ABSTRACT BOOK

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Editorial

This supplement issue of Applied Medical Informatics is dedicated to the 1st Conference of the Romanian Society of Medical Informatics (RSMI) RoMedINF dedicated to the entry levels researchers on digital health technical solutions. The jRoMedINF first edition is organized as a hybrid event by RSMI in association and hosted by the West University of Timişoara. "Victor Babeş" University of Medicine and Pharmacy and Politehnica University of Timişoara are also co-organizers.

Healthcare digital ecosystems represent a promising frontier in the pursuit of better health outcomes and enhanced healthcare delivery focus of precision medicine. By embracing hypotheses-driven research, leveraging innovative methods, and harnessing the potential of digital technologies, the landscape of healthcare face new possibilities, with expected more accessible, efficient, and patient-centric healthcare worldwide.

Digital ecosystems could reshape the landscape of disease preventions, patient care, medical research, and operational efficiency. The integration of digital technologies into healthcare systems need appropriate evaluation as per short and long term sustainability of the system. New hypotheses are born, innovative methods are applied and need validation, while impact of new technologies on healthcare outcomes and costs need validation.

Nowadays, digital health stands out as a frontier ripe with opportunities and challenges. As freshmen entering this dynamic multidisciplinary field, we feel that a dedicated scientific conference tailored to address the unique needs and aspirations of newcomers is needed. jRoMedINF event serves as an open-minded non-discriminating environment tailored to open-discussion and constructive debates for digital health solution and methods, a pivotal platform for ideas and knowledge exchange, skill development, and networking, aiming to catalyze the growth and innovation essential for advancing digital health.

jRoMedINF scientific conference provides an opportunity to interact with experts in healthcare innovation, ethics and its role in artificial intelligence, and opinion of what digital health done right means. The active attendees had the opportunity to present their ideas, hypothesis and results and to receive constructive feedback from the audience. The passive attendees had the opportunity to be in touch with the new researches in the digital healthcare and to interact actively with the researches in the field. Our conference serves as a catalyst for skill development and capacity building among aspiring digital health professionals. Moreover, jRoMedINF scientific conference fosters a vibrant ecosystem of collaboration and networking, essential for fostering interdisciplinary partnerships and driving collective progress. Attendees interact with peers, mentors, and experts, forging connections that transcend disciplinary boundaries and feed collaborative initiatives. The interactions facilitate knowledge sharing and inspire creativity, innovation, and the cross-pollination of ideas, laying the groundwork for future collaborations and breakthroughs.

The jRoMedINF scientific conference dedicated to freshmen in digital health is a strategic investment in the future of healthcare innovation. By providing a platform for ideas and knowledge exchange, skill development, and networking, this event empowers newcomers to navigate the complexities of the digital health landscape with confidence and purpose, driving forward a future where technology transforms healthcare for the better.

Sorana D. BOLBOACĂ, Prof. Dr. Habil., M.Sc., M.D.
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The Ethical Dimension of AI-Systems in Healthcare: On Globalizing its Scope

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Abstract
Artificial intelligence systems (AI-systems) are said to revolutionize healthcare. They are predicted to increase efficiency, free up time for more in-person care, lead to more accessible care, etc. However, these systems come with ethical reservations related to individuals' privacy, dignity, social bias, etc. And although there are many approaches to the ethics of ai-systems in healthcare, most overlook these systems' global impacts, such as their environmental and global social impacts. To meet this gap, I present some first steps to a global approach to the ethics of ai-systems in healthcare. In the first part of the presentation, I first describe some current and predicted uses of ai-systems in healthcare. Then, I shortly survey the most heavily discussed ethical issues related to these uses and present one particular common approach to meet these issues, the principlist approach. In the second part of the presentation, I argue that this common approach is unsuitable to meet the different environmental and the herewith related social impacts, such as increased health risks. Based on an interpretation of ai-systems as world-objects, which emphasizes the environmental and social materiality of ai-systems, I then present a global approach to the ethics of these systems which exists of five interrelated levels of ethical analysis and impacts: an individual-relational, organizational, societal, global, and historical level. The global approach to the ethics of ai-systems in healthcare complements current common ethical approaches, such as the principlist approach, by including ethical issues related to the environmental and social impacts, such as increased health risks, of ai-systems. Although there is already much ethical ground prepared to guide the use of ai-systems in healthcare, only by accounting for these systems' global environmental and social impacts these systems can be ethically responsive for everyone and everywhere.

