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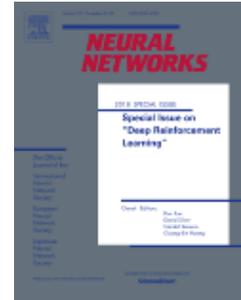
The Official Journal of the International Neural Network Society, European Neural Network Society & Japanese Neural Network Society

TABLE OF CONTENTS

ISSN: 0893-6080

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 Center

AUDIENCE

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

IMPACT FACTOR

ABSTRACTING AND INDEXING

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

EDITORIAL BOARD

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

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

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

Barbara Hammer, Universität Bielefeld, Bielefeld, Germany
Fields of specialization: Learning in structured domains, self-organizing systems, metric learning, nonlinear-dimensionality reduction, bioinformatics applications

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, computational neuroscience, fMRI, mathematics of neural systems, reinforcement learning, and unsupervised 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
Fields of specialization: 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, Politecnico di Milano, Milan, Italy
Fields of specialization: Control theory, control engineering applications, computational methods

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

Yoshinobu Kawahara, Osaka University, Osaka, Japan
Fields of specialization: Statistical machine learning, dynamical systems, optimization

Irwin King, The 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 Kùrková, Academy of Sciences of the Czech Republic, Prague, Czech Republic
Fields of specialization: Mathematical theory of neurocomputing and learning
Oh Min Kwon, Chungbuk National University, Chungbuk, The Republic of Korea
Fields of specialization: Stability analysis of delayed neural networks, recurrent neural networks, synchronization, complex networks, systems with time delays, stochastic system, control synthesis, neural networks and fuzzy methods, synchronization of oscillators and chaotic systems
Minho Lee, Kyungpook National University, Buk-Gu, Dae-gu, The Republic of Korea
Fields of specialization: Deep learning, intention and emotion understanding, visual perception, and brain-computer interface.
Xuelong Li, Chinese Academy of Sciences, Xian, Shaanxi, China
Fields of specialization: Optical imagery, image analysis, pattern recognition
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
Jordi Madrenas, Universitat Politècnica de Catalunya (UPC), Barcelona, Spain
Fields of specialization: Bioinspired and neuromorphic implementations, integrated sensory systems, hardware architectures
Elisa Magosso, Università di Bologna, Bologna, Italy
Fields of specialization: Neurocomputational modeling, multisensory integration, peripersonal space, cognitive functions, synaptic learning, EEG
Danilo Mandic, Imperial College London, London, UK
Fields of specialization: Recurrent neural networks, deep learning, big data, tensor decompositions, complexity science, adaptive systems, brain computer interface, smart grid
Ali Minai, 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
Jun Morimoto, Advanced Telecommunications Research Institute International (ATR), Kyoto, Japan
Fields of specialization: Robot learning, humanoid robotics
Jay Myung, The Ohio State University, Columbus, Ohio, USA
Fields of specialization: Computational cognition, Bayesian inference, active learning
Hiroyuki Nakahara, RIKEN Advanced Science Institute, Saitama, Japan
Fields of specialization: Computational neuroscience, reinforcement learning, neural coding
Arun Narayanan, Google, Inc., Mountain View, California, USA
Fields of specialization: Automatic speech recognition, deep neural networks for speech processing
Tetsuya Ogata, Waseda University, Shinjuku-ku, Tokyo, Japan
Fields of specialization: Cognitive robotics, neurodynamical models of cognition & behavior, recurrent neural network, deep architecture
Jaakko Peltonen, University of Tampere, Finland
Fields of specialization: Exploratory data analysis, information visualization, nonlinear dimensionality reduction, machine learning
Yuriy Pershin, University of South Carolina, Columbia, South Carolina, USA
Fields of specialization: Memristive neural networks, memory, hardware implementation
Tommaso Poggio, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA
Fields of specialization: Approximation theory, vision
Danil Prokhorov, Toyota Research Institute NA, TRD, Ann Arbor, Michigan, USA
Fields of specialization: Recurrent neural networks, gradient-based learning algorithms, approximate dynamic programming, intelligent control, diagnostics, computer vision, autonomous systems
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
Hayaru Shouno, University of Electro-Communications, Tokyo, Japan

Fields of specialization: Image processing, pattern recognition, deep neural networks

Alessandro Sperduti, Università degli Studi di Padova, Padova, Italy

Fields of specialization: Learning in structured domains, recursive neural networks, deep architectures, kernel methods

