



Anadolu University Journal of Science and Technology is a international refereed journal which has editorial board consisting of academicians from different disciplines. It is published twice a year since 2000. Since June 2010, Anadolu University Journal of Science and Technology has entered restructuring process in line with recommendations ULAKBİM and to be published in both print and electronic media in three parts; **Anadolu University Journal of Science and Technology-A Applied Sciences and Engineering, Anadolu University Journal of Science and Technology-B Theoretical Sciences and Anadolu University Journal of Science and Technology-C Life Sciences and Biotechnology.**

Manuscripts submitted for publication are analyzed in terms of scientific quality, ethics and research methods in terms of its compliance by the Editorial Board representatives of the relevant areas. Then, the abstracts of the appropriate articles are sent to two different referees with a well-known in scientific area. If the referees agree to review the article, full text in the framework of the privacy protocol is sent. In accordance with the decisions of referees, either directly or corrected article is published or rejected. Confidential reports of the referees in the journal archive will be retained for ten years. All post evaluation process is done electronically on the internet. Detailed instructions to authors are available in each issue of the journal.

**Anadolu University holds the copyright of all published material
that appear in AUJST-A.**

**Frequency: Quarterly
A Peer-Reviewed International Journal**

Indexed by *DOAJ* - Directory of Open Access Journals
Indexed by EBSCO
Indexed by ULAKBİM

**ISSN: 1302-3160
EISSN: 2146-0205**



Volume: 18 / No: 2 – 2017

Owner / Publisher: Prof. Dr. Naci GÜNDOĞAN (The Rector of Anadolu University)

EDITOR-IN-CHIEF

Prof. Dr. Nedim DEĞİRMENÇİ

Anadolu University, Graduate School of Science, 26470 Eskişehir, TURKEY

Phone: +90-222-335 05 80 /ext:1755

Fax: +90-222 3354122

e-mail: ndegirmenci@anadolu.edu.tr

CO-EDITOR IN CHIEF

Prof. Dr. Müfide BANAR

Anadolu University, Graduate School of Science, 26470 Eskişehir, TURKEY

Phone: +90-222-335 05 80 /ext:1755

Fax: +90-222 335 41 22

e-posta/e-mail: mbanar@anadolu.edu.tr

CO-EDITOR IN CHIEF

Assoc. Prof. Dr. Yunus ÖZDEMİR

Anadolu University, Graduate School of Science, 26470 Eskişehir, TURKEY

Phone: +90-222-335 05 80 /ext:1755

Fax: +90-222 335 41 22

e-mail: yunuso@anadolu.edu.tr

CONTACT INFORMATION

Anadolu University Journal of Science and Technology

Anadolu University, Graduate School of Science, 26470 Eskişehir, TURKEY

Phone: +90-222-335 05 80 /ext. 1767

Fax: +90-222 335 41 22

e-mail : btada@anadolu.edu.tr, btd@anadolu.edu.tr



OWNER

Naci GÜNDOĞAN, The Rector of Anadolu University

EDITORIAL BOARD

Nedim DEĞİRMENCI, **Editor in Chief**

Müfide BANAR, **Co-Editor in Chief**

Yunus ÖZDEMİR, **Co-Editor in Chief**

STYLE EDITOR

Aysun ÖZKAN

LANGUAGE EDITOR-ENGLISH

Bariş ERBAŞ

SECTION EDITORS

Dilek AK (Anadolu University, Turkey)
Kadri Can ATLI (Anadolu University, Turkey)
Uğur AVDAN (Anadolu University, Turkey)
Erhan AYAS (Anadolu University, Turkey)
Aydın AYBAR (Anadolu University, Turkey)
Recep BAKIŞ (Anadolu University, Turkey)
Müfide BANAR (Anadolu University, Turkey)
Henry BERGMAN (Anhalt University, Germany)
Ayşe H. BİLGE (Kadir Has University, Turkey)
Feodor M. BORODICH (Cardiff University, UK)
Berrin BOZAN (Anadolu University, Turkey)
Karel BOUZEK (Institute of Chemical Tech., Czechia)
Steven BUTT (Western Michigan University, USA)
Harun BÖCÜK (Anadolu University, Turkey)
Vakıf CAFER (Anadolu University, Turkey)
Müjdat ÇAĞLAR (Anadolu University, Turkey)
Yunus Ali ÇENGEL (Adnan Menderes University, Turkey)
Feyza ÇİNİCİOĞLU (İstanbul University, Turkey)
Farid EL-TANTAWY (Suez Canal University, Egypt)
Refail KASIMBEYLİ (Anadolu University, Turkey)
Hasan Ferdi GERÇEL (Anadolu University, Turkey)

