DESCRIPTION

Neural Networks is the archival journal of the world’s three oldest neural modeling societies: the International Neural Network Society (INNS), the European Neural Network Society (ENNS), and the Japanese Neural Network Society (JNNS). A subscription to the journal is included with membership in each of these societies.

Neural Networks provides a forum for developing and nurturing an international community of scholars and practitioners who are interested in all aspects of neural networks and related approaches to computational intelligence. Neural Networks welcomes high quality submissions that contribute to the full range of neural networks research, from behavioral and brain modeling, learning algorithms, through mathematical and computational analyses, to engineering and technological applications of systems that significantly use neural network concepts and techniques. This uniquely broad range facilitates the cross-fertilization of ideas between biological and technological studies, and helps to foster the development of the interdisciplinary community that is interested in biologically-inspired computational intelligence. Accordingly, Neural Networks editorial board represents experts in fields including psychology, neurobiology, computer science, engineering, mathematics, and physics. The journal publishes articles, letters and reviews, as well as letters to the editor, editorials, current events, software surveys, and patent information. Articles are published in one of five sections: Cognitive Science, Neuroscience, Learning Systems, Mathematical and Computational Analysis, Engineering and Applications.

The journal is published twelve times a year. Neural Networks can be accessed electronically via Science Direct (http://www.sciencedirect.com/science/journal/08936080), which is used by over eight million individuals world-wide.

Benefits to authors
We also provide many author benefits, such as free PDFs, a liberal copyright policy, special discounts on Elsevier publications and much more. Please click here for more information on our author services.

Please see our Guide for Authors for information on article submission. If you require any further information or help, please visit our support pages: http://support.elsevier.com
AUDIENCE

Computer scientists, artificial intelligence developers, electronic engineers, neuroscientists and psychologists.

IMPACT FACTOR

2014: 2.708 © Thomson Reuters Journal Citation Reports 2015

ABSTRACTING AND INDEXING

Artificial Intelligence Abstracts
BIOSIS
Bioengineering Abstracts
Elsevier BIOBASE
CMCI
Cambridge Scientific Abstracts
Current Contents/Engineering, Computing & Technology
Current Contents/Science Citation Index
Information Science Abstracts
Operations Research & Management Science
Zentralblatt MATH
Scopus

EDITORIAL BOARD

Co-Editors-in-Chief:
Kenji Doya, Okinawa Inst. of Science & Tech., Onna, Okinawa, Japan
DeLiang Wang, Ohio State University, Columbus, Ohio, USA

Current Events Editor:
Paul Pang, UNITEC Institute of Technology, Auckland, New Zealand

Action Editors:
Cesare Alippi, Politecnico di Milano, Milano, Italy
Fields of specialization: Learning in non-stationary environments, intelligence for embedded and cyber-physical systems, computational Intelligence

Toru Aonishi, Tokyo Institute of Technology, Yokohama, Japan
Fields of specialization: Statistical mechanics, computational neuroscience, coupled oscillators, neural data analysis

Sabri Arik, Istanbul University, Istanbul, Turkey
Fields of specialization: Computational neuroscience, neurodynamics, recurrent neural network learning architectures, nonlinear systems, stability theory

Pierre Baldi, University of California at Irvine, Irvine, California, USA
Fields of specialization: Supervised and unsupervised learning, recursive neural networks, deep architectures, bioinformatics applications

Anil Anthony Bharath, Imperial College London, London, UK
Fields of specialization: Network architectures for computer vision, deep networks, biomedical applications

Roman Borisynuk, Plymouth University, Plymouth, UK
Fields of specialization: Computational neuroscience, nonlinear systems, oscillations and synchronization, neural network models of cognitive functions

Steven Bressler, Florida Atlantic University, Boca Raton, Florida, USA
Fields of specialization: Neurocognitive networks, cerebral cortex, event-related potentials, EEG, MEG, local field potentials

Thomas Burwick, Frankfurt Institute for Advanced Studies (FIAS), Frankfurt am Main, Germany
Fields of specialization: Oscillatory neural networks, models of cortical oscillations and cross-frequency couplings, models of attention and binding, pattern recognition

Jinde Cao, Southeast University, Nanjing, China
Fields of specialization: Neurodynamics, chaos synchronization, complex networks, collective dynamics, consensus, secure communication, bifurcation control

Gail Carpenter, Boston University, Boston, Massachusetts, USA
Fields of specialization: Machine learning, memory, vision, ART

David Casasent, Carnegie Mellon University, Pittsburgh, Pennsylvania, USA
Fields of specialization: Pattern recognition, classifier neural networks, optical neural network

