

Curriculum Vitae

Dr Darryl Charles *B.Eng., PGCE, M.Sc., Ph.D.*

School of Computing and Information
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CAREER & JOB DESCRIPTIONS

University of Ulster (Lecturer) 2001-

Research:

- Specialism in Computational Intelligence for computer games and with a particular interest in adaptive mechanisms and real time machine learning to enhance player entertainment, serious games contexts such as games for rehabilitation and games inspired e-learning systems.
- Established the C3 research group at the UU and is currently involved in projects that include modeling emotion in AI agent architecture, procedural content generation in games, games inspired e-learning systems, information based player profiling, and adaptive games for stroke rehabilitation.
- Conference organisation:
 - o Local conference programme committee: Irish Machine Vision and Image Processing Conference 2003 and Eurographics Ireland Workshop, 2003.
 - o Reviewer for annual conferences: European Symposium on Artificial Neural Networks, IEEE Computational Intelligence and Games, IEEE Congress on Evolutionary Computation.
- Journal reviewer: Neurocomputing, ACM Entertainment Computing, Journal of Machine Learning Research, Interacting with Computers, The International Journal of Intelligent Games & Simulation, Computing and Information Systems Journal
- Current PhD project involvement:
 - o 2005 - , "Real time machine learning for computer games"
 - o 2005 - , "Player modelling and profiling"
 - o 2006 - , "Game enhanced e-learning systems"
 - o 2007 - , "Emotional behaviours for intelligent game agents"
 - o 2007 - , "Games for stroke rehabilitation"
 - o 2008 - , "Procedural content generation for games"
- Completed PhD projects:
 - o Stephen Workman, University of Ulster, 2004 - 2007, "Adaptive Multipoint Multimedia over Wireless IP Networks"
- PhD internal examiner:

- Xiaoyun Yang, "Automated Identification of Optic Nerve Head and Blood Vessels in Retinal Images", September 2006.
- Julian Kucklich, "Playing with the Rules - A Gamer's Guide to Deludology", October 2007.
- Grants: HEIF grant: Commercial Games for Stroke Rehabilitation, 2007
- Consultancy:
 - KTP with Foyle Technologies: e-learning educational technologies and computer games, 2008 - 2010
 - Serious games consultancy with GradNet Limited, 2008

Teaching:

- Lecturer in the School of Information and Software Engineering within the Faculty of Informatics.
- Course co-ordinator for BSc Computing (Computer Game Development).
- Subject Specialism: Computational Intelligence, and Computer Game Development.
- Module responsibility: Computer Game Design and Development, Computer Console Development, and Introduction to Computer Games.
- Established the student creative computing society and runs an outreach programme to school age students using game technologies to inspire young learners to consider Computing as a study and career pathway.
- Final year project co-ordinator, 2001 - 2007.

University of Paisley (Lecturer/Senior Lecturer) 1996 - 2001

Research:

- Specialism: Unsupervised artificial neural networks - statistical neural methods for low level visual processing systems (e.g. PCA, ICA and FA).
- Other Research Interests: Image analysis and processing, low level biological visual systems, multispectral image analysis, unsupervised data mining techniques, and computer game AI.
- International Conference Programme Committee: ICNNAI'99, Brest, Belarus, 1999, and SOCO 2001, at the university of Paisley, 2000.
- International Conference Organizing Committee: EIS 2000, at the university of Paisley, 2000.
- Director of Studies for two research students working in the area of unsupervised neural networks and visual processing, and on the supervisory team for two additional Ph.D. students working in related areas.
- Co-editor for a special edition of International Journal of Neural Systems (IJNS) that appeared during March 2001.
- Co-organised a special session for ESANN 2001 - "Artificial Neural Networks and Early Vision Processing".

Teaching:

- Lecturer in Computer and Information Systems department.
- Subject Specialism: Artificial Neural Networks and Information theory.
- Other Subjects and Teaching Interests: Artificial Life, C++, Computer Architecture, Game AI and 3D Game Graphics, Human and Computer Vision.
- Course Development: Convenor of a sub-committee responsible for designing modules a new Computer Games Technology course.

Cox Green School (Head of Information Technology) 1995 - 1996

- Information Technology Co-ordinator
- Teacher of Information Technology, Design and Technology

Portadown College (Teacher) 1989 - 1995

- Teacher of Design & Technology to A-Level
- Responsible for Duke of Edinburgh Gold expeditions
- Mountain leadership certification level II

QUALIFICATIONS

Queens University Belfast, Northern Ireland 1985 - 1988
 B.Eng. Electrical & Electronic Engineering (Hons).

