). A new vision system for traffic sign recognition. Intelligent Vehicles Symposium (IV), 2010 IEEE, 7 – 12, 21-24.