Zerrin AŞAN GREENACRE (Anadolu University, Turkey)
Emrah GÖKALTUN (Anadolu University, Turkey)
Serdar GÖNCÜ (Anadolu University, Turkey)
Ömer Nezih GEREK (Anadolu University, Turkey)
Ram GUPTA (Pittsburg State University, USA)
Cihan KALELİ (Anadolu University, Turkey)
Alpagut KARA (Anadolu University, Turkey)
Kateryna KAZHAN (National Aviation University, Ukraine)
Süleyman KAYTAKOĞLU (Anadolu University, Turkey)
Sabiha KOCA (Eskişehir Osmangazi University, Turkey)
Ali Savaş KOPARAL (Anadolu University, Turkey)
Dilek Funda KURTULUŞ (METU, Turkey)
Susumu NII (Nagoya University, Japan)
Andrea NOBILI (The University of Modena and Reggio Emilia, Italy)
Asiye Safa ÖZCAN (Anadolu University, Turkey)
Yunus ÖZDEMİR (Anadolu University, Turkey)
Kemal ÖZKAN (Eskişehir Osmangazi University, Turkey)
Danila PRIKAZCHIKOV (Keele University, UK)
Birdal ŞENOĞLU (Ankara University, Turkey)
Önder TURAN (Anadolu University, Turkey)

TYPESET

Handan YİĞİT

Ayça KIRAÇ

ABOUT

Anadolu University Journal of Science and Technology A - Applied Sciences and Engineering (AUJST-A) is an peer-reviewed and refereed international journal by Anadolu University. Since 2000, it has been regularly published and distributed biannually. Starting in 2016, it will be published quarterly and electronically only.

- **The journal accepts only ENGLISH language manuscripts.**
- **The journal is indexed by EBSCO, DOAJ and ULAKBIM (MTBVT).**

AIM AND SCOPE

AUJST-A publishes high quality original research papers in the field of engineering and applied science. Special Issues devoted to important topics in science and technology will occasionally be published. The journal publishes research papers in the fields of applied science and technology such as Physics, Biology, Mathematics, Statistics, Chemistry and Chemical Engineering, Environmental Sciences and Engineering, Civil Engineering, Earth and Atmospheric Sciences, Electrical and Electronical Engineering, Computer Science and Informatics, Materials Sciences and Engineering, Mechanical Engineering, Mining Engineering, Industrial Engineering, Aeronautics and Astronautics, Health Sciences, Pharmaceutical Sciences, and so on.

PEER REVIEW PROCESS

Manuscripts are first reviewed by the editorial board in terms of its journal's style rules scientific content, ethics and methodological approach. If found appropriate, the manuscript is then send to at least two renown referees by editor. The decision in line with the referees may be an acceptance, a rejection or an invitation to revise and resubmit. Confidential review reports from the referees will be kept in archive. All submission process manage through the online submission systems.

OPEN ACCESS POLICY

This journal provides immediate open access to its content on the principle that making research freely available to the public supports a greater global exchange of knowledge. Copyright notice and type of licence : **CC BY-NC-ND**.

The journal doesn't have Article Processing Charge (APC) or any submission charges.

AUTHOR GUIDELINES

All manuscripts must be submitted electronically.

