

External Awards

2010 CLEO/Laser Focus World Innovation Awards “Grand Prize”

Winner: NTT AT

Date: May 17, 2010

Organization: CLEO/QELS (The Conference on Lasers and Electro-Optics and The Quantum Electronics and Laser Science Conference): 2010

For “KTN Voltage-Controlled Laser Beam Scanner Using KTN Crystals”.

* This award was given to the most timely and innovative product released during the period from September 2008 to March 2010 in the fields of optics and photonics. This is the first time that a Japanese company has won the Grand Prize.

International Activities Encouragement Award in the Field of ITU Activities, 38th ITU Association of Japan Award

Winner: Jun Okamoto, NTT Service Integration Laboratories

Date: May 17, 2010

Organization: ITU Association of Japan, Inc.

For contributions to international standardization activities on objective video quality assessment methods.

Papers Published in Technical Journals and Conferences Proceedings

3D Photodynamic Tool Using a Single 2D Image with 3D Velocity Primitives and Physical Effects

H. Sakaino, Y. Zhao, and Y. Liu

Proc. ICME 2009 (IEEE International Conference on Multimedia and Expo), pp. 986–989, New York, NY, USA, June 2009.

Natural phenomena such as smoke, waterfalls, and streams show both texture and motion changes over time. The underlying physical properties bring complicated 3D variations which have attracted our interest. Velocity, which is one of important physical properties, affects fluidity on both small and large scales. This paper presents a 3D photodynamic tool (PDT) using a single fluid-like 2D image with 3D velocity primitives and physical models. Using only a few manipulations, our tool can generate a long-term animation from a single image in a minute. Experimental results show that our 3D PDT can animate a realistic texture change from a single 2D photo even when there is occlusion in the scene.

Dynamic Edge Detection and Analysis by Multiple Frame-based Derivative Tensor

H. Sakaino and X. Lu

Proc. ICIP 2009 (16th IEEE International Conference on Image Processing), Cairo, Egypt, Nov. 2009.

Edge detection or interesting point detection is one of the most fundamental methods in computer vision and image processing. Most previous methods have tried to detect spatial image features. For videos of natural phenomena, not only the spatial features but

also the temporal features are important in the analysis and classification of a dynamic scene. In this paper, a spatio-temporal derivative tensor based on multiple frames is proposed. The spatio-temporal information contained in the multiple frames enables us to estimate the magnitude and orientation of the dynamic edges. With the estimated magnitude and orientation of dynamic edges, we can classify the dynamic scene into different regions with distinctive motion activities. The present experimental results demonstrate the method’s ability to classify both rigid motions and also non-rigid motions compared with some state-of-the-art techniques.

Falling Snow Motion Estimation Based on a Semi-transparent and Particle Trajectory Model

H. Sakaino, Y. Shen, Y. Pang, and L. Ma

Proc. ICIP 2009 (16th IEEE International Conference on Image Processing), Cairo, Egypt, Nov. 2009.

This paper presents a motion estimation method for semi-transparent objects with long-range displacement between frames, i.e., falling snow in a video. Previous optical-flow-based methods have treated non-transparent, rigid, and fluid-like moving objects in short-range displacements, but they fail to match between frames when moving objects are transparent or homogeneous in color in long-range displacement. To handle such object properties, we devised a two-step algorithm to cover the range from rough to refined motion estimation via energy minimization. First, the rough motion of all snow particles is extracted from a video using a novel “time filter” method to obtain/

update a quasi-stationary background at 30 fps. Second, the rough optical flow from the first step is used to estimate and refine the long-range snowflake trajectories by propagation, linking, pruning, and optimization. Experimental results for videos of real falling snow show that our method is more effective than a previous optical flow method. It is useful for the analysis of natural environment changes.

BaseNP Supersense Tagging for Japanese Texts

H. Taira, S. Yoshida, and M. Nagata

PACLIC 2009 (The 23rd Pacific Asia Conference on Language, Information and Computation), Hong Kong, China, Dec. 2009.