Jonathan Chan, King Mongkut's University of Technology Thonburi, Bangkok, Thailand
Fields of specialization: Modeling and simulation, computational systems biology, bioinformatics, machine learning

Ke Chen, University of Manchester, Manchester, England, UK
Fields of specialization: Machine learning, speech processing

Zhe Chen, New York University (NYU) School of Medicine, New York, New York, USA
Fields of specialization: Machine learning and computational statistics, computational neuroscience, statistics in neuroscience, neural spike train analysis

Yoonsuck Choe, Texas A&M University, College Station, Texas, USA
Fields of specialization: Visual and tactile processing, natural statistics, sensorimotor learning, self-organizing models, thalamocortical circuit models, temporal processing, neuroinformatics

José Contreras-Vidal, University of Houston, Houston, Texas, USA
Fields of specialization: Brain-machine interfaces, neuroscience, large-scale neural network models, movement disorders, EEG/MEG/fMRI, neural decoding, sensorimotor control

Mounya Elhilali, John Hopkins University, Baltimore, Maryland, USA
Fields of specialization: Auditory perception, sound processing, models of attention, computational neuroscience, neural decoding

Jean-Marc Fellous, University of Arizona, Tucson, Arizona, USA
Fields of specialization: Computational neuroscience, emotion and motivation, spatial navigation, neuromodulation

Gregory Francis, Purdue University, West Lafayette, Indiana, USA
Fields of specialization: Visual perception, cognitive psychology, human factors

Faustino Gomez, Dalle Molle Institute for Artificial Intelligence (IDSIA), Manno (Lugano), Switzerland
Fields of specialization: Machine learning, neuroevolution, reinforcement learning, recurrent neural networks

Xiaodong Gu, Fudan University, Shanghai, China
Fields of specialization: Spatial-temporal coding neural networks, pulse coupled neural networks, oscillations and synchronization

Masahiko Haruno, NICT Center for Information and Neural Networks, Osaka, Japan
Fields of specialization: Computational neuroscience, social neuroscience, decision making

Sebastien Helie, Purdue University, West Lafayette, Indiana, USA
Fields of specialization: Cognitive neuroscience, fMRI, reinforcement learning

Zeng-Guang Hou, Chinese Academy of Sciences (CAS), Beijing, China
Fields of specialization: Intelligent control, robotic systems, biomedical engineering

Dewen Hu, National University of Defense Technology, Hunan, China
Fields of specialization: Neural networks, Identification and control, cognitive neuroscience, robotics

De-Shuang Huang, Tongji University, Shanghai, China
Fields of specialization: Feedforward networks, pattern recognition, bioinformatics

Guang Bin Huang, Nanyang Technological University, Singapore, Singapore
Support vector machines, feedforward networks, brain computer interface, human computer interface, EEG signal based machine learning

Kazushi Ikeda, Nara Institute of Science and Technology, Nara, Japan
Fields of specialization: Learning theory, neurodynamics, adaptive systems

Shin Ishii, Kyoto University, Kyoto, Japan
Fields of specialization: Statistical learning, reinforcement learning, bioinformatics, dynamical systems

Herbert Jaeger, Jacobs University Bremen, Bremen, Germany
Fields of specialization: Reservoir computing, recurrent neural network learning architectures, agent architectures, machine learning applications

Hamid Reza Karimi, Universitetet i Agder, Grimstad, Norway
Fields of specialization: Soft computing, modeling and identification, nonlinear control systems, robotics, mechatronics, signal processing

Nikola Kasabov, Auckland University of Technology, Auckland, New Zealand
Fields of specialization: Novel connectionist learning methods, evolving connectionist systems, neuro-fuzzy systems, computational neuro-genetic modeling, EEG data analysis, bioinformatics, gene data analysis, quantum neuro-computation, spiking neural networks, multimodal information processing
in the brain, multimodal neural network models for pattern recognition, connectionist-based decision support systems

Irwin King, Chinese University of Hong Kong, Hong Kong, China
Fields of specialization: Machine learning, social computing, data mining, information retrieval

Christof Koch, California Institute of Technology, Pasadena, California, USA
Fields of specialization: Neuroscience, biophysics

Robert Kozma, University of Memphis, Memphis, Tennessee, USA
Fields of specialization: Autonomous adaptive systems, mathematical and computational modeling of spatio-temporal dynamics of cognitive processes, chaos, neuro-fuzzy systems, computational intelligence

Jeffrey Krichmar, University of California at Irvine, Irvine, California, USA
Fields of specialization: Embodied cognition, neurorobotics, computational neuroscience

Vera Kůrková, Academy of Sciences of the Czech Republic, Prague, Czech Republic
Fields of specialization: Mathematical theory of neurocomputing and learning

