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ICPRAM 2022



<https://www.ijcnn.org/>

We are pleased to offer INNS members access to the IJCNN 2021 virtual conference. The IJCNN program features 29 special sessions, 7 plenary talks, 2 competitions, 8 tutorials, and 3 workshops. You can find the full programme at <https://www.ijcnn.org/draft-program-ijcnn-2021>. Instructions how to access the virtual platform are being sent.

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Prediction of Students at Risk of Dropout

- By Dr. Nabeel Murshed, Director, QA&IE Department, University of Dubai

In Higher Education Institutions (HEIs), student dropout (attrition) is considered one of the strategic indicators of the effectiveness of its academic system, and if ignored or neglected, it may eat up the system as the Termite does to the wood. The rates of dropout in many HEIs are staggering.

In a study published in 2017 by the Hechinger Report, 3.9 million undergraduates with federal student loan dropped out of college in the US, of which 23% dropped out of for-profit universities. Another study published by Forbes in 2018, showed that 48% of first-time, full-time students who enrolled in a four-year college in the US, six years earlier had not completed their study. In 19 OECD countries, 31% of students drop out of college. The same rate ranges from more than 40% in Hungary and New Zealand to below 24% in Belgium, Denmark, France, Germany, and Japan. In the Middle East and Brazil, the dropout rates are around 40%.

The financial cost associated with dropout is a function of the total enrollment, the attrition rate, and the tuition fees. For a total enrollment of 5000 students, an attrition rate of 30%, and an annual average tuition of \$ 20,000.00, the annual cost of attrition is \$ 15 million. Such an amount cannot be ignored, and, thus, it is of a paramount importance to identify the reasons of dropout, predict it, and reduce it to the minimum possible.

A framework for predicting students at risk of dropout in Higher Education Institutions has been developed. It is part of a long-term research project to improve student learning and retention. The approach differs from the existing ones in three aspects. First, the proposed approach is based on an ensemble of three Fuzzy ARTMAPs (FMAPs). Second, the decision is based on three risk levels (Low, Medium, High). Third, the student data include students' personal and academic data, and institutional data. Two ensemble learning methods were evaluated: Random Splits and k-fold Cross Validation. The data used in this study consisted of 29891 of undergraduate student records of students from 2009 to 2018, of which 28% dropouts. The ensemble was developed with 19952 records, and its performance was assessed with 9939 records. The framework achieved an accuracy of 98.44% of predicting dropout with FAR and FRR errors of 1.4% and 2.0%, respectively; and an accuracy of 99.16% of predicting students of high-risk of dropout with FAR and FRR errors of 0.7% and 1.2%, respectively. The framework shall be implemented to monitor and identify students at risk of dropout.

Cutting Edge AI Workshop in April Cherry Blossom 2020

- By Harold H. Szu, CUA Wash DC

Due to the Pandemic delay, "Cutting Edge AI(CEAI)" Workshop of computational intelligence including electric signals IQ and chemical signals emotion-IQ will be held 2 days during April Cherry Blossom 2022 at Catholic Univ. America, which is centrally located in Washington DC, and conveniently accessible via DC Metro Subway. CEAI will invite more than a dozen International celebrity speakers, together with attendance contributing poster presentations with token amount registration fee for coffee breaks. The workshop will be at 1st April Friday & weekend followed with Cruise Dinner social event on Wash DC Potomac River.

<http://ica-wavelet.org/>

Published "A Software Defined Network information security risk assessment based on Pythagorean fuzzy sets" in Expert Systems with Applications Journal

- By Sudipta Roy, Assam University

Published the paper A Software Defined Network information security risk assessment based on Pythagorean fuzzy sets in Expert Systems with Applications last week. This is a research work carried out for the PhD degree of my scholar Raktim Deb.

Please visit the link for view, critical comments and suggestions for further research in this area.
https://www.sciencedirect.com/science/article/abs/pii/S0957417421008083?CMX_ID=&SIS_ID=&dgcid=STMJ_AUTH_SERV_PUBLISHED&utm_acid=160103231&utm_campaign=STMJ_AUTH_SERV_PUBLISHED&utm_in=DM158626&utm_medium=email&utm_source=AC_

New Book: Deep Learning in Science

- By Pierre Baldi, University of California, Irvine

Deep Learning in Science provides a rigorous treatment of deep learning from first principles, and demonstrates several applications of deep learning in the natural sciences.