Soundar Srinivasan, Robert Bosch LLC, Palo Alto, California, USA

Fields of specialization: Pattern recognition, time series analysis, data mining, applications

Masashi Sugiyama, The 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

Taro Toyoizumi, RIKEN Advanced Science Institute, Saitama, Japan

Fields of specialization: Computational neuroscience, synaptic plasticity

Jochen Triesch, Goethe-Universität Frankfurt, Frankfurt am Main, Germany

Fields of specialization: Computational neuroscience, neural plasticity, vision

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-evolutonairy, 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)

Herbert Werner, Hamburg University of Technology, Hamburg, Germany

Fields of specialization: Dynamic systems, nonlinear modeling and control, system identification, linear parameter-varying systems

Rolf Peter Wurtz, Ruhr-Universität Bochum, Bochum, Germany

Fields of specialization: Object recognition, artificial vision systems, autonomous learning, organic computing

Keisuke Yamazaki, National Institute of Advanced Industrial Science and Technology (AIST), Tokyo, Japan

Fields of specialization: Statistical learning, Bayesian statistics, unsupervised learning

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

Min-Ling Zhang, Southeast University, Nanjing, China

Fields of specialization: Machine learning, data mining, pattern recognition

Xiao-Lei Zhang, Northwestern Polytechnical University, Xi'an Citym Shaanxi Province, China

Fields of specialization: Deep learning, unsupervised learning, speech signal processing, statistical signal processing

Liang Zhao, Universidade de São Paulo at São Carlos, São Paulo, Brazil

Fields of specialization: Machine learning, oscillatory networks, chaotic neural networks

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)

Ma

Submission checklist
You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

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:
Manuscript:
• Include keywords
• All figures (include relevant captions)
• All tables (including titles, description, footnotes)
• Ensure all figure and table citations in the text match the files provided
• Indicate clearly if color should be used for any figures in print
Graphical Abstracts / Highlights files (where applicable)
Supplemental files (where applicable)

Further considerations
• Manuscript has been 'spell checked' and 'grammar checked'
• 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)
• A competing interests statement is provided, even if the authors have no competing interests to declare
• Journal policies detailed in this guide have been reviewed
• Referee suggestions and contact details provided, based on journal requirements

For further information, visit our Support Center.

BEFORE YOU BEGIN

Ethics in publishing
Please see our information pages on Ethics in publishing and Ethical guidelines for journal publication.

Declaration of interest
All authors must disclose any financial and personal relationships with other people or organizations that could inappropriately influence (bias) their work. Examples of potential competing interests include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/registrations, and grants or other funding. Authors must disclose any interests in two places: 1. A summary declaration of interest statement in the title page file (if double-blind) or the manuscript file (if single-blind). If there are no interests to declare then please state this: 'Declarations of interest: none'. This summary statement will be ultimately published if the article is accepted. 2. Detailed disclosures as part of a separate Declaration of Interest form, which forms part of the journal's official records. It is important for potential interests to be declared in both places and that the information matches. More information.

Submission declaration and verification
Submission of an article implies that the work described has not been published previously (except in the form of an abstract, a published lecture or academic thesis, see 'Multiple, redundant or concurrent publication' for more information), 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 in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder. To verify originality, your article may be checked by the originality detection service Crossref Similarity Check.

Preprints
Please note that preprints can be shared anywhere at any time, in line with Elsevier's sharing policy. Sharing your preprints e.g. on a preprint server will not count as prior publication (see 'Multiple, redundant or concurrent publication' for more information).

Use of inclusive language
Inclusive language acknowledges diversity, conveys respect to all people, is sensitive to differences, and promotes equal opportunities. Articles should make no assumptions about the beliefs or commitments of any reader, should contain nothing which might imply that one individual is superior to another on the grounds of race, sex, culture or any other characteristic, and should use inclusive

language throughout. Authors should ensure that writing is free from bias, for instance by using 'he or she', 'his/her' instead of 'he' or 'his', and by making use of job titles that are free of stereotyping (e.g. 'chairperson' instead of 'chairman' and 'flight attendant' instead of 'stewardess').

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' (see more information on this). 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. 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.

For gold open access articles: Upon acceptance of an article, authors will be asked to complete an 'Exclusive License Agreement' (more information). Permitted third party reuse of gold open access articles is determined by the author's choice of user license.

Author rights

As an author you (or your employer or institution) have certain rights to reuse your work. More information.

Elsevier supports responsible sharing
Find out how you can share your research published in Elsevier journals.