Honglak Lee, University of Michigan, Ann Arbor, Michigan, USA
Fields of specialization: Deep learning; unsupervised learning; semi-supervised learning

Minho Lee, Kyungpook National University, Buk-Gu, Dae-gu, South Korea
Field of specialization: Visual perception

Qinshan Liu, Huazhong University of Science and Technology, Wuhan, China
Fields of specialization: Neurodynamics, recurrent neural networks, computational intelligence

Shih-Chii Liu, Universität Zürich, Zürich, Switzerland
Fields of specialization: Neuromorphic systems, sensory systems, event-driven processing and hardware

Xiufen Liu, University of Cincinnati, Cincinnati
Fields of specialization: Computational neuroscience, neurodynamical models of cognition & behavior, attractor networks, sequence learning, semantic cognition, motor control

Francesco Carlo Morabito, University Mediterranea, Reggio C., Italy
Fields of specialization: Engineering applications of computational intelligence (industrial inspection, biomedical signal processing, environmental data modeling), nonlinear systems and complexity

Jay Myung, Ohio State University, Columbus, Ohio, USA
Fields of specialization: Computational cognition, Bayesian inference, active learning

Hiroyuki Nakahara, Tohoku University, Sendai, Japan
Fields of specialization: Computational neuroscience, reinforcement learning, neural coding

Tommaso Poggio, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA
Fields of specialization: Approximation theory, vision

Asim Roy, Arizona State University, Phoenix, Arizona, USA
Fields of specialization: Radial basis function networks, autonomous learning, semantic cognition, complexity of learning, machine learning

Shigeo Sato, Tohoku University, Sendai, Japan
Fields of specialization: Semiconductor devices and LSI circuits for implementation

Stefan Schaal, University of Southern California, Los Angeles, California, USA
Fields of specialization: Statistical learning, neuro-motor control, robotics, humanoid robotics, behavioral motor psychophysics, computational neuroscience

Terrence Sejnowski, The Salk Institute for Biological Studies, La Jolla, California, USA
Field of specialization: Neuroscience

Tomohiro Shibata, Kyushu Institute of Technology, Fukuoka, Japan
Fields of specialization: Learning robotics, assistive robotics, human-machine cooperation, computational neuroscience, brain-computer interface, motor control

Alessandro Sperduti, Università degli Studi di Padova, Padova, Italy
Fields of specialization: Learning in structured domains, recursive neural networks, deep architectures, kernel methods

Narayan Srinivasa, Hughes Research Laboratories (HRL), Malibu, California, USA
Fields of specialization: Brain architectures, spiking dynamics, synaptic plasticity, recurrent neural networks, spatiotemporal pattern recognition

Soundar Srinivasan, Robert Bosch LLC, Palo Alto, California, USA
Fields of specialization: Pattern recognition, time series analysis, data mining, applications

Masashi Sugiyama, University of Tokyo, Tokyo, Japan
Fields of specialization: Statistical machine learning, data mining

Ron Sun, Rensselaer Polytechnic Institute, Troy, New York, USA
Fields of specialization: Psychological modeling, cognitive architectures, neural network models of consciousness, skill acquisition, reasoning, neuro-symbolic systems, social simulation

Taiji Suzuki, Tokyo Institute of Technology, Meguro-Ku, Japan
Fields of specialization: Machine learning, statistics

Ryota Tomioka, Toyota Technological Institute at Chicago, Chicago, Illinois, USA
Fields of specialization: Statistical machine learning, optimization, brain-computer interface

Taro Toyoizumi, RIKEN, Saitama, Japan
Fields of specialization: Computational neuroscience, synaptic plasticity

Jochen Triesch, Goethe-Universität Frankfurt, Frankfurt am Main, Germany
Fields of specialization: Vision, recurrent neural networks, unsupervised learning, reinforcement learning

Marley Maria Vellasco, Pontifícia Universidade Católica do Rio de Janeiro (PUC-Rio), Rio de Janeiro, Brazil
Fields of specialization: Hybrid intelligent systems (neuro-fuzzy, neuro-evolutionary, etc.), time series forecasting, computational intelligence

Zidong Wang, Brunel University London, Uxbridge, Middlesex, UK
Fields of specialization: Intelligent data analysis (bioinformatics, neural networks, etc.), signal processing (filter designs, etc.), real-time systems (control of nonlinear and multi-dimensional systems)

Si Wu, Beijing Normal University, Beijing, China
Fields of specialization: Computational neuroscience, machine learning