From the synopsis: "This is the first rigorous, self-contained treatment of the theory of deep learning. Starting with the foundations of the theory and building it up, this is essential reading for any scientists, instructors, and students interested in artificial intelligence and deep learning. It provides guidance on how to think about scientific questions, and leads readers through the history of the field and its fundamental connections to neuroscience. The author discusses many applications to beautiful problems in the natural sciences, in physics, chemistry, and biomedicine.

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Examples include the search for exotic particles and dark matter in experimental physics, the prediction of molecular properties and reaction outcomes in chemistry, and the prediction of protein structures and the diagnostic analysis of biomedical images in the natural sciences. The text is accompanied by a full set of exercises at different difficulty levels and encourages out-of-the-box thinking."

<http://www.cambridge.org/9781108845359>

Student Research Project in Applied Artificial Intelligence

-By Alexander Gegov, University of Portsmouth, UK

Antonio Cefalo - BSc student in the School of Computing, University of Portsmouth, UK - has completed a final year research project entitled 'A Systematic Approach to Financial Modelling using Machine Learning'. The project was supervised by Dr Alexander Gegov - Reader in Computational Intelligence. The project evaluates comparatively accuracy and efficiency of machine learning algorithms such as Linear Regression, Polynomial Regression, Random Forest and LSTM Neural Networks, for stock price prediction. The novel research approach introduced in the project has been successfully validated against an established benchmark approach using quantitative performance evaluation indicators. The research results provide a higher level of flexibility for investors on the stock market depending on their preferences with regard to prediction accuracy and efficiency.

https://github.com/Eltony10/Final-year-project-Report/blob/main/FYP_%20828398.pdf

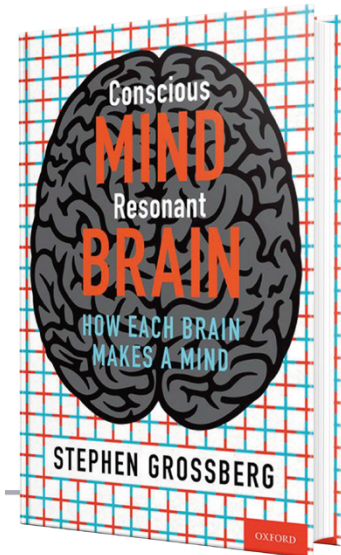
About Peter Erdi's Ranking book

- By Peter L Erdi, Kalamazoo College

Peter Erdi's book "Ranking: The unwritten rules of the social games we all play" was translated into several languages - especially striking a chord in Japan and Taiwan. Now it is also published in Korean, and well, in Hungarian.

<https://lsa.umich.edu/cscs/news-events/all-news/search-news/international-success-for-peter-erdi-s--ranking---book.html> <http://www.kzoo.edu/news/rankings-book>

<http://www.kzoo.edu/news/rankings-book/> <http://www.yes24.com/Product/Goods/95541734>



New Book by INNS Founder and First President **Stephen Grossberg on How Each Brain Makes a Mind**

Oxford University Press will publish in May, 2021 my Magnum Opus, which is called **Conscious MIND, Resonant BRAIN: How Each Brain Makes a Mind**

<https://global.oup.com/academic/product/conscious-mind-resonant-brain-9780190070557?cc=us&lang=en&>

Summary:

- Explores how your mind works, notably how you learn to consciously see, hear, feel, and know things
- Explains how mental disorders can be understood on a continuum with normal behaviors
- Creates a computational foundation for applications of autonomous adaptive intelligence and AI

Description:

How does your mind work? How does your brain give rise to your mind? These are questions that all of us have wondered about at some point in our lives, if only because everything that we know is experienced in our minds. They are also very hard questions to answer. After all, how can a mind understand itself? How can you understand something as complex as the tool that is being used to understand it?

This book provides an introductory and self-contained description of some of the exciting answers to these questions that modern theories of mind and brain have recently proposed. Stephen Grossberg is broadly acknowledged to be the most important pioneer and current research leader who has, for the past 50 years, modelled how brains give rise to minds, notably how neural circuits in multiple brain regions interact together to generate psychological functions. This research has led to a unified understanding of how, where, and why our brains can consciously see, hear, feel, and know about the world, and effectively plan and act within it.

