On the problem of classifying vietnamese online handwritten characters

Nguyen D.K., Bui T.D.
Human Machine Interaction Laboratory, College of Technology, Vietnam National University, Hanoi

Abstract: Recognizing circumflexes and diacritics in a Latin-based tonal language of Vietnamese is important because they are used to distinguish words. There are two main approaches to solve the diacritics recognition problems. The first approach tries to separate diacritics from their main character and recognizes them independently. This approach, however, should only be applied with printed documents as the diacritics of printed characters are separable. With free-styled handwritten characters, diacritics are very hard to separate and recognize because they may overlap main characters. The second approach tries to recognize both main character and diacritics without separation step. In this paper, we want to show that our approach with an appropriate feature extraction method and subclass diving strategy, a robust recognition can be obtained with high recognition rate. ?? 2008 IEEE.
Author Keywords: Diacritics recognition; Online handwritten recognition; Pattern recognition; Vietnamese handwritten recognition
Index Keywords: Diacritics recognition; Feature extraction methods; Hand-written characters; Online handwritten recognition; Printed documents; Recognition rates; Robust recognition; Tonal languages; Vietnamese handwritten recognition; Feature extraction; Robotics; Computer vision

Year: 2008
Source title: 2008 10th International Conference on Control, Automation, Robotics and Vision, ICARCV 2008
Art. No.: 4795620
Page : 803-808
Link: Scorpus Link
Correspondence Address: Nguyen, D. K.; Human Machine Interaction Laboratory, College of Technology, Vietnam National University, Hanoi; email: s0420219@coltech.vnu.vn
Conference name: 2008 10th International Conference on Control, Automation, Robotics and Vision, ICARCV 2008
Conference date: 17 December 2008 through 20 December 2008
Conference location: Hanoi
Conference code: 75841
ISBN: 9.78E+12
DOI: 10.1109/ICARCV.2008.4795620
Language of Original Document: English
Abbreviated Source Title: 2008 10th International Conference on Control, Automation, Robotics and Vision, ICARCV 2008
Document Type: Conference Paper

Source: Scopus

Authors with affiliations:

1. Nguyen, D.K., Human Machine Interaction Laboratory, College of Technology, Vietnam National University, Hanoi
2. Bui, T.D., Human Machine Interaction Laboratory, College of Technology, Vietnam National University, Hanoi

References:

1. Abe, S., (2005) Support Vector Machines for Pattern Classification, , SpringerVerlag London
2. Abdul Rahim Ahmad, Christian Viard-Gaudin, Marzuki Khalid, and Rubiyah Yusof, Online Handwriting Recognition using Support Vector Machine, Proceedings of the Second International Conference on Artificial Intelligence in Engineering & Technology, August 3-5 2004, Kota Kinabalu, Sabah, MalaysiaAhmed, N., Natarajan, T., Rao, K.R., Discrete cosine transform (1974) IEEE Trans. Computers, C-23 (1). , January
3. (2007) Computational Intelligence, , D. Andina and D. T. Pham eds, Springer
4. Arica, N.I., (1998) An off-line character recognition System for free style handwriting, , Master thesis, METU, September
5. Bahlmann, C., (2004) Advanced Sequence Classification Techniques Applied to Online Handwriting Recognition, , Ph.D. Thesis, Albert-Ludwigs- Universit??t Freiburg, October
6. Bahlmann, C., Burkhardt, H., The Writer Independent Online Handwriting Recognition System frog on hand and Cluster Generative Statistical Dynamic Time Warping (2004) IEEE Transactions on Pattern Analysis and Machine Intelligence, 26 (3), pp. 299-310. , Mar
7. Cheriet, M., Kharma, N., Liu, C., Suen, C.Y., (2007) Characters Recognition Systems, , Willey & Son
8. Connell, S.D., (2000) Online handwriting recognition using multiple pattern class models, Doctor of philosophy
9. Gagne, C., Parizeau, M., Genetic engineering of hierarchical fuzzy regional representations for handwritten character recognition (2006) International Journal of Document Analysis and Recognition, 8 (4), pp. 223-231. , September
10. I.Guyon, L. Schomaker, R. Plamondon, M. Liberman, and S. Janet. Unipen project of on-line data exchange and recognizer benchmarks. In Proceedings of the 14th International Conference on Pattern Recognition (ICPR), 1994J.F.,M Hebert and N. Ghazzali, A new fuzzy geometric representation for on-line isolated character recognition. In Proceedings of the 14th International Conference on Pattern Recognition, pp. 33-40 (1998)Syed Ali Khayam, Department of Electrical & Computer Engineering, Michigan State University, The Discrete Cosine Transform (DCT): Theory and ApplicationH. Kiem, L. Bac, and L. Thai. A fuzzy neural network for Vietnamese character recognition. In Proceedings of ICIP99, pages 585-589, 1999Lemieux, A., Gagn??, C., Parizeau, M., Genetical Engineering of Handwriting Representations (2002) Proceedings of the Eighth international Workshop on Frontiers in Handwriting Recognition - IWFHR-8, , IEEE Computer Society
11. Li, X., Hall, N.S., Corner Detection and Shape Classification of OnLine Handprinted Kanji Strokes (1993) Pattern Recognition, 26 (9), pp. 1315-1334
12. Liu, C., Online Recognition of Chinese Characters: The State-of-the-Art (2004) IEEE transactions on pattern analysis, 26 (2). , February
13. Nguyen, D.K., Bui, T.D., Recognizing Vietnamese Online Handwritten Separated Characters (2008) Proc. of ALPIT
14. Niels, R., (2004) Dynamic Time Warping An intuitive way of handwriting recognition, , Master Thesis, Radboud University Nijmegen, December
15. Polyakov, V.G., Ryleev, M.A., Method and apparatus for representing image data using polynomial approximation method and iterative transformation-reparametrization technique (1995), United States Patent number 5,473,742, DecemberV. Quan, H. Kiem, P. Trung, L. Tin, N. Ha, and A. Nguyen. A system for recognizing Vietnamese document images based on hmm and linguistics. In Proc. of ICDAR01, 2001V. Quan, P. Trung, N. Due, and H. Ha. A robust method for the Vietnamese handwritten and speech recognition. In Proc. of ICPR02, 2002E. H. Ratzlaff, Methods, Report and Survey for the

Comparison of Diverse Isolated Character Recognition Results on the UNIPEN Database, Proceedings of the Seventh International Conference on Document Analysis and Recognition, ICDAR 2003Ye, P.J., Hugli, H., Pellandini, F., Techniques for On-Line Chinese Character Recognition with Reduced Writing Constraints (1984) Proc. Seventh Int'l Conf. Pattern Recognition, pp. 1043-1105

16. Yhap, E.F., Greanias, E.C., An On-Line Chinese Character Recognition System (1981) IBM J. Research Development, 25 (3), pp. 187-195