

Image Processing Laboratory



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Refereed academic journal

[yaguchi-301-015-01:2015] Yuki Niitsuma, Syunpei Torii, Yuichi Yaguchi, and Ryuichi Oka. Time-segmentation- And position-free recognition from video of air-drawn gestures and characters. *Multimedia Tools and Applications*, pages 1–25, May 2015.

We report the recognition in video streams of isolated alphabetic characters and connected cursive textual characters, such as alphabetic, hiragana and kanji characters, that are drawn in the air. This topic involves a number of difficult problems in computer vision, such as the segmentation and recognition of complex motion on videos. We use an algorithm called time—space continuous dynamic programming (TSCDP), which can realize both time- and location-free (spotting) recognition. Spotting means that the prior segmentation of input video is not required. Each reference (model) character is represented by a single stroke that is composed of pixels. We conducted two experiments involving the recognition of 26 isolated alphabetic characters and 23 Japanese hiragana and kanji air-drawn characters. We also conducted gesture recognition experiments based on TSCDP, which showed that TSCDP was free from many of the restrictions imposed by conventional methods.

Refereed proceedings of an academic conference

[yaguchi-301-015-02:2015] Shusuke Moriya, Yuichi Yaguchi, and Ian Wilson. Normalization and matching routine for comparison of native speaker and non-native speaker tongue. In *The 16th International Symposium on Advanced Intelligent Systems*, November 2015.

The main purpose of this research is to specify articulation difference between native and non-native speakers by digitizing tongue motions and analyzing the difference between utterances. Differences in tongue motion directly influence speaker's pronunciation, therefore it may be possible to improve non-native speaker's efficiency of pronunciation practice with the relevant feedback and visualization. It is necessary for comparison of native and non-native speakers' tongue motions to that end, however, normalization is absolutely necessary to remove the influence of anything except tongue motion before comparison, because every person has a unique shape and size. In this paper, we use coronal cross section of the tongue taken by ultrasound scanner to carry out the following: first record the ultrasound of speaker's tongue

motion using the corpus “The Boy Who Cried Wolf.” Then, sample tongue motion by using a histogram of oriented gradients and Karhunen-Loeve expansion. Next, apply eight prepared normalizations to tongue motions. Finally, compare each tongue motion per frame via dynamic time warping. The experimental result allowed us to compare with speaker’s tongue motions in sentences which were recorded in different environments or by different speakers and to point out non-native speaker’s speaking errors

[yaguchi-301-015-03:2015] Yuichi Yaguchi, Yuta Hiroto, Takaaki Mamiya, and Ryuichi Oka. A Coarse-to-Fine Strategy for Full Pixel Image-Matching in High-Resolution Images. In *The 16th International Symposium on Advanced Intelligent Systems*, November 2015.

Image registration is a key issue in many computer vision problems such as object recognition and 3D shape reconstruction by structure from motion, where there is a need to identify many precise trajectories in a set of pictures. Two-dimensional continuous dynamic programming (2DCDP) is a full pixel image-matching technique for obtaining a large set of corresponding points. In this paper, we improve the 2DCDP algorithm to enable its application to larger images, where the conventional method would involve excessive memory requirements. First, we reduce pixels to a suitable size to enable coarse matching. Second, we obtain corresponding blocks in the original images from the results of the coarse matching. Finally, we extract the actual corresponding points in the original images to apply to each segmented subimage. From our experimental results, the proposed method is more effective for extracting precisely corresponding points than previous methods.

Research grants from scientific research funds and public organizations

[yaguchi-301-015-04:2015] SYNC, Bird’s View, BSN-iNet, University of Aizu, and Fukushima Medical University. Fukushima medical and welfare equipment development project subsidy (Emergency and Disaster), 2014-2016.

[yaguchi-301-015-05:2015] (including University of Aizu) Kikuchi Seisakusyo et. al. Fukushima medical and welfare equipment development project subsidy (Emergency and Disaster), 2014-2016.

Academic society activities

Summary of Achievement

[yaguchi-301-015-06:2015] Yuichi Yaguchi, September 2015.

Local Organization Committee Member, ASJ2015-Fall

[yaguchi-301-015-07:2015] Yuichi Yaguchi, November 2015.

Session Chair, ISIS2015.

Advisor for undergraduate research and graduate research

[yaguchi-301-015-08:2015] Yukinori Inoue. Graduation Thesis: Visualizing State Cluster of Indicator Sequence in Sewage Treatment Facilities, University of Aizu, 2015.

Thesis Advisor: Yuichi Yaguchi

[yaguchi-301-015-09:2015] Takaaki Mamiya. Graduation Thesis: Developing A Control System of Drones using Open-RTM, University of Aizu, 2015.

Thesis Advisor: Yuichi Yaguchi

[yaguchi-301-015-10:2015] Aya Higuchi. Graduation Thesis: Generation of All directional Range Image Using Two Omni-directional Cameras, University of Aizu, 2015.

Thesis Advisor: Yuichi Yaguchi

[yaguchi-301-015-11:2015] Yuta Oshima. Graduation Thesis: A Study of Epidemic Database System for Emergency Medicine, University of Aizu, 2015.

Thesis Advisor: Yuichi Yaguchi

[yaguchi-301-015-12:2015] Shinichi Hashimoto. Master Thesis: Reconstructing 3D Wide Area from Aerial Images Using Pixel-Wise Matching, University of Aizu, 2015.

Thesis Advisor: Yuichi Yaguchi

[yaguchi-301-015-13:2015] Shinya Sato. Master Thesis: 3D shape reconstruction of holes in silica aerogel based on optical microscope tomography, University of Aizu, 2015.

Thesis Advisor: Yuichi Yaguchi

Contributions related to syllabus preparation

Summary of Achievement

[yaguchi-301-015-14:2015] Following course planning, a syllabus becomes the A03-Digital Image Processing

Contribution related to the creation of the annual schedule

[yaguchi-301-015-15:2015] A member of evaluation room.

[yaguchi-301-015-16:2015] A member of culliculum working group.

Contribution related to toward equipment management, classroom management, building management, and crime or fire prevention.

[yaguchi-301-015-17:2015] Management for facilities on Image Processing Lab.

Advisor of a student club or circle

[yaguchi-301-015-18:2015] Advisor of Pokemon Circle, Soccer Circle and CUO.

Other significant contribution toward university planning, management, or administration

[yaguchi-301-015-19:2015] Member of Pasokon Koshien and chief of mobile section.

Contribution toward education for employees of regional industries

[yaguchi-301-015-20:2015] Accepting collaboration research with Aquacrew