The work embodies revolutionary Principia of Mind that clarify how autonomous adaptive intelligence is achieved. It provides mechanistic explanations of multiple mental disorders, including symptoms of Alzheimer's disease, autism, amnesia, and sleep disorders; biological bases of morality and religion, including why our brains are biased towards the good so that values are not purely relative; perplexing aspects of the human condition, including why many decisions are irrational and self-defeating despite evolution's selection of adaptive behaviors; and solutions to large-scale problems in machine learning, technology, and Artificial Intelligence that provide a blueprint for autonomously intelligent algorithms and robots.

Because brains embody a universal developmental code, unifying insights also emerge about

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shared laws that are found in all living cellular tissues, from the most primitive to the most advanced, notably how the laws governing networks of interacting cells support developmental and learning processes in all species.

The fundamental brain design principles of complementarity, uncertainty, and resonance that Grossberg has discovered also reflect laws of the physical world with which our brains ceaselessly interact, and which enable our brains to incrementally learn to understand those laws, thereby enabling humans to understand the world scientifically.

Accessibly written, and lavishly illustrated, *Conscious Mind/Resonant Brain* is the magnum opus of one of the most influential scientists of the past 50 years, and will appeal to a broad readership across the sciences and humanities.

Advance Reviews

"Conscious MIND and Resonant BRAIN is a tour de force on How the Brain Works. It's a masterpiece on brain science and neuro-computing that could only be created by Grossberg."

-- Leon Chua, University of California at Berkeley

"Whenever you claim to be "the first to do" this or that in artificial intelligence, it is customary – and correct – to add "with the exception of Stephen Grossberg". Quite simply, Stephen is a living giant and foundational architect of the field."

-- Karl J. Friston, University College London

"This is a breath-taking book authored by a giant pioneer of the brain and mind."

-- Shun-Ichi Amari, RIKEN Brain Science Institute

"Professor Grossberg is a rara avis. In an age of increasing specialization, he has a remarkable, unparalleled, gift of seeing connections between seemingly unrelated ideas. And he writes about these with passion, but without compromising accuracy."

-- V. S. Ramachandran, University of California San Diego

"Stephen Grossberg is a true genius, who has discovered and developed many of the most important concepts and theories about how our brains make our minds. His fundamental contributions to science for over 50 years are richly worthy of a Nobel Prize."

-- Leonid Perlovsky, Harvard University

"Stephen Grossberg is a "big picture" thinker who has had a remarkably deep influence on many aspects of several fields. It's difficult to overstate the range of his vision and the depth of his thinking, and I expect this book to be required reading in many courses for years to come."

-- Stephen Kosslyn, Foundry College

"After reading many papers by the author, I always wished that he would present them in a coherent whole. And here it is. A magnificent volume of great science from mind to brain and back, a condensed arts poetica of a great scientist."

-- György Buzsáki, New York University

"The current volume charts the remarkable developments that have led Dr. Grossberg to a principled, unified theory of the link between brain and mind. Dr. Grossberg's insights are unparalleled in their breadth and detail, leading us to a scientific understanding of the most remarkable aspect of the mind, consciousness."

-- Michael Mozer, Google Brain, Mountain View, CA

*"Stephen Grossberg is one of the most original and influential theorists in contemporary cognitive science and computational neuroscience. In *Conscious MIND Resonant BRAIN*, he takes the reader on an eye-opening tour in which he addresses fundamental problems of mind and brain from his unique theoretical perspective. This is an important book that should be of interest to anyone who wonders how a brain can give rise to a mind."*

-- Daniel L. Schacter, Harvard University

"In this book Stephen Grossberg shares the wisdom and encyclopedic knowledge that he acquired over 50 years of research devoted to unravel the mysteries of the human brain. Stephen pioneered the field of theoretical neuroscience and this approach allowed him to discover general principles that govern functions as diverse as visual perception, learning and memory, attention, emotion, decision making and consciousness. It is the essence

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of overarching principles to be abstract and to sometimes defy intuition, but Stephen succeeds to convey the essential in a language that is readily accessible to the non-expert. He embeds the discussion of neuronal mechanisms in the rich framework of cognitive psychology and elegantly bridges the gap between scientific evidence and subjective experience. He takes the readers by the hand and lets them discover the often surprising philosophical, ethical and societal implications of neurobiological discoveries. For those who enjoy intellectual adventures and wish to explore the boundaries of the known this scholarly written book is a real treasure."

