



FUZZY SETS AND SYSTEMS

An International Journal in Information Science and Engineering

AUTHOR INFORMATION PACK

TABLE OF CONTENTS

●	Description	p.1
●	Audience	p.2
●	Impact Factor	p.2
●	Abstracting and Indexing	p.2
●	Editorial Board	p.2
●	Guide for Authors	p.6



ISSN: 0165-0114

DESCRIPTION

Since its launching in 1978, the journal *Fuzzy Sets and Systems* has been devoted to the international advancement of the theory and application of **fuzzy sets** and **systems**. The theory of fuzzy sets now encompasses a well organized corpus of basic notions including (and not restricted to) aggregation operations, a generalized theory of relations, specific measures of information content, a calculus of fuzzy numbers. Fuzzy sets are also the cornerstone of a non-additive uncertainty theory, namely possibility theory, and of a versatile tool for both linguistic and numerical modeling: fuzzy rule-based systems. Numerous works now combine fuzzy concepts with other scientific disciplines as well as modern technologies.

In mathematics fuzzy sets have triggered new research topics in connection with category theory, topology, algebra, analysis. Fuzzy sets are also part of a recent trend in the study of generalized measures and integrals, and are combined with statistical methods. Furthermore, fuzzy sets have strong logical underpinnings in the tradition of many-valued logics.

Fuzzy set-based techniques are also an important ingredient in the development of **information technologies**. In the field of information processing fuzzy sets are important in clustering, data analysis and data fusion, pattern recognition and computer vision. Fuzzy rule-based modeling has been combined with other techniques such as neural nets and evolutionary computing and applied to systems and control engineering, with applications to robotics, complex process control and supervision. In the field of information systems, fuzzy sets play a role in the development of intelligent and flexible man-machine interfaces and the storage of imprecise linguistic information. In Artificial Intelligence various forms of knowledge representation and automated reasoning frameworks benefit from fuzzy set-based techniques, for instance in interpolative reasoning, non-monotonic reasoning, diagnosis, logic programming, constraint-directed reasoning, etc. Fuzzy expert systems have been devised for fault diagnosis, and also in medical science. In decision and organization sciences, fuzzy sets has had a great impact in preference modeling and multicriteria evaluation, and has helped bringing optimization techniques closer to the users needs. Applications can be found in many areas such as management, production research, and finance. Moreover concepts and methods of fuzzy set theory have attracted scientists in many other disciplines pertaining to human-oriented studies such as cognitive psychology and some aspects of social sciences.

The scope of the journal *Fuzzy Sets and Systems* has expanded so as to account for all facets of the field while emphasizing its specificity as bridging the gap between the flexibility of human representations and the precision and clarity of mathematical or computerized representations, be they numerical or symbolic.

The journal welcomes original and significant contributions in the area of Fuzzy Sets whether on empirical or mathematical foundations, or their applications to any domain of information technology, and more generally to any field of investigation where fuzzy sets are relevant. Applied papers demonstrating the usefulness of **fuzzy methodology** in practical problems are particularly welcome. *Fuzzy Sets and Systems* publishes high-quality research articles, surveys as well as case studies. Separate sections are Recent Literature, and the Bulletin, which offers research reports, book reviews and conference announcements and various news items. Invited review articles on topics of general interest are included and special issues are published regularly.

AUDIENCE

Mathematicians, Statisticians, Probabilists, Systems Engineers.

IMPACT FACTOR

2016: 2.718 © Clarivate Analytics Journal Citation Reports 2017

ABSTRACTING AND INDEXING

Current Contents Search
INSPEC
Enviroline
MathSci
PASCAL/INIST-CNRS
UnCover
Ei Compendex
Social Scisearch
TRID, the TRIS and ITRD Database
SCISEARCH
Inside Conferences
Arts & Humanities Search
Science Citation Index
Scopus
Zentralblatt MATH

EDITORIAL BOARD

Co-Editors-in-Chief:

B. De Baets, KERMIT, Dept. of Mathematical Modelling, Statistics and Bioinformatics, Universiteit Gent, Coupure links 653, B-9000, Gent, Belgium

D. Dubois, IRIT-CNRS, Université Paul Sabatier (Toulouse III), 118 route de Narbonne, 31062, Toulouse, France

E. Hüllermeier, Department of Computer Science, Universität Paderborn, Warburger Str. 100, 33098, Paderborn, Germany

L. Godo, The Artificial Intelligence Research Institute (IIIA-CSIC), Campus de la UAB, E-08193, Bellaterra, Catalonia, Spain