Rolf Peter Wurtz, Ruhr-University Bochum, Bochum, Germany
Fields of specialization: Object recognition, artificial vision systems, autonomous learning, organic computing

Lei Xu, Chinese University of Hong Kong, Hong Kong, China
Fields of specialization: Finite mixture, mixture of experts, EM algorithm, clustering and self-organizing algorithms, RBF net, PCA & ICA, independent factor analysis, state space modeling, Hidden Markov model, model selection, evidence combination, computational finance/financial engineering

Tadashi Yamazaki, The University of Electro-Communications, Tokyo, Japan
Fields of specialization: Cerebellum, numerical simulation, high-performance computing, neuroinformatics

Zhigang Zeng, Huazhong University of Science and Technology, Wuhan, China
Fields of specialization: Nonlinear dynamics, hybrid systems, associative memories

Liang Zhao, Universidade de São Paulo at São Carlos, São Paulo, Brazil
Fields of specialization: Machine learning, oscillatory networks, chaotic neural networks

Zhi-Hua Zhou, Nanjing University, Nanjing, China
Fields of specialization: Machine learning, data mining, pattern recognition
GUIDE FOR AUTHORS

INTRODUCTION
The Official Journal of the International Neural Network Society, European Neural Network Society & Japanese Neural Network Society

Types of Paper

Articles
Original, full-length articles are considered with the understanding that they have not been published except in abstract form and are not concurrently under review elsewhere. Authors are welcome, but not required, to suggest an action editor from the editorial board to handle the review process. Authors need to specify one of the five Sections: Cognitive Science, Neuroscience, Learning Systems, Mathematical and Computational Analysis, Engineering and Applications.

Letters
Letters (up to 2500 words) are expected to contain important new research results for which rapid publication is justified. Each Letter should include an abstract (no more than 100 words), and a maximum of 25 references. Figures and tables together with their legends should occupy no more than one of the pages. Authors are welcome, but not required, to suggest an action editor from the editorial board to handle the review process. A Letter submission undergoes an expedited review cycle, and a major revision is not allowed. If a submission requires a substantial revision, the authors are encouraged to resubmit a revised version as an Article.

Reviews
Topical, comprehensive reviews that summarize significant advances in a broad area of research. Authors should contact the corresponding Editor-in-Chief with a review outline before submitting the full manuscript.

Letters to the Editor
Short communications that comment on, point out errors in, or express a significant disagreement with a previously published paper in this journal. An author of the original paper will be asked to review the submission along with independent reviewers. In the case of substantive disagreement between the authors of a Letter to the Editor and the authors of the original paper, the Editor may invite to a rebuttal from the latter authors. Such letters should be as concise as possible, not exceeding 2 formatted pages. If both the Letter to the Editor and the Rebuttal are accepted, they will be published in the same issue.

It is acceptable for conference papers to be extended to a journal submission. However, authors are required to cite their related prior work and the extension must be substantial, such as new experimental results or analyses. The journal submission should clearly specify how the journal paper differs from or goes beyond the cited prior work.

Contact Details for Submission
All manuscripts must be submitted through the Elsevier online system: http://ees.elsevier.com/neunet/

Authors should specify the Editor-in-Chief in the corresponding geographic area:
Europe, North and South America: Prof. DeLiang Wang (dwang@cse.ohio-state.edu)
Africa, Asia and Australia: Prof. Kenji Doya (nneo@oist.jp)

BEFORE YOU BEGIN

Ethics in publishing
For information on Ethics in publishing and Ethical guidelines for journal publication see https://www.elsevier.com/publishingethics and https://www.elsevier.com/journal-authors/ethics.
**Conflict of interest**
All authors are requested to disclose any actual or potential conflict of interest including any financial, personal or other relationships with other people or organizations within three years of beginning the submitted work that could inappropriately influence, or be perceived to influence, their work. See also https://www.elsevier.com/conflictsofinterest. Further information and an example of a Conflict of Interest form can be found at: http://service.elsevier.com/app/answers/detail/a_id/286/supporthub/publishing.

**Submission declaration**
Submission of an article implies that the work described has not been published previously (except in the form of an abstract or as part of a published lecture or academic thesis or as an electronic preprint, see https://www.elsevier.com/sharingpolicy), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere including electronically in the same form, in English or in any other language, without the written consent of the copyright-holder.

**Changes to authorship**
Authors are expected to consider carefully the list and order of authors before submitting their manuscript and provide the definitive list of authors at the time of the original submission. Any addition, deletion or rearrangement of author names in the authorship list should be made only before the manuscript has been accepted and only if approved by the journal Editor. To request such a change, the Editor must receive the following from the corresponding author: (a) the reason for the change in author list and (b) written confirmation (e-mail, letter) from all authors that they agree with the addition, removal or rearrangement. In the case of addition or removal of authors, this includes confirmation from the author being added or removed.