-- Wolf Singer, Max Plank Institute for Brain Research, Frankfurt

"Although a behavioral modeler and not a neuroscientist, I have followed Stephen Grossberg's research closely for many years, because I regard him as one of the very most creative and insightful neuroscience theorists that the field has seen. His book should be a must read for those wanting to understand how the brain produces mind."

-- Richard Shiffrin, Indiana University

"How often do we have the chance to hold a true masterpiece? Grossberg's monumental accomplishments developed over multiple decades now written at an accessible level to a broader audience. What a true privilege!"

-- Luis Pessoa, University of Maryland

"Steve Grossberg is one of the most insightful and prolific writers on biological intelligence. This book is a masterful presentation of fundamental methods of modeling minds, brains and their interactions with the world, many of which are due to the author and his collaborators. The models are presented as mathematical systems, including computing and neural networks. The variables, parameters and functions represent biological and environmental concepts; mathematical conclusions are interpreted as predictions of biological behavior. In many cases these have been verified experimentally. There are illuminating and surprising connections to other disciplines, including art, music and economics. Highly recommended to a general audience."

-- Morris W. Hirsch, University of California at Berkeley

"This comprehensive overview of Grossberg's contributions to our understanding of the mind and brain shows exactly how prescient he, and his colleagues, have been. Whatever one's specific interest, from visual illusions to mental illness, this book provides a principled treatment of it. The principles flow from Grossberg's early framing of many of the questions that have come to define computational neuroscience – including his early understanding of the centrality of expectations. Kudos to him for pulling it all together here."

-- Lynn Nadel, University of Arizona

"This book is not for the faint of heart. Stephen Grossberg has been a giant in the field of computational neuroscience for 60 years. In this book he presents his carefully developed, integrative neurobiological theory on how the nervous system generates our conscious lives. It is bold yet self-reflective and therein challenging to all students trying to figure out how the brain does its tricks. A must read."

-- Michael Gazzaniga, University of California at Santa Barbara

"Conscious Mind, Resonant Brain is the magnum opus of one of the giants of neural networks. The soaring ambition of this book reflects the career achievements of Grossberg's insatiable appetite for understanding how brains work. It is a must-read for those interested in all aspects of how the mind and brain function in health and disease."

-- Donald C. Wunsch II, Missouri University of Science and Technology

"Grossberg has single-handedly elevated the psychophysics and psychology pioneered by Herman von Helmholtz and William James into a comprehensive mathematical theory of brain and behavior with profound implications and strong empirical support."

-- David Hestenes, Arizona State University

"An excellent and wide-ranging view of how the brain perceives the world for us by a pioneering brain theoretician."

-- Wolfram Schultz, University of Cambridge

ICPRAM 2022

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11th International Conference on Pattern Recognition Applications and Methods

Vienna - Austria

3 - 5 February, 2022

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The International Conference on Pattern Recognition Applications and Methods is a major point of contact between researchers, engineers and practitioners on the areas of Pattern Recognition and Machine Learning, both from theoretical and application perspectives. Contributions describing applications of Pattern Recognition techniques to real-world problems, interdisciplinary research, experimental and/or theoretical studies yielding new insights that advance Pattern Recognition methods are especially encouraged.

Papers describing original work are invited in any of the areas listed below. Accepted papers, presented at the conference by one of the authors, will be published in the proceedings of ICPRAM with an ISBN. Acceptance will be based on quality, relevance and originality. There will be both oral and poster sessions.

Special sessions, dedicated to case-studies and commercial presentations, as well as technical tutorials, dedicated to technical/scientific topics, are also envisaged: companies interested in presenting their products/methodologies or researchers interested in presenting a demo or lecturing a tutorial are invited to contact the conference secretariat.

More information on <http://www.icpram.org>