Former Editors in Chief

H.J. Zimmermann

(Founding Editor, 1978-1998)

H. Prade

(1998-2006)

Honorary Editor:

L.A. Zadeh†, Dept. of Electrical Engineering and Computer Sciences (EECS), Div. of Computer Science, University of California at Berkeley, Berkeley, California, CA 94720-1776, USA

Advisory Editors:

J.C. Bezdek, Dept. of Computing and Information Systems, University of Melbourne, 111 Barry Street - Building 168, Parkville, VIC 3010, Victoria, Australia

R. Kruse, Fakultät für Informatik, Otto-von-Guericke-Universität Magdeburg, Postfach 4120, D-39106, Magdeburg, Germany

Y.-M. Liu, President Office, Sichuan University, Chengdu, 610064, Sichuan, China

M. Sugeno, Fac. of Information Science, Doshisha University, 1-3 Miyakodani Tatara, Kyonatabe, 610-0394, Kyoto, Japan

E. Trillas, Edificio Científico-Tecnológico, European Centre for Soft Computing, Calle Gonzalo Gutierrez Quiros, 33600, Mieres (Asturias), Spain

Area Editors:

G. Beliakov, Burwood, Victoria, Australia

Aggregation Operations

R. Belohlavek, Olomouc, Czech Republic

Algebra

M. Bernal, Sonora, Mexico

Control Engineering

J.P. Carvalho, Lisboa, Portugal

Fuzzy systems

P. Cintula, Prague, Czech Republic

Logic

L. Coroianu, Oradea, Romania

Fuzzy intervals

I. Couso, Oviedo, Spain

Fuzzy sets and Possibility theory

L.C. De Barros, Campinas, Brazil

Differential equations

S. Díaz Vázquez, Oviedo, Spain

Preference modeling

T Flaminio, Bellaterra, Spain

Uncertainty and game theory in many-valued structures

J. Fodor, Budapest, Hungary

Aggregation Functions

J.L. García-Lapresta, Valladolid, Spain

Preference Modeling & Decision Analysis

T-M. Guerra, Valenciennes, France

Control Engineering

J. Gutierrez Garcia, Bilbao, Spain

Topology & Category Theory

E. Hüllermeier, Paderborn, Germany

Learning & Data mining

M. Inuiguchi, Osaka, Japan

Optimisation & Mathematical Programming

B. Jayaram, India

Aggregation operations

R. Mesiar, Bratislava, Czech Republic

Aggregation Functions

A.M. Ojeda-Aciego, Malaga, Spain

Fuzzy Formal concept analysis and fuzzy logic programming

E. Pap, Novi Sad, Serbia

Measure Theory

M. Reformat

Engineering Applications

A. Rico, France

Aggregation operations

A. Sala, Valencia, Spain

Control Engineering

D. Sánchez, Granada, Spain

Data Mining and Learning

I. Sato, Tsukuba, Japan

Clustering

S. Schockaert, Roath, Cardiff, Wales, UK

Logics and Artificial Intelligence

L. Stefanini, Urbino, Italy
Fuzzy Intervals
M. Stepnicka, Ostrava 1, Czech Republic
Fuzzy Rule-Based Systems
T. Sudkamp, Dayton, Ohio, USA
Engineering Applications
B. Vantaggi, Rome, Italy
Probability and statistics
J.L. Verdegay, Granada, Spain
Optimisation & Metaheuristics
T. Vetterlein, Linz, Austria
Algebraic Aspects of Fuzzy Sets
S. Zadrozny, Warsaw, Poland
Information Systems
D. Zhang, Chengdu, China
Topology

Book Review Editor:

A. Gegov, Portsmouth, UK

Editorial Board:

S. Aguzzoli, Milano, Italy
P. Angelov, Lancaster, UK
R. Babuska, Delft, Netherlands
M. Banerjee, Kanpur, India
T. Bilgic, Istanbul, Turkey
U. Bodenhofer, Linz, Austria
P. Bonissone, Schenectady, New York, USA
B. Bouchon-Meunier, Paris, France
H. Bustince, Pamplona, Spain
Y.-K. Cai, Beijing, China
T. Calvo, Alcalá de Henares, Spain
C. Carlsson, Abo, Finland
K. Cechlarova, Kosice, Slovakia
B.-S. Chen, Hsinchu, Taiwan
G. Chen, Beijing, China
M. Ćirić, Niš, Serbia
G. De Tré, Gent, Belgium
M. Demirci, Antalya, Turkey
T. Denoeux, Compiègne, France
A. Di Nola, Baronissi (SA), Italy
M. Frigon, Montreal, Quebec, Canada
H. Frigui, Louisville, Kentucky, USA
S. Galichet, Annecy le Vieux, France
M.A. Gil, Oviedo, Spain
F. Gomide, Campinas SP, Brazil
M. Grabisch, Paris, France
S. Greco, Catania, Italy
M. Hanss, Stuttgart, Germany
F. Herrera, Granada, Spain
E. Herrera-Viedma, Granada, Spain
U. Höhle, Wuppertal, Germany
H. Ishibuchi, Osaka, Japan
J. Kacprzyk, Warsaw, Poland
W. Karwowski, Orlando, Florida, USA
A. Kasperski, Wrocław, Poland
U. Kaymak, Eindhoven, Netherlands
J.M. Keller, Columbia, Missouri, USA
E.P. Klement, Linz, Austria
L.T. Kóczy, Budapest, Hungary
W.J. Kotzé
T. Kubiak, Poznan, Poland
H.L. Larsen, Aalborg, Faroe Islands, Denmark
J. Lawry, Bristol, England, UK
K.S. Leung, Hong Kong, China
C.-J. Liau, Taipei, Taiwan

W.A. Lodwick, Denver, Colorado, USA
R. Lowen, Antwerpen, Belgium
T. Marchant, Gent, Belgium
J.-L. Marichal, Luxembourg, Luxembourg
R. A. Marques Pereira, Trento, Italy
T. Martin, Bristol, UK
S. Miyamoto, Ibaraki, Japan
J.N. Mordeson, Omaha, Nebraska, USA
T. Murofushi, Yokohama, Japan
D. Naso, Bari, Italy
M. Navara, Prague, Czech Republic
H.T. Nguyen, Las Cruces, New Mexico, USA
V. Nývák, Ostrava, Czech Republic
N. R. Pal, Kolkata, India
S.K. Pal, Calcutta, India
G. Pasi, Milano, Italy
W. Pedrycz, Edmonton, Alberta, Canada
K. Peeva, Sofia, Bulgaria
I. Perfilieva, Ostrava, Czech Republic
F.E. Petry, Stennis Space Center, Mississippi, USA
O. Pivert, Lannion Cedex, France
H. Prade, Toulouse, France
D. Ralescu, Cincinnati, Ohio, USA
J. Ramik, Karvina, Czech Republic
E.H. Ruspini, Mieres (Austurias), Spain
L. Saitta, Torino, Italy
S. Sessa, Napoli, Italy
Q. Shen, Ceredidgion, Wales, UK
R. Slowinski, Poznan, Poland
A. Sostaks, Riga, Latvia
J.M. Sousa, Lisboa, Portugal
U. Straccia, Pisa, Italy
V. Torra, Bellaterra, Catalonia, Spain
W. Trutschnig, Mieres, Spain
A. R. Várkonyi-Kóczy, Budapest, Hungary
P. Vojtáš, Prague, Czech Republic
M. Wagenknecht, Zittau, Germany
Z.Y. Wang, Omaha, Nebraska, USA
R.R. Yager, New York, New York, USA
H. Ying, Detroit, Michigan, USA
M. Ying, Beijing, China
J. Yoneyama, Kanagawa, Japan

GUIDE FOR AUTHORS

INTRODUCTION

Since its launching in 1978, the journal *Fuzzy Sets and Systems* has been devoted to the international advancement of the theory and application of fuzzy sets and systems. The theory of fuzzy sets now encompasses a well organized corpus of basic notions including (and not restricted to) aggregation operations, a generalized theory of relations, specific measures of information content, a calculus of fuzzy numbers. Fuzzy sets are also the cornerstone of a non-additive uncertainty theory, namely possibility theory, and of a versatile tool for both linguistic and numerical modeling: fuzzy rule-based systems. Numerous works now combine fuzzy concepts with other scientific disciplines as well as modern technologies.

In mathematics fuzzy sets have triggered new research topics in connection with category theory, topology, algebra, analysis. Fuzzy sets are also part of a recent trend in the study of generalized measures and integrals, and are combined with statistical methods. Furthermore, fuzzy sets have strong logical underpinnings in the tradition of many-valued logics.

