

บทความที่น่าสนใจประจำเดือนกุมภาพันธ์ 2559
สาขาวิทยาศาสตร์และเทคโนโลยี

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Title:	A Fuzzy Logic-Based Retrofit System for Enabling Smart Energy-Efficient Electric Cookers
Author:	Ghelli, A. ; Hagra, H. ; Aldabbagh, G.
Journal:	IEEE Transactions on Fuzzy Systems, Volume 23, Issue 6, December 2015, Pages 1984 - 1997
Abstract:	In recent years, our homes have been equipped with smarter and more energy-efficient electric appliances, such as smart fridges, washing machines, TVs, etc. However, it seems that cookers seem to have been left aside during this trend although, for example, in U.K., electric cookers consume up to 20% of the evening peak electricity consumption. In addition, over half of the accidental house fires are due to cooking and cooking appliances. One of the reasons for the lack of smart energy-efficient electric cookers is the complexity of performing energy-efficient control for the various cooking techniques. This paper presents a fuzzy logic-based system, which can be cheaply retrofitted in existing electric cookers to convert them to semiautonomous, energy efficient, and safe smart electric cookers. The proposed system can control the cooker heating plate to allow the semiautonomous safe operation of the most common cooking techniques including boiling, stir/shallow-frying, deep-frying, and warming. In addition, the developed system can identify when human intervention is necessary and when dangerous situations happen or are imminent. We will present several real-world experiments, which were performed in the University of Essex intelligent apartment (iSpace) with various users where the proposed system operated a cooker semiautonomously in various cooking modes, and it was shown that when compared with the human manual operation, the proposed system realized an average energy saving of 21.42%, 34.43%, and 20.29% for the boiling, stir/shallow-frying, and deep-frying cooking techniques, respectively. In addition, the realized smart cooker has shown unique safety features not present in the existing commercial cookers.
Database:	IEEE/IET Electronic Library (IEL)

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Title:	Fast Fuzzy Pattern Tree Learning for Classification
Author:	Senge, R. ; Hullermeier, E.
Journal:	IEEE Transactions on Fuzzy Systems, Volume 23, Issue 6, December 2015, Pages 2024 - 2033
Abstract:	Fuzzy pattern trees have recently been introduced as a novel type of fuzzy system, specifically with regard to the modeling of classification functions in machine learning. Moreover, different algorithms for learning pattern trees from data have been proposed in the literature. While showing strong performance in terms of predictive accuracy, these algorithms exhibit a rather high computational complexity, and their runtime may become prohibitive for large datasets. In this paper, we therefore propose extensions of an existing state-of-the-art algorithm for fuzzy pattern tree induction, which are

	aimed at making this algorithm faster without compromising its predictive accuracy. These extensions include the use of adaptive sampling schemes, as well as heuristics for guiding the growth of pattern trees. The effectiveness of our modified algorithm is confirmed by means of several experimental studies.
Database:	IEEE/IET Electronic Library (IEL)

3	Title: Fuzzy Planar Graphs
	Author: Samanta, S. ; Pal, M.
	Journal: IEEE Transactions on Fuzzy Systems, Volume 23, Issue 6, December 2015, Pages 1936 - 1942
	Abstract: Fuzzy planar graph is a very important subclass of fuzzy graph. In this paper, two types of edges are mentioned for fuzzy graphs: effective edges and considerable edges. In addition, a comparative study between Kuratowski's graphs and fuzzy planar graph is made. A new concept of a strong fuzzy planar graph is introduced. Some related results are established. These results have certain applications in subway tunnels, routes, oil/gas pipelines representation, etc. It is also shown that an image can be represented by a fuzzy planar graph, and contraction of such an image can be made with the help of a fuzzy planar graph.
	Database: IEEE/IET Electronic Library (IEL)

