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The Joinability and Unification Problems for Confluent Semi-Constructor TRSs , Ichiro MITSUHASHI, Michio OYAMAGUCHI, Yoshikatsu OHTA and Toshiyuki YAMADA, Proceedings of the 15th International Conference on Rewriting Techniques and Applications (RTA 2004), Lecture Notes in Computer Science 3091, pp.285-300, June 2004.

The unification problem for term rewriting systems (TRSs) is the problem of deciding, for a TRS  $R$  and two terms  $s$  and  $t$ , whether  $s$  and  $t$  are unifiable modulo  $R$ . Mitsuhashi et al. have shown that the problem is decidable for confluent simple TRSs. Here, a TRS is simple if the right-hand side of every rewrite rule is a ground term or a variable. In this paper, we extend this result and show that the unification problem for confluent semi-constructor TRSs is decidable. Here, a semi-constructor TRS is such a TRS that every subterm of the right-hand side of each rewrite rule is ground if its root is a defined symbol. We first show the decidability of joinability for confluent semi-constructor TRSs. Then, using the decision algorithm for joinability, we obtain a unification algorithm for confluent semi-constructor TRSs.

Inductive Theorems for Higher-Order Rewriting, Takahito AOTO\*, Toshiyuki YAMADA and Yoshihito TOYAMA\*, Proceedings of the 15th International Conference on Rewriting Techniques and Applications (RTA 2004), Lecture Notes in Computer Science 3091, pp.269-284, June 2004.

Simply typed term rewriting proposed by Yamada (2001) is a framework of higher-order term rewriting which dispenses with bound variables. This paper proposes an extension of the dependency pair method of first-order term rewriting introduced by Arts and Giesl (2000), which enables automated termination proof of simply typed term rewriting systems.

Improvements on SIMD Macroblock Processor in MPEG-2Video Encoder LSI, Koyo NITTA\*, Takeshi YOSHITOME\*, Toshio KONDO, Hiroe IWASAKI\* and Jiro NAGANUMA\*: Trans. of IEICE, Vol.J87-C, No.4, pp.377-385,2004

Low Energy Consumption by a Variable Stages Pipeline Technique, Yuji Ichikawa\*, Takahiro Sasaki, Tetsuo Hironaka\*, Toshiaki Kitamura\*, Toshio Kondo: International Technical Conference on Circuits/Systems, Computers and Communications, 2004

Proposition and Evaluation of a Bank based Multi-port Memory with Blocking Network, Tomohiro Inoue\*, Tetsuo Hironaka\*, Takahiro Sasaki, Seiji Fukae\*, Tetsushi Koide\*, Hans Jurgen Mattausch\*: International Technical Conference on Circuits/Systems, Computers and Communications, 2004

Featuring vowels by five layers sandglass type neural network [in Japanese], Tadaaki SHIMIZU\*,

Masaya KIMOTO\*, Hiroki YOSHIMURA\*, Naoki ISU, Kazuhiro SUGATA\*: Brain Neural Net., Vol.11, pp.167-175, 2004.

We showed a new scheme to characterize speech from LSP parameters by 5 layers sandglass type nonlinear neural network (SNN(NL5)). In order to synthesize speech, we take advantage of useful abilities of SNN(NL5) for compressing and restoring the information. We performed learning experiments on LSP parameters of 5 vowels to investigate the ability of SNN. The followings were verified, 1) the distribution of LSP parameters compressed by SNN(NL5) are similar to the distribution of F1-F2 formants plane. 2) Nonlinear output function of neural elements in second and fourth layers of SNN(NL5) work effectively from view point of separating the distribution of vowels. 3) In order to prevent SNN(NL5) from over learning, there exists the optimum numbers of neural elements in second and fourth layers. For 14 orders of LSP parameters, this number was determined to be 20. 4) There is a preferable property on the plane to separate the vowels distinctively when the restoring error of LSP parameters becomes less. 5) SNN(NL5) can restore the LSP parameters with accuracy enough to synthesize speech from the compressed parameters.

An evaluation of question answering challenge (QAC-1) at the NTCIR workshop 3, Jun'ichi FUKUMOTO\*, Tsuneaki KATO\*, and Fumito MASUI: ACM SIGIR Forum, Vol.38, Issue 1, pp.25-28, 2004.6.