Fuzzy set-based techniques are also an important ingredient in the development of information technologies. In the field of information processing fuzzy sets are important in clustering, data analysis and data fusion, pattern recognition and computer vision. Fuzzy rule-based modeling has been combined with other techniques such as neural nets and evolutionary computing and applied to systems and control engineering, with applications to robotics, complex process control and supervision. In the field of information systems, fuzzy sets play a role in the development of intelligent and flexible man-machine interfaces and the storage of imprecise linguistic information. In Artificial Intelligence various forms of knowledge representation and automated reasoning frameworks benefit from fuzzy set-based techniques, for instance in interpolative reasoning, non-monotonic reasoning, diagnosis, logic programming, constraint-directed reasoning, etc. Fuzzy expert systems have been devised for fault diagnosis, and also in medical science. In decision and organization sciences, fuzzy sets has had a great impact in preference modeling and multicriteria evaluation, and has helped bringing optimization techniques closer to the users needs. Applications can be found in many areas such as management, production research, and finance. Moreover concepts and methods of fuzzy set theory have attracted scientists in many other disciplines pertaining to human-oriented studies such as cognitive psychology and some aspects of social sciences. The scope of the journal *Fuzzy Sets and Systems* has expanded so as to account for all facets of the field while emphasizing its specificity as bridging the gap between the flexibility of human representations and the precision and clarity of mathematical or computerized representations, be they numerical or symbolic.

Types of Paper

The journal welcomes original and significant contributions in the area of Fuzzy Sets whether on empirical or mathematical foundations, or their applications to any domain of information technology, and more generally to any field of investigation where fuzzy sets are relevant. Applied papers demonstrating the usefulness of fuzzy methodology in practical problems are particularly welcome. *Fuzzy Sets and Systems* publishes high-quality research articles, surveys as well as case studies. Separate sections are Recent Literature, and the Bulletin, which offers research reports, book reviews and conference announcements and various news items. Invited review articles on topics of general interest are included and special issues are published regularly.

Contact Details for Submission

There are three options available for FSS:

1. Authors are preferentially encouraged to submit their papers electronically by using online manuscript submission at <http://ees.elsevier.com/fss/>. Authors interested in online submission are requested to go to the website and upload their manuscript and its associated artwork. An electronic (PDF) proof is generated and the reviewing process is carried out using that PDF. The PDF file may be edited after acceptance to follow journal standards. Authors and editors send and receive all correspondence by e-mail via the website and no paper correspondence is performed.
2. In case access to the website is impossible for some reason, authors can send their PS or PDF file to Elsevier via e-mail at fss@elsevier.com.
3. Paper submission is not encouraged. It is allowed only for authors who cannot use electronic submission. In that case, five copies should be sent to:

Elsevier

Editorial-Production Journals
FSS, attn. Edward Bibo, room 10.030
Radarweg 29
1043 NX, Amsterdam
The Netherlands

You are invited to indicate which editorial board area your submission is relevant to.

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).

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.

Article transfer service

This journal is part of our Article Transfer Service. This means that if the Editor feels your article is more suitable in one of our other participating journals, then you may be asked to consider transferring the article to one of those. If you agree, your article will be transferred automatically on your behalf with no need to reformat. Please note that your article will be reviewed again by the new journal. [More information](#).

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.

Elsevier Researcher Academy

[Researcher Academy](#) is a free e-learning platform designed to support early and mid-career researchers throughout their research journey. The "Learn" environment at Researcher Academy offers several interactive modules, webinars, downloadable guides and resources to guide you through the process of writing for research and going through peer review. Feel free to use these free resources to improve your submission and navigate the publication process with ease.

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.

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.

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 required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential, then cite the author(s) and year(s). Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

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

Keywords. A list of keywords should be provided at the end of the abstract. They should preferably be selected from the list of keywords below. If necessary, additional keywords may be added. Basic Concepts. Fuzzy connectives and aggregation operators, Measures of information, Fuzzy relations, Fuzzy numbers, Possibility theory, Psychometry and measurement. Mathematics. Non-classical logics, Category theory, Topology, Algebra, Analysis, Non-additive measures, Fuzzy random variables. Information Sciences. Approximate reasoning, Fuzzy inference systems, Fuzzy constraint satisfaction, Data fusion, Learning, Fuzzy databases, Information retrieval, Pattern recognition, Fuzzy clustering, Image processing, Fuzzy system models, Fuzzy control, Neuro-fuzzy systems, Genetic algorithms, Decision analysis, Multiple criteria evaluation, Group decision-making, Fuzzy mathematical programming, Combinatorial problems, Fuzzy statistics and data analysis, Fuzzy switching logic, Fuzzy hardware. Applications. Process control, Fault detection and diagnosis, Reliability, Large-scale systems, Production research, Design, Nuclear engineering, Robotics, Transportation, Chemical engineering, Medicine, Economics, Finance, Social sciences, Cognitive sciences, Linguistic modeling, Ergonomics, Geography, Physics.