4	Title: Increasing N200 Potentials Via Visual Stimulus Depicting Humanoid Robot Behavior
	Author: Mengfan Li, Wei Li, and Huihui Zhou
	Journal: International Journal of Neural Systems, Volume 26, Issue 01, February 2016, 1550039 (16 pages)
	Abstract: Achieving recognizable visual event-related potentials plays an important role in improving the success rate in telepresence control of a humanoid robot via N200 or P300 potentials. The aim of this research is to intensively investigate ways to induce N200 potentials with obvious features by flashing robot images (images with meaningful information) and by flashing pictures containing only solid color squares (pictures with incomprehensible information). Comparative studies have shown that robot images evoke N200 potentials with recognizable negative peaks at approximately 260ms in the frontal and central areas. The negative peak amplitudes increase, on average, from $1.2\mu\text{V}$ to $6.7\mu\text{V}$, induced by flashing the squares, to $6.7\mu\text{V}$, induced by flashing the robot images. The data analyses support that the N200 potentials induced by the robot image stimuli exhibit recognizable features. Compared with the square stimuli, the robot image stimuli increase the average accuracy rate by 9.92%, from 83.33% to 93.25%, and the average information transfer rate by 24.56bits/min, from 72.18bits/min to 96.74 bits/min, in a single repetition. This finding implies that the robot images might provide the subjects with more information to understand the visual stimuli meanings and help them more effectively concentrate on their mental activities.
	Database: World Scientific

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Title:	An Improved Sparse Representation over Learned Dictionary Method for Seizure Detection
Author:	Junhui Li, Weidong Zhou, Shasha Yuan, Yanli Zhang, Chengcheng Li, Qi Wu
Journal:	International Journal of Neural Systems, Volume 26, Issue 01, February 2016, 1550035 (15 pages)
Abstract:	Automatic seizure detection has played an important role in the monitoring, diagnosis and treatment of epilepsy. In this paper, a patient specific method is proposed for seizure detection in the long-term intracranial electroencephalogram (EEG) recordings. This seizure detection method is based on sparse representation with online dictionary learning and elastic net constraint. The online learned dictionary could sparsely represent the testing samples more accurately, and the elastic net constraint which combines the l_1 -norm and l_2 -norm not only makes the coefficients sparse but also avoids over-fitting problem. First, the EEG signals are preprocessed using wavelet filtering and differential filtering, and the kernel function is applied to make the samples closer to linearly separable. Then the dictionaries of seizure and nonseizure are respectively learned from original ictal and interictal training samples with online dictionary optimization algorithm to compose the training dictionary. After that, the test samples are sparsely coded over the learned dictionary and the residuals associated with ictal and interictal sub-dictionary are calculated, respectively. Eventually, the test samples are classified as two distinct categories, seizure or nonseizure, by comparing the reconstructed residuals. The average segment-based sensitivity of 95.45%, specificity of 99.08%, and event-based sensitivity of 94.44% with false detection rate of 0.23/h and average latency of -5.14 s have been achieved with our proposed method.
Database:	World Scientific

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Title:	An Auditory-Tactile Visual Saccade-Independent P300 Brain-Computer Interface
Author:	Erwei Yin, Timothy Zeyl, Rami Saab, Dewen Hu, Zongtan Zhou, Tom Chau
Journal:	International Journal of Neural Systems, Volume 26, Issue 01, February 2016, 1650001 (16 pages)
Abstract:	Most P300 event-related potential (ERP)-based brain-computer interface (BCI) studies focus on gaze shift-dependent BCIs, which cannot be used by people who have lost voluntary eye movement. However, the performance of visual saccade-independent P300 BCIs is generally poor. To improve saccade-independent BCI performance, we propose a bimodal P300 BCI approach that simultaneously employs auditory and tactile stimuli. The proposed P300 BCI is a vision-independent system because no visual interaction is required of the user. Specifically, we designed a direction-congruent bimodal paradigm by randomly and simultaneously presenting auditory and tactile stimuli from the same direction. Furthermore, the channels and number of trials were tailored to each user to improve online performance. With 12 participants, the average online information transfer rate (ITR) of the bimodal approach improved by 45.43% and 51.05% over that attained, respectively, with the auditory and tactile approaches individually. Importantly, the average online ITR of the bimodal approach, including the break time between selections, reached 10.77 bits/min. These findings

	suggest that the proposed bimodal system holds promise as a practical visual saccade-independent P300 BCI.
Database:	World Scientific

