Editorial

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Biographical notes: Nazmul H. Siddique obtained his Dipl-Ing in Cybernetics from TU Dresden, Germany, MSc in Computer Science from BUET, Bangladesh and PhD in Intelligent Control from the University of Sheffield in 1989, 1995 and 2003 respectively. He is a Lecturer in the School of Computing and Intelligent Systems, University of Ulster. His research interests relate to computational intelligence, stochastic systems and robotics. He authored/ co-authored three books and 120 research papers. He is a senior member of IEEE. He is on the editorial board of the *International Journal of Neural Systems*, *Journal of Behavioural Robotics*, *Engineering Letters* and *International Journal of Automation and Control Engineering*.

Richard J. Mitchell received his BSc (Hons.) in Cybernetics and Control Engineering and PhD in Cybernetics from the University of Reading, Reading, UK, in 1980 and 1987, respectively. He was appointed Lecturer in Cybernetics in 1983 and is now Senior Lecturer in Cybernetics and also Senior Tutor in the School of Systems Engineering, University of Reading. He won a University Teaching Fellowship in 2011. He is a senior member of the IEEE, a Fellow of the IET and Senior Fellow of the Higher Education Academy. He has published four textbooks, edited two custom books on cybernetics, and has over 100 research papers in control engineering, robotics, and learning systems. He was Lead Academic on the Classification KTP project.

Michael O'Grady is a Senior Research Fellow Researcher in the School of Computer Science and Informatics at the University College Dublin. His research interests include the applicability of intelligent systems in pervasive

computing and how these may be harnessed in a multiple of application domains including pervasive health and environmental informatics. Currently, he is researching citizen observatories and how these may be designed to support citizen science and participatory sensing projects. He has published in a range of international journals and conferences, contributed to over 100 peer reviewed publications. He is a senior member of both the ACM and IEEE.

Pattern recognition and analysis have a wide range of applications in science, engineering, medical technology, diagnosis, security systems and many other fields. Intelligent techniques are also becoming popular and finding application in this emerging field because of their advantages over traditional mathematical and statistical techniques.

This is the second special issue on intelligent approaches to pattern recognition based on selected papers from the 11th International Conference on *Cybernetic Intelligent Systems* organised by the UK and Republic of Ireland Chapter of the IEEE Systems, Man and Cybernetics Society held at University of Limerick, Ireland in August 2012. It comprises four papers with original research contributions applying intelligent techniques, hybridisation with traditional techniques and their synergies, which demonstrate the enhancement of time series analysis, feature selection, face recognition and speech signal analysis and their applications to various fields.

Time series are hard to analyse because of their intrinsic variability which arises from the stochastic nature of the underlying process. Analysis is harder still if the underlying process is non-stationary. Further extrinsic variation may be imposed by the variability of the sampling process, for instance, by sampling at different or non-uniform time intervals. The first paper, contributed by Shreeya Sengupta, Piyush Ojha, Hui Wang, and William Blackburn, explores the efficacy of some distance or similarity measures for time series such as Euclidean (EUC), neighbourhood counting metric (NCM), dynamic time warping (DTW), longest common subsequence (LCS) and all common subsequences (ACS). The similarity measures are tested on an artificial dataset containing the trajectories of a two-dimensional dynamical system followed by analysis of three real datasets such as the Australian Sign Language Dataset (AUSLAN), KTH and Weizmann video sequences of human actions.

The applicability of feature selection methods for text document summarisation is a relatively unexplored topic in information retrieval. The ability of feature selection techniques to identify key features within the text document could produce better summaries. The second paper, authored by R. Jayashree, K. Srikanta Murthy, Basavaraj S. Anami, and Alex P. James, reports on the impact of feature selection on text summarisation. By considering feature selection as an essential pre-processing step for text document summarisation, the authors explored several feature selection methods and their role in text document summarisation. The corpus used is Technology Development for Indian Languages (TDIL) that consists of 483 documents belonging to categories; aesthetics, commerce, social sciences and natural sciences.

Face recognition itself has a wide range of applications such as surveillance, security, access control, etc. It has become more vital in biometric authentication systems because face spoofing is a problem where attempts can be made to impersonate the identity of any genuine user. In such situations, liveliness detection is a way to detect that the authentic person is actually present or not in front of the system during the submission of their biometric trait for verification. Literature suggests various ways to deal with this problem such as analysis of eye blinks, lip movements, face texture and fusion of two or more

biometrics, but there is a limited amount of research using face 3D information. The third paper, contributed by Avinash Kumar Singh, Piyush Joshi and G.C. Nandi, investigates the different aspects of the issue and develops a method for face liveliness detection through face structure analysis. 3D structure/shape of the face is measured. A gradient-based neighbour feature extraction technique has been proposed to extract unique features from the disparity images. It produces minimal computational cost by taking subset of the overall image. The authors have applied the linear discriminant analysis (LDA) and C-means algorithms on these features while principal component analysis (PCA) is applied on raw disparity images. The experimental results strengthen the confidence of the proposed feature extraction technique.

Noise cancellation in speech signal processing is an ongoing issue. Several noise suppression methods for speech signals have been proposed by many researchers. A key issue is that the actual speech signal fluctuates within a finite range and the observed data are sometimes affected by amplitude saturation due to the existence of definite dynamic range in measurement instrument. The fourth paper, contributed by authors Akira Ikuta and Hisako Orimoto, addresses this issue using a stochastic approach for noise suppression of speech signal considering finite range of amplitude fluctuation. In this study, a new type of noise suppression method is proposed by introducing a statistical orthogonal expansion expression of the probability distribution based on beta distribution defined within the finite fluctuation ranges of speech signal and observation. Furthermore, the effectiveness of the proposed method is confirmed experimentally by applying it to real speech signals and noises measured in anechoic chamber of acoustic building.

These two special editions of papers on pattern recognition from our Cybernetic Intelligent Systems conference series have demonstrated some interesting and varied applications. We hope these will help to inspire further work in intelligent cybernetic approaches to pattern recognition.

The guest editors would like to thank all the anonymous reviewers of the two special issues and the Editor-in-Chief for their kind support in this endeavour.