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 funding bodies will reimburse the author for the gold open access publication fee. Details of existing agreements are available online.

Open access

This journal offers authors a choice in publishing their research:

Subscription

• Articles are made available to subscribers as well as developing countries and patient groups through our universal access programs.
• No open access publication fee payable by authors.

• The Author is entitled to post the accepted manuscript in their institution's repository and make this public after an embargo period (known as green Open Access). The published journal article cannot be shared publicly, for example on ResearchGate or Academia.edu, to ensure the sustainability of peer-reviewed research in journal publications. The embargo period for this journal can be found below.

Gold open access
• Articles are freely available to both subscribers and the wider public with permitted reuse.
• A gold open access publication fee is payable by authors or on their behalf, e.g. by their research funder or institution.

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

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

Creative Commons Attribution (CC BY)
Lets 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 gold open access publication fee for this journal is **USD 3100**, excluding taxes. Learn more about Elsevier's pricing policy: https://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. 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. Find out more.

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.

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

Peer review
This journal operates a single blind review process. All contributions will be initially assessed by the editor for suitability for the journal. Papers deemed suitable are then typically sent to a minimum of two independent expert reviewers to assess the scientific quality of the paper. The Editor is responsible for the final decision regarding acceptance or rejection of articles. The Editor's decision is final. More information on types of peer review.

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). 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 to prepare your manuscript and BibTeX to generate your bibliography.

Our LaTeX site has detailed submission instructions, templates and other information.

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. You can add your name between parentheses in your own script behind the English transliteration. 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. This responsibility includes answering any future queries about Methodology and Materials. **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 require **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). You can view example Highlights on our information site.

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.).

Formatting of funding sources
List funding sources in this standard way to facilitate compliance to funder's requirements:

Funding: This work was supported by the National Institutes of Health [grant numbers xxxx, yyyy]; the Bill & Melinda Gates Foundation, Seattle, WA [grant number zzzz]; and the United States Institutes of Peace [grant number aaaa].

It is not necessary to include detailed descriptions on the program or type of grants and awards. When funding is from a block grant or other resources available to a university, college, or other research institution, submit the name of the institute or organization that provided the funding.

If no funding has been provided for the research, please include the following sentence:

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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.
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. Further information on the preparation of electronic artwork.

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 and shading in table cells.

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.

Data references

This journal encourages you to cite underlying or relevant datasets in your manuscript by citing them in your text and including a data reference in your Reference List. Data references should include the following elements: author name(s), dataset title, data repository, version (where available), year, and global persistent identifier. Add [dataset] immediately before the reference so we can properly identify it as a data reference. The [dataset] identifier will not appear in your published article.

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, such as Mendeley and Zotero, as well as EndNote. 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. If you use reference management software, please ensure that you remove all field codes before submitting the electronic manuscript. More information on how to remove field codes.

Users of Mendeley Desktop can easily install the reference style for this journal by clicking the following link:
http://open.mendeley.com/use-citation-style/neural-networks
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
Text: Citations in the text should follow the referencing style used by the American Psychological Association. You are referred to the Publication Manual of the American Psychological Association, Sixth Edition, ISBN 978-1-4338-0561-5, copies of which may be ordered online or APA Order Dept., P.O.B. 2710, Hyattsville, MD 20784, USA or APA, 3 Henrietta Street, London, WC3E 8LU, UK.
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:
Van der Geer, J., Hanraads, J. A. J., & Lupton, R. A. (2010). The art of writing a scientific article. *Journal of Scientific Communications, 163*, 51–59. https://doi.org/10.1016/j.Sc.2010.00372.
Reference to a journal publication with an article number:
Van der Geer, J., Hanraads, J. A. J., & Lupton, R. A. (2018). The art of writing a scientific article. *Heliyon*, *19*, e00205. https://doi.org/10.1016/j.heliyon.2018.e00205.
Reference to a book:
Strunk, W., Jr., & White, E. B. (2000). *The elements of style.* (4th ed.). New York: Longman, (Chapter 4).
Reference to a chapter in an edited book:
Mettam, G. R., & Adams, L. B. (2009). How to prepare an electronic version of your article. In B. S. Jones, & R. Z. Smith (Eds.), *Introduction to the electronic age* (pp. 281–304). New York: E-Publishing Inc.
Reference to a website:
Cancer Research UK. Cancer statistics reports for the UK. (2003). http://www.cancerresearchuk.org/aboutcancer/statistics/cancerstatsreport/ Accessed 13 March 2003.
Reference to a dataset:
[dataset] Oguro, M., Imahiro, S., Saito, S., Nakashizuka, T. (2015). *Mortality data for Japanese oak wilt disease and surrounding forest compositions*. Mendeley Data, v1. https://doi.org/10.17632/xwj98nb39r.1.
Reference to a conference paper or poster presentation:
Engle, E.K., Cash, T.F., & Jarry, J.L. (2009, November). The Body Image Behaviours Inventory-3: Development and validation of the Body Image Compulsive Actions and Body Image Avoidance Scales. Poster session presentation at the meeting of the Association for Behavioural and Cognitive Therapies, New York, NY.