You will be guided stepwise through the creation and uploading of the various files. There are no page charges. Papers are accepted for publication on the understanding that they have not been published and are not going to be considered for publication elsewhere. Authors should certify that neither the manuscript nor its main contents have already been published or submitted for publication in another journal. We ask a signed **Copyright Form** to start the evaluation process. After a manuscript has been submitted, it is not possible for authors to be added or removed or for the order of authors to be changed. If authors do so, their submission will be cancelled.

Manuscripts may be rejected without peer review by the editor-in-chief if they do not comply with the instructions to authors or if they are beyond the scope of the journal. After a manuscript has been accepted for publication, i.e. after referee-recommended revisions are complete, the author will not be permitted to make any changes that constitute departures from the manuscript that was accepted by the editor. Before publication, the galley proofs are always sent to the authors for corrections. Mistakes or omissions that occur due to some negligence on our part during final printing will be rectified in an errata section in a later issue.

This does not include those errors left uncorrected by the author in the galley proof. The use of someone else's ideas or words in their original form or slightly changed without a proper citation is considered plagiarism and will not be tolerated. Even if a citation is given, if quotation marks are not placed around words taken directly from another author's work, the author is still guilty of plagiarism. All manuscripts received are submitted to iThenticateR, a plagiarism checking system, which compares the content of the manuscript with a vast database of web pages and academic publications. Manuscripts judged to be plagiarised or self-plagiarised, based on the iThenticateR report or any other source of information, will not be considered for publication.

Preparation of Manuscript

Style and Format: Manuscripts should be **single column** by giving one-spaced with 2.5 cm margins on all sides of the page, in Times New Roman font (font size 11). Every page of the manuscript, including the title page, references, tables, etc., should be numbered. All copies of the manuscript should also have line numbers starting with 1 on each consecutive page. Manuscripts must be upload as word document (*.doc, *.docx vb.). Please avoid uploading *texts in *.pdf format.*

Manuscripts should be written in English.

Symbols, Units and Abbreviations: Standard abbreviations and units should be used; SI units are recommended. Abbreviations should be defined at first appearance, and their use in the title and abstract should be avoided. Generic names of chemicals should be used. Genus and species names should be typed in italic or, if this is not available, underlined.

Manuscript Content: Articles should be divided into logically ordered and numbered sections. Principal sections should be numbered consecutively with Arabic numerals (1. Introduction, 2. Formulation of problem, etc.) and subsections should be numbered 1.1., 1.2., etc. Do not number the Acknowledgements or References sections. The text of articles should be, if possible, divided into the following sections: Introduction, Materials and Methods (or Experimental), Results, Discussion, and Conclusion.

Title and contact information

The first page should contain the full title in sentence case (e.g., Hybrid feature selection for text classification), the full names (last names fully capitalised) and affiliations (in English) of all authors (Department, Faculty, University, City, Country, E-mail), and the contact e-mail address for the clearly identified corresponding author. The first page should contain only the full title, abstract and keywords (both English and Turkish).

Abstract

The abstract should provide clear information about the research and the results obtained, and should not exceed 300 words. The abstract should not contain citations and must be written in Times New Roman font with font size 9.

Keywords

Please provide 3 to 5 keywords which can be used for indexing purposes.

Introduction

The motivation or purpose of your research should appear in the “Introduction”, where you state the questions you sought to answer, and then provide some of the historical basis for those questions.

Methods

Provide sufficient information to allow someone to repeat your work. A clear description of your experimental design, sampling procedures, and statistical procedures is especially important in papers describing field studies, simulations, or experiments. If you list a product (e.g., animal food, analytical device), supply the name and location of the manufacturer. Give the model number for equipment used.

Results

Results should be stated concisely and without interpretation.

Discussion

Focus on the rigorously supported aspects of your study. Carefully differentiate the results of your study from data obtained from other sources. Interpret your results, relate them to the results of previous research, and discuss the implications of your results or interpretations.

Conclusion

This should state clearly the main conclusions of the research and give a clear explanation of their importance and relevance. Summary illustrations may be included.

Acknowledgments

Acknowledgments of people, grants, funds, etc. should be placed in a separate section before the reference list. The names of funding organizations should be written in full.