Stranmillis College Belfast, Northern Ireland 1988 - 1989
 PGCE Technology.

University of Ulster Coleraine, Northern Ireland 1992 - 1995
 Diploma Microelectronics & Microcomputer Applications (with commendation).
 M.Sc. Microelectronics & Microcomputer Applications (with distinction).

University of Paisley, Scotland 1996 - 1999
 Ph.D. Computer Science, "Unsupervised Artificial Neural Networks for the
 Identification of Multiple Causes in Data".

MEMBERSHIP & TRAINING

A member of the IEEE Task Force on Player Satisfaction Modelling
 A member of the EPSRC Computational Intelligence in games network

Microsoft Training Course 4995A: Programming with the Microsoft® .NET Framework
 Using Microsoft Visual Studio®, 2007
 XNA GameStudio Express training at Rare Studios, 2007
 Microsoft Training Course 6463A: Visual Studio 2008: ASP.NET 3.5, 2008

PERSONAL

Date of Birth: 31.07.66
Birth Place: Brisbane, Australia.
Nationality: UK.

PUBLICATIONS

Journal Publications:

Cowley, B., Charles, D., Black, M., and Hickey, R. 2008. "Toward an understanding of flow in video games". *Comput. Entertain.* 6, 2 (Jul. 2008), 1-27.

Leo Galway, Darryl Charles, Michaela Black, "Machine Learning in Digital Games: A Survey", to appear in *AI Review*, 2008

McAlister M, Charles D, "Building Digital Learning Environments", *Journal of Advanced Technology*, Sept. 2004.

Charles D, Koetsier J, McDonald D. & Fyfe C., Unsupervised Neural Networks for the Identification of Minimum Overcomplete Basis in Visual Data, *Neurocomputing*, Volume 47, Issues 1-4, August 2002, Pages 119-143.

McGlinchey, S, Charles, D, & Lai, P.L., Fyfe, C. Unsupervised Extraction of Structural Information from High Dimensional Visual Data, *Applied Intelligence*, 1999.

Charles, D. and Fyfe C. Modelling Multiple Cause Structure Using Rectification Constraints. *Network: Computation in Neural Systems*, 9:167-182, May 1998.

Charles, D. Constrained PCA Techniques for the Identification of Common Factors in Data. *Neurocomputing*, 22:145-156, November 1998.

Book:

Charles D, Fyfe C, Livingstone D, and McGlinchey S, "Biologically Inspired Artificial Intelligence for Computer Games", IGI Publishing, 2008.

Book Chapters:

Charles D, McNeill M, McAlister M, Black M, Moore M, Stringer K, Kücklich J, and Kerr A, "Adaptive Game Technology as a Player-Centered Approach to Game Design", in *Worlds in Play: International Perspectives on Digital Games Research (New Literacies and Digital Epistemologies)*, Jennifer Jenson (Ed), Suzanne De Castell (Ed), Peter Lang Pub Inc (Jul 2007)

Charles, D. and Fyfe, C., Lai P.L., MacDonald, D., Rosipal, R., Unsupervised Learning using Radial Basis Kernels, In *Radial Basis Function Networks: Design and Applications*, ed. R.J.Howlett, 2000

Charles, D. and Fyfe, C. Extraction of Independent Causes from Video Data in Self Organising Systems, *Springer-Verlag Lecture Notes in Computer Science*, ed. N. Allinson 1999.

Charles, D. and Fyfe, C. Unsupervised Detection of Illusory Contours. *Connectionist Models in Neuroscience*, Proceedings of the 5th Computation and Psychology Workshop, 1999.

Lai, P. L., Charles, D., Fyfe, C. Seeking Independence using Biologically Inspired Artificial Neural Networks, in *Developments in Artificial Neural Network Theory: Independent Component Analysis and Blind Source Separation*, ed. M. Girolami 1999.

Refereed Conferences:

Charles D., "Final Fantasy in the Classroom: Using Player Representation Techniques from Computer Games to Improve Student Engagement", HEA Workshop on Novel Approaches to Promoting Student Engagement, 2008.

Burke J, Morrow P, McNeill M, McDonough S, Charles D, "Vision Based Games for Upper-Limb Stroke Rehabilitation", IMVIP, pp. 159-164, International Machine Vision and Image Processing Conference, 2008.