In this paper we describe the Question Answering Challenge (QAC), a question answering task, and its first evaluation (QAC1). The project was carried out as a task of the NTCIR Workshop 3 in October 2002. One objective of the QAC was to develop practical QA systems in a general domain by focusing on research relating to user interaction and information extraction. Our second objective was to develop an evaluation method for the question answering system and information resources for evaluation. We defined three kinds of tasks in the QAC: Task 1, where questions required five possible answers; Task 2, where questions had a single answer; and Task 3, where there was one answer to a question related to a question in Task 2. We prepared 200 questions for Task 1 and Task 2 and 40 questions for Task 3 at the Formal Run and about 900 questions for the additional run. We conducted a Dry Run and a Formal Run evaluation. There were 16 participants (two of them from among the task organizers) at the QAC1.

A Method for Rating English Texts by Reading Level for Japanese Learners of English [in Japanese], Ryo NAGATA, Tatsuya IGUCHI, Fumito MASUI, and Atsuo KAWAI: IEICE Vol.J87-D-II, No.6, pp.1329-1338., 2004.6.

It has been recognized that existing methods for rating English texts by reading level are mostly aimed at native speakers of English and therefore are not completely appropriate for Japanese learners of the language. Here we propose a method for rating English texts by reading level specifically targeted at Japanese learners of the language. To rate the reading level of a text for a Japanese learner of English, our method takes two types information regarding a given text into account, namely, vocabulary and grammatical structure. Specifically, we rate the reading level of a text by using a vocabulary list and parser to extract particularly difficult vocabulary items or grammatical structures as features. To rate a text's reading level, two types of model are used:

multiple regression and neural networks. Our experiments show that the proposed methods rate the reading level of a text with the following levels of accuracy: an average of 75% accuracy for multiple regression and 81% when using neural networks.

Sensation and Illusion of Rotation Caused by a Coriolis Stimulus [in Japanese], Naoki ISU, Atsuo KAWAI, and Fumito MASUI: *Equilibrium Res.*, Vol.63, No.3, pp.183-193, 2004.

The sensation of rotation derived from the semicircular canal system during a Coriolis stimulus, or cross-coupled rotation, was estimated by an approach from mechanics with giving some hypotheses and simplifications on the semicircular canal system. By solving an equation of motion of the endolymph during a Coriolis stimulus with a moderate time course, rotating angle of the endolymph was obtained, and the sensation of rotation derived from each semicircular canal was estimated. Then the sensation was integrated in the whole semicircular canal system which was considered to be composed of three orthogonal semicircular canals. The sensation of rotation derived from the semicircular canal system comes into conflict with those from the otolithic system and the somatosensory system. The conflict causes an illusion such that the head rotates vertically with keeping inclination at a constant tilt angle. The nauseogenic severity of motion sickness caused by a Coriolis stimulus is enhanced in accordance with the integrated angle of rotation perceived by the illusion.

Recognizing Article Errors in the Writing of Japanese Learners of English[in Japanese], Ryo NAGATA, Tatsuya IGUCHI, Kenta WAKIDERA, Fumito MASUI, and Atsuo KAWAI: *IEICE Vol.J87-D-I*, No.1, pp.60-68., 2004.1.

In this paper, the authors propose a method to recognize article errors often seen in English text written by Japanese learners of English. In this method, article errors are recognized based on the statistic extracted from an electronic corpus such as English-language newspapers. The authors' method is different from earlier methods in that there is no need to create a dictionary or rules for article error recognition. The results of experiments confirm that the performance of the authors' method is equivalent or superior to earlier methods.

Question Answering Method -- Answering to Questions based on Hudge Data Set -- [in Japanese], Jun'ichi FUKUMOTO\* and Fumito MASUI: *Information Processing Society of Japan Magazine*, vol.45, No.6, pp.30-25., 2004.

Recognizing Article Errors based on the Three Head Words, Ryo NAGATA, Fumito MASUI, Atsuo KAWAI, and Naoki ISU: In *Proceedings of the Cognition and Exploratory Learning in Digital Age(CELDA 2004)*, pp.165-172, 2004.

A Method for Distinguishing Mass and Count Nouns Based on Contextual Information, Ryo NAGATA, Fumito MASUI, Atsuo KAWAI, and Naoki ISU: In *Proceedings of the 4th International Symposium*

on Human and Artificial Intelligence Systems(International Series on Natural and Artificial Intelligence), pp.516--521, 2004.

MAIQA: Mie Univ. Participated System at NTCIR4 QAC2, Naoya HIDAHA and Fumito MASUI: In Working Notes of the Fourth NTCIR Workshop Meeting(NTCIR4), pp.315--319, 2004.

Question Answering Challenge for Information Access Dialogue -- Overview of NTCIR4 QAC2 Subtask3 -, Tsuneaki KATO\*, Jun'ichi FUKUMOTO\*, and Fumito MASUI: In Working Notes of the Fourth NTCIR Workshop Meeting(NTCIR4), pp.291--297, 2004.