7	Title: A Fast and Accurate Unconstrained Face Detector
	Author: Liao, S. ; Jain, A.K. ; Li, S.Z.
	Journal: IEEE Transactions on Pattern Analysis and Machine Intelligence, Volume 38, Issue 2, February 2016, Pages 211 - 223
	Abstract: We propose a method to address challenges in unconstrained face detection, such as arbitrary pose variations and occlusions. First, a new image feature called Normalized Pixel Difference (NPD) is proposed. NPD feature is computed as the difference to sum ratio between two pixel values, inspired by the Weber Fraction in experimental psychology. The new feature is scale invariant, bounded, and is able to reconstruct the original image. Second, we propose a deep quadratic tree to learn the optimal subset of NPD features and their combinations, so that complex face manifolds can be partitioned by the learned rules. This way, only a single soft-cascade classifier is needed to handle unconstrained face detection. Furthermore, we show that the NPD features can be efficiently obtained from a look up table, and the detection template can be easily scaled, making the proposed face detector very fast. Experimental results on three public face datasets (FDDB, GENKI, and CMU-MIT) show that the proposed method achieves state-of-the-art performance in detecting unconstrained faces with arbitrary pose variations and occlusions in cluttered scenes.
	Database: IEEE/IET Electronic Library (IEL)

8	Title: A Stochastic Approach to Diffeomorphic Point Set Registration with Landmark Constraints
	Author: Kolesov, I. ; Lee, J. ; Sharp, G. ; Vela, P. ; Tannenbaum, A.
	Journal: IEEE Transactions on Pattern Analysis and Machine Intelligence, Volume 38, Issue 2, February 2016, Pages 238 - 251
	Abstract: This work presents a deformable point set registration algorithm that seeks an optimal set of radial basis functions to describe the registration. A novel, global optimization approach is introduced composed of simulated annealing with a particle filter based generator function to perform the registration. It is shown how constraints can be incorporated into this framework. A constraint on the deformation is enforced whose role is to ensure physically meaningful fields (i.e., invertible). Further, examples in which landmark constraints serve to guide the registration are shown. Results on 2D and 3D data demonstrate the algorithm's robustness to noise and missing information.
	Database: IEEE/IET Electronic Library (IEL)

9	Title: Estimate Hand Poses Efficiently from Single Depth Images
	Author: Chi Xu, Ashwin Nanjappa, Xiaowei Zhang, Li Cheng

Journal:	International Journal of Computer Vision, January 2016, Volume 116, Issue 1, pp 21-45
Abstract:	<p>This paper aims to tackle the practically very challenging problem of efficient and accurate hand pose estimation from single depth images. A dedicated two-step regression forest pipeline is proposed: given an input hand depth image, step one involves mainly estimation of 3D location and in-plane rotation of the hand using a pixel-wise regression forest. This is utilized in step two which delivers final hand estimation by a similar regression forest model based on the entire hand image patch. Moreover, our estimation is guided by internally executing a 3D hand kinematic chain model. For an unseen test image, the kinematic model parameters are estimated by a proposed dynamically weighted scheme. As a combined effect of these proposed building blocks, our approach is able to deliver more precise estimation of hand poses. In practice, our approach works at 15.6 frame-per-second (FPS) on an average laptop when implemented in CPU, which is further sped-up to 67.2 FPS when running on GPU. In addition, we introduce and make publicly available a data-glove annotated depth image dataset covering various hand shapes and gestures, which enables us conducting quantitative analyses on real-world hand images. The effectiveness of our approach is verified empirically on both synthetic and the annotated real-world datasets for hand pose estimation, as well as related applications including part-based labeling and gesture classification. In addition to empirical studies, the consistency property of our approach is also theoretically analyzed.</p>
Database:	SpringerLink

10	Title:	Reading Text in the Wild with Convolutional Neural Networks
	Author:	Max Jaderberg , Karen Simonyan, Andrea Vedaldi, Andrew Zisserman
	Journal:	International Journal of Computer Vision, January 2016, Volume 116, Issue 1, pp 1-20
	Abstract:	<p>In this work we present an end-to-end system for text spotting—localising and recognising text in natural scene images—and text based image retrieval. This system is based on a region proposal mechanism for detection and deep convolutional neural networks for recognition. Our pipeline uses a novel combination of complementary proposal generation techniques to ensure high recall, and a fast subsequent filtering stage for improving precision. For the recognition and ranking of proposals, we train very large convolutional neural networks to perform word recognition on the whole proposal region at the same time, departing from the character classifier based systems of the past. These networks are trained solely on data produced by a synthetic text generation engine, requiring no human labelled data. Analysing the stages of our pipeline, we show state-of-the-art performance throughout. We perform rigorous experiments across a number of standard end-to-end text spotting benchmarks and text-based image retrieval datasets, showing a large improvement over all previous methods. Finally, we demonstrate a real-world application of our text spotting system to allow thousands of hours of news footage to be instantly searchable via a text query.</p>
	Database:	SpringerLink