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PENGECAMAN KEDUDUKAN PENUMPANG MENGGUNAKAN MOMEN ORTOGON LEGENDRE DAN TEKNIK PENGAMBANGAN SETEMPAT

(Passenger Position Recognition Using Legendre Orthogonal Moment and Local Thresholding Technique)

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ABSTRAK

Dalam makalah ini dinilai dan dibincangkan penggunaan momen ortogon Legendre (MOL) sebagai fitur untuk pengecaman kedudukan penumpang yang tersegmen menggunakan teknik pengambangan setempat. Pengecaman kedudukan penumpang dalam kereta penting dalam sistem kereta pintar; misalnya, mengenal pasti kedudukan penumpang boleh membantu ke arah pelepasan beg udara keselamatan secara bijak. Dalam kajian ini, sebanyak 1292 imej daripada sepuluh kelas kedudukan yang berbeza digunakan. Imej-imej kedudukan ini disegmen menggunakan teknik pengambangan setempat untuk mengasingkan bahagian penumpang daripada latar belakang imej. Kemudian sembilan fitur MOL dijana daripada setiap imej yang tersegmen itu. Langkah-langkah segmentasi dan pengekstrakan fitur dilaksanakan dengan menggunakan atur cara C++. Fitur-fitur momen ini seterusnya diinput ke pakej SPSS untuk proses pengelasan menggunakan analisis diskriminan. Kepentingan fitur-fitur dari segi keupayaan untuk menerangkan kedudukan turut dikaji. Hasil pengelasan menunjukkan bahawa 99.5% data dikelaskan dengan jayanya. Kesesuaian penggunaan teknik pengambangan setempat dalam proses segmentasi dapat disokong melalui tahap pengelasan yang sangat tinggi ini. Kesimpulannya, kesemua imej kedudukan penumpang yang dikaji telah berjaya didiskriminan dengan sangat baik ke dalam kelas yang sepatutnya. Ini mencadangkan bahawa penggunaan teknik pengambangan setempat dan fitur MOL adalah suatu pilihan yang boleh dipertimbangkan untuk pengelasan pelbagai kedudukan penumpang itu.

Kata kunci: momen ortogon Legendre; teknik pengambangan setempat; pengecaman kedudukan penumpang

ABSTRACT

In this paper we evaluate and discuss the application of Legendre orthogonal moments (LOMs) as features for recognition of passenger positions that have been segmented using local thresholding technique. Identification of passenger position in a car is vital in a smart-car system; for example, identifying the passenger position may help in intelligent deployment of the safety airbags. In this study, a total of 1292 images of ten different classes of passenger position have been used. These images have been segmented using the local thresholding technique in order to separate the passenger region from the image background. Then nine LOMs features have been generated for each of the segmented images. The segmentation and feature extraction tasks have been accomplished using C++ programs. The moment features were then fed into the SPSS package for classification using discriminant analysis. The importance of each of the moments in its ability to explain each of the positions is also investigated. The classification results show that 99.5% of the data has been classified successfully. The applicability of the local thresholding technique for the segmentation task is well supported by this very high success rate. We can conclude that the passenger position images investigated has been very well discriminated into the desired passenger position classes. This suggests that the application of local thresholding technique and LOMs is a potential choice for the identification of the various passenger positions.

Keywords: Legendre orthogonal moments; local thresholding technique; passenger position recognition

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