Only in exceptional circumstances will the Editor consider the addition, deletion or rearrangement of authors after the manuscript has been accepted. While the Editor considers the request, publication of the manuscript will be suspended. If the manuscript has already been published in an online issue, any requests approved by the Editor will result in a corrigendum.

**Copyright**
Upon acceptance of an article, authors will be asked to complete a 'Journal Publishing Agreement' (for more information on this and copyright, see https://www.elsevier.com/copyright). An e-mail will be sent to the corresponding author confirming receipt of the manuscript together with a 'Journal Publishing Agreement' form or a link to the online version of this agreement.

Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. Permission of the Publisher is required for resale or distribution outside the institution and for all other derivative works, including compilations and translations (please consult https://www.elsevier.com/permissions). If excerpts from other copyrighted works are included, the author(s) must obtain written permission from the copyright owners and credit the source(s) in the article. Elsevier has preprinted forms for use by authors in these cases: please consult https://www.elsevier.com/permissions.

For open access articles: Upon acceptance of an article, authors will be asked to complete an 'Exclusive License Agreement' (for more information see https://www.elsevier.com/OAauthoragreement). Permitted third party reuse of open access articles is determined by the author's choice of user license (see https://www.elsevier.com/openaccesslicenses).

**Author rights**
As an author you (or your employer or institution) have certain rights to reuse your work. For more information see https://www.elsevier.com/copyright.

**Role of the funding source**
You are requested to identify who provided financial support for the conduct of the research and/or preparation of the article and to briefly describe the role of the sponsor(s), if any, in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article for publication. If the funding source(s) had no such involvement then this should be stated.
**Funding body agreements and policies**
Elsevier has established a number of agreements with funding bodies which allow authors to comply with their funder's open access policies. Some authors may also be reimbursed for associated publication fees. To learn more about existing agreements please visit https://www.elsevier.com/fundingbodies.

**Open access**
This journal offers authors a choice in publishing their research:

**Open access**
- Articles are freely available to both subscribers and the wider public with permitted reuse
- An open access publication fee is payable by authors or on their behalf e.g. by their research funder or institution

**Subscription**
- Articles are made available to subscribers as well as developing countries and patient groups through our universal access programs (https://www.elsevier.com/access).
- No open access publication fee payable by authors.

Regardless of how you choose to publish your article, the journal will apply the same peer review criteria and acceptance standards.

For open access articles, permitted third party (re)use is defined by the following Creative Commons user licenses:

*Creative Commons Attribution (CC BY)*
Let others distribute and copy the article, create extracts, abstracts, and other revised versions, adaptations or derivative works of or from an article (such as a translation), include in a collective work (such as an anthology), text or data mine the article, even for commercial purposes, as long as they credit the author(s), do not represent the author as endorsing their adaptation of the article, and do not modify the article in such a way as to damage the author's honor or reputation.

*Creative Commons Attribution-NonCommercial-NoDerivs (CC BY-NC-ND)*
For non-commercial purposes, lets others distribute and copy the article, and to include in a collective work (such as an anthology), as long as they credit the author(s) and provided they do not alter or modify the article.

The open access publication fee for this journal is **USD 3100**, excluding taxes. Learn more about Elsevier's pricing policy: http://www.elsevier.com/openaccesspricing.

**Green open access**
Authors can share their research in a variety of different ways and Elsevier has a number of green open access options available. We recommend authors see our green open access page for further information (http://elsevier.com/greenopenaccess). Authors can also self-archive their manuscripts immediately and enable public access from their institution's repository after an embargo period. This is the version that has been accepted for publication and which typically includes author-incorporated changes suggested during submission, peer review and in editor-author communications. Embargo period: For subscription articles, an appropriate amount of time is needed for journals to deliver value to subscribing customers before an article becomes freely available to the public. This is the embargo period and it begins from the date the article is formally published online in its final and fully citable form.

This journal has an embargo period of 24 months.

**Language (usage and editing services)**
Please write your text in good English (American or British usage is accepted, but not a mixture of these). Authors who feel their English language manuscript may require editing to eliminate possible grammatical or spelling errors and to conform to correct scientific English may wish to use the English Language Editing service available from Elsevier's WebShop (http://webshop.elsevier.com/languagedisplaying/) or visit our customer support site (http://support.elsevier.com) for more information.
Submission
Our online submission system guides you stepwise through the process of entering your article details and uploading your files. The system converts your article files to a single PDF file used in the peer-review process. Editable files (e.g., Word, LaTeX) are required to typeset your article for final publication. All correspondence, including notification of the Editor's decision and requests for revision, is sent by e-mail.