References

Citations in the text should be identified by numbers in square brackets. The list of references at the end of the paper should be given in order of their first appearance in the text. All authors

should be included in reference lists unless there are 10 or more, in which case only the first 10 should be given, followed by ‘et al.’. Do not use individual sets of square brackets for citation numbers that appear together, e.g., [2,3,5–9], not [2], [3], [5]–[9]. Do not include personal communications, unpublished data, websites, or other unpublished materials as references, although such material may be inserted (in parentheses) in the text. In the case of publications in languages other than English, the published English title should be provided if one exists, with an annotation such as “(article in Turkish with an abstract in English)”. If the publication was not published with an English title, cite the original title only; do not provide a self-translation. References should be formatted as follows (please note the punctuation and capitalisation):

Journal articles

Journal titles should be abbreviated according to ISI Web of Science abbreviations.

Guyon I, Elisseeff A. An introduction to variable and feature selection. *J Mach Learn Res* 2003; 3: 1157-1182.

Izadpanahi S, Ozcinar C, Anbarjafari G, Demirel H. Resolution enhancement of video sequences by using discrete wavelet transform and illumination compensation. *Turk J Elec Eng & Comp Sci* 2012; 20: 1268-1276.

Books

Haupt RL, Haupt SE. *Practical Genetic Algorithms*. 2nd ed. New York, NY, USA: Wiley, 2004.
Kennedy J, Eberhart R. *Swarm Intelligence*. San Diego, CA, USA: Academic Press, 2001.

Chapters in books

Poore JH, Lin L, Eschbach R, Bauer T. Automated statistical testing for embedded systems. In: Zander J, Schieferdecker I, Mosterman PJ, editors. *Model-Based Testing for Embedded Systems*. Boca Raton, FL, USA: CRC Press, 2012. pp. 111-146.

Conference proceedings

Li RTH, Chung SH. Digital boundary controller for single-phase grid-connected CSI. In: *IEEE 2008 Power Electronics Specialists Conference*; 15–19 June 2008; Rhodes, Greece. New York, NY, USA: IEEE. pp. 4562-4568.

Thesis

Boynukalın Z. Emotion analysis of Turkish texts by using machine learning methods. MSc, Middle East Technical University, Ankara, Turkey, 2012.

Tables and Figures

All illustrations (photographs, drawings, graphs, etc.), not including tables, must be labelled “Figure.” Figures must be submitted in the manuscript.

All tables and figures must have a caption and/or legend and be numbered (e.g., Table 1, Figure 2), unless there is only one table or figure, in which case it should be labelled “Table” or “Figure” with no numbering. Captions must be written in sentence case (e.g., Macroscopic appearance of the samples.). The font used in the figures should be Times New Roman. If symbols such as \times , μ , η , or ν are used, they should be added using the Symbols menu of Word. All tables and figures must be numbered consecutively as they are referred to in the text. Please refer to tables and figures with capitalisation and unabbreviated (e.g., “As shown in Figure 2...”, and not “Fig. 2” or “figure 2”).

The resolution of images should not be less than 118 pixels/cm when width is set to 16 cm. Images must be scanned at 1200 dpi resolution and submitted in jpeg or tiff format. Graphs and diagrams must be drawn with a line weight between 0.5 and 1 point. Graphs and diagrams with a line weight of less than 0.5 point or more than 1 point are not accepted. Scanned or photocopied graphs and diagrams are not accepted.

Figures that are charts, diagrams, or drawings must be submitted in a modifiable format, i.e. our graphics personnel should be able to modify them. Therefore, if the program with which the figure is drawn has a “save as” option, it must be saved as *.ai or *.pdf. If the “save as” option does not include these extensions, the figure must be copied and pasted into a blank Microsoft Word document as an editable object. It must not be pasted as an image file (tiff, jpeg, or eps) unless it is a photograph.

Tables and figures, including caption, title, column heads, and footnotes, must not exceed 16 × 20 cm and should be no smaller than 8 cm in width. For all tables, please use Word’s “Create Table” feature, with no tabbed text or tables created with spaces and drawn lines. Please do not duplicate information that is already presented in the figures.