Journal abbreviations source
Journal names should be abbreviated according to the List of Title Word Abbreviations.

Video

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 file in one of our recommended file formats with a preferred maximum size of 150 MB per file, 1 GB in total. Video and animation files supplied will be published online in the electronic version of your article in Elsevier Web products, including ScienceDirect. 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. 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.

Data visualization

Include interactive data visualizations in your publication and let your readers interact and engage more closely with your research. Follow the instructions here to find out about available data visualization options and how to include them with your article.

Supplementary material

Supplementary material such as applications, images and sound clips, can be published with your article to enhance it. Submitted supplementary items are published exactly as they are received (Excel or PowerPoint files will appear as such online). Please submit your material together with the article and supply a concise, descriptive caption for each supplementary file. If you wish to make changes to supplementary material during any stage of the process, please make sure to provide an updated file. Do not annotate any corrections on a previous version. Please switch off the 'Track Changes' option in Microsoft Office files as these will appear in the published version.

Data linking

If you have made your research data available in a data repository, you can link your article directly to the dataset. Elsevier collaborates with a number of repositories to link articles on ScienceDirect with relevant repositories, giving readers access to underlying data that gives them a better understanding of the research described.

There are different ways to link your datasets to your article. When available, you can directly link your dataset to your article by providing the relevant information in the submission system. For more information, visit the database linking page.

For supported data repositories a repository banner will automatically appear next to your published article on ScienceDirect.

In addition, you can link to relevant data or entities through identifiers within the text of your manuscript, using the following format: Database: xxxx (e.g., TAIR: AT1G01020; CCDC: 734053; PDB: 1XFN).

Data in Brief

You have the option of converting any or all parts of your supplementary or additional raw data into one or multiple data articles, a new kind of article that houses and describes your data. Data articles ensure that your data is actively reviewed, curated, formatted, indexed, given a DOI and publicly available to all upon publication. You are encouraged to submit your article for *Data in Brief* as an additional item directly alongside the revised version of your manuscript. If your research article is accepted, your data article will automatically be transferred over to *Data in Brief* where it will be editorially reviewed and published in the open access data journal, *Data in Brief*. Please note an open access fee of 500 USD is payable for publication in *Data in Brief*. Full details can be found on the Data in Brief website. Please use this template to write your Data in Brief.

MethodsX

You have the option of converting relevant protocols and methods into one or multiple MethodsX articles, a new kind of article that describes the details of customized research methods. Many researchers spend a significant amount of time on developing methods to fit their specific needs or setting, but often without getting credit for this part of their work. MethodsX, an open access journal, now publishes this information in order to make it searchable, peer reviewed, citable and reproducible. Authors are encouraged to submit their MethodsX article as an additional item directly alongside the revised version of their manuscript. If your research article is accepted, your methods article will automatically be transferred over to MethodsX where it will be editorially reviewed. Please note an open access fee is payable for publication in MethodsX. Full details can be found on the MethodsX website. Please use this template to prepare your MethodsX article.

AFTER ACCEPTANCE

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 the free Adobe Reader, version 9 (or higher). Instructions on how to annotate PDF files will accompany the proofs (also given online). The exact system requirements are given at the Adobe site.

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 will, at no cost, receive a customized Share Link providing 50 days free access to the final published version of the article on ScienceDirect. The Share Link can be used for sharing the article via any communication channel, including email and social media. 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. Corresponding authors who have published their article gold open access do not receive a Share Link as their final published version of the article is available open access on ScienceDirect and can be shared through the article DOI link.

AUTHOR INQUIRIES

Visit the Elsevier Support Center to find the answers you need. Here you will find everything from Frequently Asked Questions to ways to get in touch.

You can also check the status of your submitted article or find out when your accepted article will be published.