PREPARATION
Use of word processing software
It is important that the file be saved in the native format of the word processor used. The text should be in single-column format. Keep the layout of the text as simple as possible. Most formatting codes will be removed and replaced on processing the article. In particular, do not use the word processor's options to justify text or to hyphenate words. However, do use bold face, italics, subscripts, superscripts etc. When preparing tables, if you are using a table grid, use only one grid for each individual table and not a grid for each row. If no grid is used, use tabs, not spaces, to align columns. The electronic text should be prepared in a way very similar to that of conventional manuscripts (see also the Guide to Publishing with Elsevier: https://www.elsevier.com/guidepublication). Note that source files of figures, tables and text graphics will be required whether or not you embed your figures in the text. See also the section on Electronic artwork.
To avoid unnecessary errors you are strongly advised to use the 'spell-check' and 'grammar-check' functions of your word processor.

LaTeX
You are recommended to use the Elsevier article class elsarticle.cls (http://www.ctan.org/tex-archive/macros/latex/contrib/elsarticle) to prepare your manuscript and BibTeX (http://www.bibtex.org) to generate your bibliography.
For detailed submission instructions, templates and other information on LaTeX, see https://www.elsevier.com/latex.

Article structure
Subdivision - numbered sections
Divide your article into clearly defined and numbered sections. Subsections should be numbered 1.1 (then 1.1.1, 1.1.2, ...), 1.2, etc. (the abstract is not included in section numbering). Use this numbering also for internal cross-referencing: do not just refer to 'the text'. Any subsection may be given a brief heading. Each heading should appear on its own separate line.

Introduction
State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

Conclusions
The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

Appendices
If there is more than one appendix, they should be identified as A, B, etc. Formulae and equations in appendices should be given separate numbering: Eq. (A.1), Eq. (A.2), etc.; in a subsequent appendix, Eq. (B.1) and so on. Similarly for tables and figures: Table A.1; Fig. A.1, etc.

Essential title page information
• **Title.** Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible.
• **Author names and affiliations.** Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower-case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.
• **Corresponding author.** Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author.
• **Present/permanent address.** If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

**Abstract**
A concise and factual abstract is required which should not exceed 250 words.

**Highlights**
Highlights are a short collection of bullet points that convey the core findings of the article. Highlights are optional and should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point). See [https://www.elsevier.com/highlights](https://www.elsevier.com/highlights) for examples.

**Keywords**
Immediately after the abstract, provide a maximum of 6 keywords, using American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, 'and', 'of'). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

**Acknowledgements**
Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

**Math formulae**
Please submit math equations as editable text and not as images. Present simple formulae in line with normal text where possible and use the solidus (/) instead of a horizontal line for small fractional terms, e.g., X/Y. In principle, variables are to be presented in italics. Powers of e are often more conveniently denoted by exp. Number consecutively any equations that have to be displayed separately from the text (if referred to explicitly in the text).

**Footnotes**
Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors can build footnotes into the text, and this feature may be used. Otherwise, please indicate the position of footnotes in the text and list the footnotes themselves separately at the end of the article. Do not include footnotes in the Reference list.

**Artwork**

**Electronic artwork**

**General points**
- Make sure you use uniform lettering and sizing of your original artwork.
- Embed the used fonts if the application provides that option.
- Aim to use the following fonts in your illustrations: Arial, Courier, Times New Roman, Symbol, or use fonts that look similar.
- Number the illustrations according to their sequence in the text.
- Use a logical naming convention for your artwork files.
- Provide captions to illustrations separately.
- Size the illustrations close to the desired dimensions of the published version.
- Submit each illustration as a separate file.

A detailed guide on electronic artwork is available on our website: [https://www.elsevier.com/artworkinstructions](https://www.elsevier.com/artworkinstructions).

**You are urged to visit this site; some excerpts from the detailed information are given here.**

**Formats**
If your electronic artwork is created in a Microsoft Office application (Word, PowerPoint, Excel) then please supply 'as is' in the native document format. Regardless of the application used other than Microsoft Office, when your electronic artwork is finalized, please 'Save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/halftone combinations given below):
- EPS (or PDF): Vector drawings, embed all used fonts.
- TIFF (or JPEG): Color or grayscale photographs (halftones), keep to a minimum of 300 dpi.
- TIFF (or JPEG): Bitmapped (pure black & white pixels) line drawings, keep to a minimum of 1000 dpi.
TIFF (or JPEG): Combinations bitmapped line/half-tone (color or grayscale), keep to a minimum of 500 dpi.