Christopher Hanna, Ray Hickey, Darryl Charles and Michaela Black, "Reactive-Deliberative Mechanisms for Emotional Intelligent Agent Architecture", AICS-2008: The 19th Irish Conference on Artificial Intelligence and Cognitive Science.

Galway L, Charles D, and Black M, "Improvement in Game Agent Control Using State-Action Value Scaling", European Symposium on Artificial Neural Networks, Advances in Computational Intelligence and Learning, 23 - 25 April 2008 Bruges (Belgium).

McGinnis T, Bustard M, Black M, and Charles D, "Enhancing E-Learning Engagement Using Design Patterns from Computer Games", The First International Conference on Advances in Computer-Human Interaction, ACHI 2008, 10-15 February 2008, Sainte Luce, Martinique.

Minhua Ma , McNeill MDJ , Charles D , McDonough S , Crosbie JC , Oliver L , McGoldrick C. Adaptive "Virtual Reality Games for Rehabilitation of Motor Disorders", HCI International 2007, LNCS, 22nd - 27th July 2007, Beijing, China.

Cowley B, Charles D, Black M, Hickey R, "Data-Driven Decision Theory for Player Analysis in Pacman", Optimising Player Satisfaction workshop, at the AAAI conference Artificial Intelligence & Interactive Digital Entertainment (AIIDE), Stanford, CA, June 2007

M. Ma, M. D. J. McNeill, D. Charles, S. McDonough² and J. Crosbie, Virtual Reality Games for Motor Rehabilitation, CGAMES 06, 22nd-24th November 2006, Dublin Institute of Technology, Dublin, Ireland.

Galway L, Charles D, and Black M, "A Set of Guidelines for the Evaluation of Real-Time Machine Learning Techniques for use in Digital Games", CGAMES 06, 22nd-24th November 2006, Dublin Institute of Technology, Dublin, Ireland.

M. Ma, M.D.J. McNeill, D. K. Charles, S. McDonough and J.C. Crosbie, "Physics-based Virtual Reality for Post-stroke Rehabilitation", Seventh Irish Workshop on Computer Graphics (2006), Eurographics Irish Chapter.

Cowley B, Charles D, Black M, Hickey R, "Using Decision Theory for Player Analysis in Pacman", Optimising Player Satisfaction workshop, at Simulation of Adaptive Behaviour (SAB) 2006, CNR, Roma, Italia, September 2006.

Cowley B, Charles D, Black M, Hickey R, "User-System-Experience Model for User Centred Design in Computer Games", Proceedings of The International Conference on Adaptive Hypermedia and Adaptive Web-Based Systems, LNCS, pp.419-424, Vol.4018. Dublin, Ireland, June 2006.

Workman S, Morrow P, Parr G, and Charles D, "Modeling Event Communication to Enable Adaptive, Resource-Aware Distributed Virtual Environments", ICAS/SELF, July 2006

Workman S, Morrow P, Parr G, and Charles D, "Relevance-Based Adaptive Event Communication for Mobile Environments with Variable QoS Capabilities". MMNS, October 2005

Charles D, Kerr A, McNeill M, McAlister M, Black M, Kücklich J, Moore A, Stringer K, "Player-Centred Game Design: Player Modelling and Adaptive Digital Games", Digital Games Research Conference 2005, Selected Papers Publication, pp 285-298, June 16-20 2005.

Charles D & Black M, "Dynamic Player Modelling: A Framework for Player-Centered Digital Games", International Conference on Computer Games: Artificial Intelligence, Design and Education, Microsoft Campus, Reading, Nov 8 - 10 2004.

Charles D & McGlinchey S, "The Past Present and Future of Artificial Neural Networks in Digital Games", International Conference on Computer Games: Artificial Intelligence, Design and Education, Microsoft Campus, Reading, Nov 8 - 10 2004.

McAlister M, Charles D, "Using Digital Educational Games To Promote M-Learning", International Conference in Education, Bilbao, 7th - 8th July 2004.

Livingstone D, Charles D, "Intelligent Interfaces for Digital Games", AAAI-04 Workshop on Challenges in Game AI, 25-26th July 2004.

Charles D, Livingstone D, "AI: the Missing Link in Digital Game Interface Design?", 3rd International Conference on Entertainment Computing, LNCS, Eindhoven, The Netherlands, September 1st-3rd, 2004.

Workman S, Morrow P, Parr G, and Charles D, "Enabling Adaptive Multipoint Multimedia over Wireless IP Networks", fifth annual postgraduate symposium: the convergence of telecommunications, networking and broadcasting, Liverpool, 28th - 29th June, 2004.