Question Answering Challenge for Five ranked answers and List answers -- Overview of NTCIR4 QAC2 Subtask 1 and 2 -, Jun'ichi FUKUMOTO\*, Tsuneaki KATO\*, and Fumito MASUI: In Working Notes of the Fourth NTCIR Workshop Meeting(NTCIR4), pp.283--290, 2004.

Handling Information Access Dialogue through QA Technologies - A novel challenge for open-domain question answering, Tsuneaki KATO\*, Jun'ichi FUKUMOTO\*, Fumito MASUI and Noriko KANDO\*:

In Proceedings of the Workshop on Pragmatics of Question Answering at HLT-NAACL 2004, pp.70--77, 2004.

Assessment of Regional Intra-myocardial Layer Function from Ultrasonic RF echo Signal Using Hierarchical Correlation Method with Confidence, Kiyotsugu SEKIOKA\*, Toshihiro KUMISADA, Shinji TSURUOKA, Hirotake ISHII, Wataru OHYAMA, and Tetsushi WAKABAYASHI: The Transactions of The Institute of Electronics, Information and Communication Engineers, Vol. J87-D-II, No.1, pp.98-108, January, 2004

Automatic text classification of English newswire articles based on statistical classification techniques, Guowei ZU, Wataru OHYAMA, Tetsushi WAKABAYASHI and Fumitaka KIMURA: The transactions of The Institute of Electrical Engineers of Japan: Vol.124-C, No.3,pp 852--860, March, 2004

Background removal for check processing using morphology, Yimei DING, Fumitaka KIMURA, Minoru OKADA\*, Malayappan SHRIDHAR\* and John W. V. Miller\*: Two- and Three-Dimensional Vision Systems for Inspection, Control, and Metrology KK, edited by Kevin G. Harding, Proceedings of SPIE Vol.5606, pp.19--pp.26, Bellingham, WA, 2004

Automatic Tracking for Regional Myocardial Motion by Correlation Method with Connecting Multiple ROIS, Wataru Ohyama, Masaki Inami, Tetsushi Wakabayashi, Fumitaka Kimura, Shinji Tsuruoka, Kiyotsugu Sekioka\*: IEEJ Trans. EIS, Vol.124, No.10, 2004

Eigenspace Method by Autoassociative Networks for Object Recognition, Takamasa Yokoi, Wataru Ohyama, Tetsushi Wakabayashi and Fumitaka Kimura: Structural, Syntactic, and Statistical Pattern Recognition (Joint IAPR International Workshops SSPR2004 and SPR2004 Proceedings), Springer LNCS 3138, pp.95-103, Lisbon, Portugal, Aug. 18-20, 2004

Two Dimensional Motion Tracking of Left Ventricular Myocardium Using Ultrasonic Doppler Signal, Wataru Ohyama, Toshikazu Muramatsu, Tetsushi Wakabayashi, Fumitaka Kimura, Shinji Tsuruoka and Kiyotsugu Sekioka\*: Proceedings of the Sixth IASTED International Conference on Signal and Image Processing, pp.436-440 (#444-187), Honolulu, Hawaii, USA, Aug. 23-25, 2004

Local Slant Estimation for Handwritten English Words, Yimei Ding, Wataru Ohyama, Fumitaka Kimura and Malayappan Shridhar\*: Proceedings of the 9th International Workshop on Frontiers in Handwritten Recognition, pp.328-333, Kokubunji, Tokyo, Japan, Oct. 26-29, 2004

A Study on Decision Rule for Japanese Dictation Test, Meng Shi, Wataru Ohyama, Tetsushi Wakabayashi and Fumitaka Kimura: Proceedings of the 9th International Workshop on Frontiers in Handwritten Recognition, pp.592-596, Kokubunji, Tokyo, Japan, Oct. 26-29, 2004

The Impact of OCR Accuracy on Automatic Text Classification, Guowei Zu, Mayo Murata, Wataru Ohyama, Tetsushi Wakabayashi and Fumitaka Kimura: Proc. of AWCC2004, ZhenJiang, China, pp.403-409, Nov. 2004

Accuracy Improvement of Automatic Text Classification Based on Feature Transformation and Multi-classifier Combination, Xuexian Han, Guowei Zu, Wataru Ohyama, Tetsushi Wakabayashi and Fumitaka Kimura: Proc. of AWCC2004, ZhenJiang, China, pp.463-468, Nov. 2004