This paper describes baseNP supersense tagging for Japanese texts. The task extracts base noun phrases (baseNPs) from raw texts in Japanese and labels their baseNPs with supersenses. This task has a number of applications including predicate argument structure analysis and question answering. While the definition of baseNP in English is relatively clear, its definition in Japanese has not yet been clarified. In this paper, we define Japanese baseNP analogous to English and define Japanese supersenses using a broad-coverage Japanese thesaurus, *Nihongo Goi Taikei* (comprehensive outline of Japanese vocabulary). We chose to use a sequential tagging algorithm for the task, namely the averaged perceptron with a hidden Markov model, and achieved high performance compared with a baseline.

Estimating Direct-to-reverberant Energy Ratio Based on Spatial Correlation Model Segregating Direct Sound and Reverberation

Y. Hioka, K. Niwa, S. Sakauchi, K. Furuya, and Y. Haneda

ICASSP 2010 (The 35th International Conference on Acoustics, Speech, and Signal Processing), Dallas, Texas, USA.

A new approach for estimating the direct-to-reverberant energy ratio (DRR) by using a microphone array is proposed. The method is based on a model of the spatial correlation matrix that segregates direct sound and reverberation. It estimates the DRR from the power spectra of both components, which are derived from the correlation matrix of the observed signal. In experiments performed in simulated and actual reverberant environments, this method mostly succeeded in estimating the DRR accurately. We also present speech enhancement using binary masking as an example of an application of the estimated DRR. By utilizing the DRR as a factor for discriminating speaker distances, we were able to separate speech signals whose sources were located in the same direction but at different distances.

Failure Rate Estimation Considering the Change in the Number of Devices: Applicable Condition of Mathematical Model for Previously Proposed Method

Y. Funakoshi and T. Matsukawa

IEICE Trans. on Commun., Vol. J-93B, No. 4, pp. 681–692, 2010 (in Japanese).

We believe that reliability management for Internet protocol (IP)

networks constructed of commercial equipment is important and have studied a management technique using actual failure data. Failure rate, unavailability, and maintainability are typical measures for the reliability management of telecommunication networks. These reliability measures could not be exactly estimated using the previous reliability methods because the numbers of devices and users change in communication networks. We previously proposed a method for estimating the instantaneous failure rate by using the number of devices and cumulative failures, but it has a problem in that the failure rate estimated by some polynomial approximations of the cumulative failures may not be continuous. In this paper, we analyze applicable conditions of the mathematical model of the proposed method to solve the abovementioned issue.

Development of Building Alarm System on Service Delivery Platform

T. Moriya, M. Kaneko, Y. Yamato, H. Ohnishi, and J. Akahani

IEICE Trans. on Commun., Vol. J93-B, No. 4, pp. 625–638, 2010 (in Japanese).

A service delivery platform (SDP) has recently been spotlighted because it treats telecommunication functions like Web Service components and cooperates with various services on the Internet. Likewise, in a building automation system, which controls and manages facility in a building, Web Service standards such as oBIX are expected to be applied in a wide-area building monitoring network. Thus, to give a wide-area building monitoring network telecommunication functions via SDP for a new service that detects building alarms with oBIX and automatically makes third-party calls between maintenance persons/offices, we studied and developed a service-oriented-architecture-based composite system that comprehensively uses the main components of SDP such as a session initiation protocol enabler and cooperates with building automation. Then, considering the actual number of buildings and alarm frequency, we evaluated the performance of this system. In addition, we evaluated the applicability of SDP to wide-area building monitoring networks in terms of development efficiency and flexibility.

Proposal of Software Development Kit and Evaluation of Its Productivity in Program Cooperation between Web and Telecommunications

T. Moriya, H. Ohnishi, and J. Akaue

IEICE Trans. on Commun., Vol. J93-B, No. 4, pp. 649–666, 2010 (in Japanese).

This paper proposes a software development kit (SDK) that provides two libraries: a call-based model that enables developers to flexibly control a telephone call service and a user-agent-based model that enables general users to easily code a program with a telephone call service. We evaluated the productivity of our SDK for real programs coded by actual human subjects.