Charles D, McAlister M, "Integrating Ideas about Invisible Playgrounds from Play Theory into Online Educational Digital Games", 3rd International Conference on Entertainment Computing, LNCS, Eindhoven, The Netherlands, September 1st-3rd, 2004.

Charles D, "Enhancing Gameplay: Challenges for Artificial Intelligence in Digital Games", Proceedings of Digital Games Research Conference 2003, University of Utrecht, The Netherlands, 4-6 November 2003.

Charles D, "Challenges for Artificial Intelligence in Digital Games", Proceedings of the 4th Irish Workshop on Computer Graphics, pp 23-27, Coleraine, 29-30th April 2003.

Charles D. & Fyfe C, "Statistically Based Learning Rules for Unsupervised Artificial Neural Networks and Low Level Visual Processing", Proceedings of Conference on Applied Statistics in Ireland (CASI), pp 4-5, Ballycastle, 15-17th May 2002.

Koetsier J, MacDonald D, Charles D, and Fyfe C, "Multi-stream Exploratory Projection Pursuit for the Formation of Complex Cells Similar to Visual Cortical Neurons", LNCS 2415, p. 210 ff (ICANN 2002).

Koetsier J, MacDonald D, Charles D, and Fyfe C, "Exploratory Correlation Analysis", ESANN 2002.

Corchado E., Charles D., Fyfe C., "Rectified Gaussian Distributions and the Identification of Spatiotemporal Structure in Video Data", SOCO 2001.

Corchado E., Charles D., Fyfe C., "Rectified Gaussian distributions and the formation of local filters from video data", ESANN 2001.

Corchado E., Han Y., Fyfe C., Charles D. and Alonso L, "The formation of local spatiotemporal filters using lateral connections". 9th Spanish Association for Artificial Intelligence Conference, November 14-16, 2001, Gijon, Spain.

Charles, D., Fyfe C., "Unsupervised models for processing visual data", ESANN 2001.

Koetsier J, MacDonald D and Charles D, "Exploratory Correlation Analysis", December 2001, ICA 2001.

Charles, D. and Fyfe C., "Kernel Factor Analysis with Varimax rotation", IJCNN 2000.

MacDonald D, Fyfe C, Charles D, "Kernel Exploratory Projection Pursuit" EIS 2000.

Charles, D. and Fyfe, C., "Extraction of Independent Causes from Video Data, Workshop: Self-Organising Systems – Future Prospects for Computing", UMIST, October 1999.

Charles, D. and Fyfe, C., "Noise to Extract Independent Causes", ESANN 99, Bruges, p345, May 1999.

Charles, D. and Fyfe, C., "Rectified Gaussian Distributions and the Identification of Multiple Cause Structure in Data", ICANN, 1999.

Fyfe, D. and Charles, C., "Using Noise to Form a Minimal Overcomplete Basis", ICANN, 1999.

Fyfe C, Charles D, and McGlinchey S, "Learning Independent Causes of a Visual Data Set Using the Rectified Gaussian Distribution", In Proceedings of the Third International Conference on Soft Computing, SOCO, 1999.

McDonald, D., Charles, D., Fyfe, C., "Neural Networks which Identify Composite Factors", ESANN 99, Bruges, p281, May 1999

Charles D, "Finding Independent Components Using Principal Factor Analysis". In Independence and Artificial Neural Network Workshop, I&ANN98, p86-91, 1998.

Charles D. & Fyfe C, "Unsupervised Methods for Extracting Common Factors from Data Distributions". In Engineering of Intelligent Systems, EIS98, p468-489, February 1998.

Charles D. & Fyfe C, "Discovering Independent Sources with an Adapted PCA Network. In Proceeding of the Second International Conference on Soft Computing, SOCO97, p369-373 September 1997.

Charles D. & Fyfe C, "From Raw Data to Symbol Processing". In Eighth Ireland Conference on Artificial Intelligence, p17-22, September 1997.

Charles D. & Fyfe C, "Using Local-in-Time Hebbian Learning to Decipher Movement in Video Data". In Proceeding of the Second International Conference on Soft Computing, SOCO97, p363-368, September 1997.

Charles D. & Fyfe C, "Unsupervised Neural Network Methods for Extracting the Components of Movement from Video Sequences". In Irish Machine Vision and Image Processing Conference, IMVIP97, p61-68, September 1997.