**Please do not:**
- Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); these typically have a low number of pixels and limited set of colors;
- Supply files that are too low in resolution;
- Submit graphics that are disproportionately large for the content.

**Color artwork**
Please make sure that artwork files are in an acceptable format (TIFF (or JPEG), EPS (or PDF), or MS Office files) and with the correct resolution. If, together with your accepted article, you submit usable color figures then Elsevier will ensure, at no additional charge, that these figures will appear in color online (e.g., ScienceDirect and other sites) regardless of whether or not these illustrations are reproduced in color in the printed version. For color reproduction in print, you will receive information regarding the costs from Elsevier after receipt of your accepted article. Please indicate your preference for color: in print or online only. For further information on the preparation of electronic artwork, please see [https://www.elsevier.com/artworkinstructions](https://www.elsevier.com/artworkinstructions).

**Figure captions**
Ensure that each illustration has a caption. Supply captions separately, not attached to the figure. A caption should comprise a brief title (not on the figure itself) and a description of the illustration. Keep text in the illustrations themselves to a minimum but explain all symbols and abbreviations used.

**Tables**
Please submit tables as editable text and not as images. Tables can be placed either next to the relevant text in the article, or on separate page(s) at the end. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules.

**References**

**Citation in text**
Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

**Web references**
As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

**References in a special issue**
Please ensure that the words 'this issue' are added to any references in the list (and any citations in the text) to other articles in the same Special Issue.

**Reference management software**
Most Elsevier journals have their reference template available in many of the most popular reference management software products. These include all products that support Citation Style Language styles ([http://citationstyles.org](http://citationstyles.org)), such as Mendeley ([http://www.mendeley.com/features/reference-manager](http://www.mendeley.com/features/reference-manager)) and Zotero ([https://www.zotero.org](https://www.zotero.org)), as well as EndNote ([http://endnote.com/downloads/styles](http://endnote.com/downloads/styles)). Using the word processor plug-ins from these products, authors only need to select the appropriate journal template when preparing their article, after which citations and bibliographies will be automatically formatted in the journal's style. If no template is yet available for this journal, please follow the format of the sample references and citations as shown in this Guide.

Users of Mendeley Desktop can easily install the reference style for this journal by clicking the following link:
When preparing your manuscript, you will then be able to select this style using the Mendeley plug-ins for Microsoft Word or LibreOffice.

**Reference style**


**List:** references should be arranged first alphabetically and then further sorted chronologically if necessary. More than one reference from the same author(s) in the same year must be identified by the letters 'a', 'b', 'c', etc., placed after the year of publication.

**Examples:**

Reference to a journal publication:

Reference to a book:

Reference to a chapter in an edited book:

Reference to a website:

**Journal abbreviations source**

Journal names should be abbreviated according to the List of Title Word Abbreviations: [http://www.issn.org/services/online-services/access-to-the-ltwa/](http://www.issn.org/services/online-services/access-to-the-ltwa/).

**Video data**

Elsevier accepts video material and animation sequences to support and enhance your scientific research. Authors who have video or animation files that they wish to submit with their article are strongly encouraged to include links to these within the body of the article. This can be done in the same way as a figure or table by referring to the video or animation content and noting in the body text where it should be placed. All submitted files should be properly labeled so that they directly relate to the video file's content. In order to ensure that your video or animation material is directly usable, please provide the files in one of our recommended file formats with a preferred maximum size of 150 MB. Video and animation files supplied will be published online in the electronic version of your article in Elsevier Web products, including ScienceDirect: [http://www.sciencedirect.com](http://www.sciencedirect.com). Please supply 'stills' with your files: you can choose any frame from the video or animation or make a separate image. These will be used instead of standard icons and will personalize the link to your video data. For more detailed instructions please visit our video instruction pages at [https://www.elsevier.com/artworkinstructions](https://www.elsevier.com/artworkinstructions). Note: since video and animation cannot be embedded in the print version of the journal, please provide text for both the electronic and the print version for the portions of the article that refer to this content.

**AudioSlides**

The journal encourages authors to create an AudioSlides presentation with their published article. AudioSlides are brief, webinar-style presentations that are shown next to the online article on ScienceDirect. This gives authors the opportunity to summarize their research in their own words and to help readers understand what the paper is about. More information and examples are available at [https://www.elsevier.com/audioslides](https://www.elsevier.com/audioslides). Authors of this journal will automatically receive an invitation e-mail to create an AudioSlides presentation after acceptance of their paper.