Abbreviations

Define abbreviations that are not standard in this field in a footnote to be placed on the first page of the article. Such abbreviations that are unavoidable in the abstract must be defined at their first mention there, as well as in the footnote. Ensure consistency of abbreviations throughout the article.

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.

Reference links

Increased discoverability of research and high quality peer review are ensured by online links to the sources cited. In order to allow us to create links to abstracting and indexing services, such as Scopus, CrossRef and PubMed, please ensure that data provided in the references are correct. Please note that incorrect surnames, journal/book titles, publication year and pagination may prevent link creation. When copying references, please be careful as they may already contain errors. Use of the DOI is encouraged.

A DOI can be used to cite and link to electronic articles where an article is in-press and full citation details are not yet known, but the article is available online. A DOI is guaranteed never to change, so you can use it as a permanent link to any electronic article. An example of a citation using DOI for an article not yet in an issue is: VanDecar J.C., Russo R.M., James D.E., Ambeh W.B., Franke M. (2003). Aseismic continuation of the Lesser Antilles slab beneath northeastern Venezuela. *Journal of Geophysical Research*, <https://doi.org/10.1029/2001JB000884>. Please note the format of such citations should be in the same style as all other references in the paper.

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/fuzzy-sets-and-systems>

When preparing your manuscript, you will then be able to select this style using the Mendeley plugins for Microsoft Word or LibreOffice.

Reference formatting

There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct. If you do wish to format the references yourself they should be arranged according to the following examples:

Reference style

Text: Indicate references by number(s) in square brackets in line with the text. The actual authors can be referred to, but the reference number(s) must always be given.

Example: '..... as demonstrated [3,6]. Barnaby and Jones [8] obtained a different result'

List: Number the references (numbers in square brackets) in the list in the order in which they appear in the text.

Examples:

Reference to a journal publication:

[1] J. van der Geer, J.A.J. Hanraads, R.A. Lupton, The art of writing a scientific article, *J. Sci. Commun.* 163 (2010) 51–59.

Reference to a book:

[2] W. Strunk Jr., E.B. White, *The Elements of Style*, fourth ed., Longman, New York, 2000.

Reference to a chapter in an edited book:

[3] G.R. Mettam, L.B. Adams, How to prepare an electronic version of your article, in: B.S. Jones, R.Z. Smith (Eds.), *Introduction to the Electronic Age*, E-Publishing Inc., New York, 2009, pp. 281–304.

Reference to a website:

[4] Cancer Research UK, Cancer statistics reports for the UK. <http://www.cancerresearchuk.org/aboutcancer/statistics/cancerstatsreport/>, 2003 (accessed 13 March 2003).

Reference to a dataset:

[dataset] [5] M. Oguro, S. Imahiro, S. Saito, T. Nakashizuka, Mortality data for Japanese oak wilt disease and surrounding forest compositions, *Mendeley Data*, v1, 2015. <https://doi.org/10.17632/xwj98nb39r.1>.

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.

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](#). Authors of this journal will automatically receive an invitation e-mail to create an AudioSlides presentation after acceptance of their paper.

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.

Research data

This journal encourages and enables you to share data that supports your research publication where appropriate, and enables you to interlink the data with your published articles. Research data refers to the results of observations or experimentation that validate research findings. To facilitate reproducibility and data reuse, this journal also encourages you to share your software, code, models, algorithms, protocols, methods and other useful materials related to the project.

Below are a number of ways in which you can associate data with your article or make a statement about the availability of your data when submitting your manuscript. If you are sharing data in one of these ways, you are encouraged to cite the data in your manuscript and reference list. Please refer to the "References" section for more information about data citation. For more information on depositing, sharing and using research data and other relevant research materials, visit the [research data](#) page.

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).

Mendeley Data

This journal supports Mendeley Data, enabling you to deposit any research data (including raw and processed data, video, code, software, algorithms, protocols, and methods) associated with your manuscript in a free-to-use, open access repository. Before submitting your article, you can deposit the relevant datasets to *Mendeley Data*. Please include the DOI of the deposited dataset(s) in your main manuscript file. The datasets will be listed and directly accessible to readers next to your published article online.

For more information, visit the [Mendeley Data for journals](#) page.

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.

Data statement

To foster transparency, we encourage you to state the availability of your data in your submission. This may be a requirement of your funding body or institution. If your data is unavailable to access or unsuitable to post, you will have the opportunity to indicate why during the submission process, for example by stating that the research data is confidential. The statement will appear with your published article on ScienceDirect. For more information, visit the [Data Statement page](#).

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](#).

© Copyright 2018 Elsevier | <https://www.elsevier.com>