**Supplementary material**

Supplementary material can support and enhance your scientific research. Supplementary files offer the author additional possibilities to publish supporting applications, high-resolution images, background datasets, sound clips and more. Please note that such items are published online exactly as they are submitted; there is no typesetting involved (supplementary data supplied as an Excel file or as a PowerPoint slide will appear as such online). Please submit the material together with the article and supply a concise and descriptive caption for each file. If you wish to make any changes to
supplementary data during any stage of the process, then please make sure to provide an updated
file, and do not annotate any corrections on a previous version. Please also make sure to switch
off the 'Track Changes' option in any Microsoft Office files as these will appear in the published
supplementary file(s). For more detailed instructions please visit our artwork instruction pages at

**Interactive MATLAB Figure Viewer**
This journal features the Interactive MATLAB Figure Viewer, allowing you to display figures
created in MATLAB in the .FIG format in an interactive viewer next to the article. Please go to
https://www.elsevier.com/matlab for more information and submission instructions.

**Interactive plots**
This journal enables you to show an Interactive Plot with your article by simply submitting a data file.
For instructions please go to https://www.elsevier.com/interactiveplots.

**Submission checklist**
The following list will be useful during the final checking of an article prior to sending it to the journal
for review. Please consult this Guide for Authors for further details of any item.

**Ensure that the following items are present:**
One author has been designated as the corresponding author with contact details:
- E-mail address
- Full postal address
All necessary files have been uploaded, and contain:
- Keywords
- All figure captions
- All tables (including title, description, footnotes)
Further considerations
- Manuscript has been 'spell-checked' and 'grammar-checked'
- References are in the correct format for this journal
- All references mentioned in the Reference list are cited in the text, and vice versa
- Permission has been obtained for use of copyrighted material from other sources (including the
  Internet)
Printed version of figures (if applicable) in color or black-and-white
- Indicate clearly whether or not color or black-and-white in print is required.
For any further information please visit our customer support site at http://support.elsevier.com.

**AFTER ACCEPTANCE**

**Use of the Digital Object Identifier**
The Digital Object Identifier (DOI) may be used to cite and link to electronic documents. The DOI
consists of a unique alpha-numeric character string which is assigned to a document by the publisher
upon the initial electronic publication. The assigned DOI never changes. Therefore, it is an ideal
medium for citing a document, particularly 'Articles in press' because they have not yet received their
full bibliographic information. Example of a correctly given DOI (in URL format; here an article in the
journal *Physics Letters B*):
http://dx.doi.org/10.1016/j.physletb.2010.09.059
When you use a DOI to create links to documents on the web, the DOIs are guaranteed never to
change.

**Proofs**
One set of page proofs (as PDF files) will be sent by e-mail to the corresponding author (if we do
not have an e-mail address then paper proofs will be sent by post) or, a link will be provided in
the e-mail so that authors can download the files themselves. Elsevier now provides authors with
PDF proofs which can be annotated; for this you will need to download Adobe Reader version 9 (or
higher) available free from http://get.adobe.com/reader. Instructions on how to annotate PDF files
will accompany the proofs (also given online). The exact system requirements are given at the Adobe
If you do not wish to use the PDF annotations function, you may list the corrections (including replies
to the Query Form) and return them to Elsevier in an e-mail. Please list your corrections quoting line
number. If, for any reason, this is not possible, then mark the corrections and any other comments
(including replies to the Query Form) on a printout of your proof and scan the pages and return via e-
mail. Please use this proof only for checking the typesetting, editing, completeness and correctness
of the text, tables and figures. Significant changes to the article as accepted for publication will only
be considered at this stage with permission from the Editor. We will do everything possible to get your article published quickly and accurately. It is important to ensure that all corrections are sent back to us in one communication: please check carefully before replying, as inclusion of any subsequent corrections cannot be guaranteed. Proofreading is solely your responsibility.

**Offprints**

The corresponding author, at no cost, will be provided with a personalized link providing 50 days free access to the final published version of the article on ScienceDirect. This link can also be used for sharing via email and social networks. For an extra charge, paper offprints can be ordered via the offprint order form which is sent once the article is accepted for publication. Both corresponding and co-authors may order offprints at any time via Elsevier’s WebShop (http://webshop.elsevier.com/myarticleservices/offprints). Authors requiring printed copies of multiple articles may use Elsevier WebShop’s ‘Create Your Own Book’ service to collate multiple articles within a single cover (http://webshop.elsevier.com/myarticleservices/booklets).

**AUTHOR INQUIRIES**

You can track your submitted article at https://www.elsevier.com/track-submission. You can track your accepted article at https://www.elsevier.com/trackarticle. You are also welcome to contact Customer Support via http://support.elsevier.com.

© Copyright 2014 Elsevier | http://www.elsevier.com