Keywords*:* Artificial Intelligence (AI); Healthcare; Bioethics; Global Bioethics; Environmental Ethics

Digital Health Done Right

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Abstract

Once the digital environment started to rise, alongside with the patients and doctors needs, as well, the healthcare As the digital environment began to rise alongside the needs of patients and doctors, the healthcare landscape also needed to adapt accordingly. Digital products were increasingly embraced, with practices incorporating more digital solutions into treatment and monitoring processes. Simultaneously, efforts were made to help patients understand that, alongside traditional medical care, effectively utilizing technology will enhance outcomes and improve care on a larger scale. To provide excellent solutions for patients, the digital health system must adhere to rules designed to ensure that it does not cause more harm than good. Interoperability, data security, user-centered design, and remote continuous monitoring are just a few principles underpinning digital health. Digital health should be a collaborative work between the users (administrative, technology, clinical staff, patients, etc.) involved as providers and beneficiaries. Understanding the "voice" of the primary beneficiaries - the patients- leads to a personalized system that focuses on how the patient can receive the best care and how the patient will feel safer. Digital health done right is not just about the elements that are at the base of it. Still, it is about the entire medical act in which it is integrated, succeeding in transmitting safety, respect, easy access to care, involvement, support, and engagement.

Keywords: Digital Health; User-centered Design; User Research; Remote Care; Patient Monitoring

Digital Literacy among Doctors in Chişinău, Moldova. A pathway to Tailored Educational Programs

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Abstract
Background: As healthcare increasingly integrates digital technologies, it is crucial to ensure that medical professionals possess robust digital competencies to maximize the benefits of these technologies. Mastering fundamental digital skills is essential before engaging with more complex digital health technologies. *Aim*: This study aims to assess the general digital competencies of doctors in Chişinău, Moldova, and to identify specific areas needing improvement, thereby providing a foundation for tailored educational programs. *Materials and Methods*: In April 2024, data were collected using the My DigiSkills tool, a self-assessment online questionnaire developed under the European Commission's DigCompSAT project by ALL DIGITAL. This cross-sectional study involved 91 doctors from various medical institutions in Chişinău, who self-assessed their digital competence levels across five areas: Information and Data Literacy, Communication and Collaboration, Digital Content Creation, Safety, and Problem Solving. *Results*: Results indicate that while doctors in Chişinău generally possess a medium level of digital competencies, significant gaps are evident in some of the 21 individual digital competences. Notable demographic differences in age and gender suggest varying levels of digital literacy. *Conclusions*: The findings underscore the need for targeted digital skills training. Training programs should be designed to meet the diverse needs identified through self-assessment, ensuring equitable access to professional development opportunities that enhance digital proficiency and improve overall healthcare quality.

Keywords: Digital Literacy; Healthcare Education; Digital Safety; Medical Professionals; Digital Competence; Digital Training

Enhancing the Performance of Cervical Cancer Screening using the Item-Item Collaborative Filtering

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Abstract
Collaborative filtering algorithms hold significant promise in the field of cervical cancer screening. This study investigates the application of item-item collaborative filtering approach to enhance the performance of identifying benign metaplastic, abnormal koilocytosis, and abnormal dyskeratotic cervical cells. The state-of-the-art in cervical cancer screening primarily relies on cytology testing, facing challenges of sensitivity and specificity, leading to false positives and negatives. By leveraging collaborative filtering techniques, this research aims to address these limitations and improve screening outcomes. This study is a retrospective study that was conducted by using the publicly available datasets of cervical cell samples collected from multiple healthcare institutions. The study employed a cross-sectional design and machine learning methodologies for data preprocessing and feature extraction. The item-item collaborative filtering approach was trained on a dataset of annotated cervical cell images by cytologists, with validation performed using a separate number of datasets to assess performance metrics. The results demonstrate the effectiveness of collaborative filtering in accurately identifying specific cervical cell abnormalities, achieving a sensitivity of 90.7%, specificity of 84.3%, and an ROC-AUC of almost 92%. These findings highlight the potential of collaborative filtering as a valuable tool in augmenting early detection and reducing false results in cervical cancer screening programs. Further validation studies and integration into existing screening protocols are recommended to offer the clinical adoption of the proposed approach.

Keywords: Item-Item Collaborative Filtering; Cervical Cancer; Screening; Cervical Cell Abnormalities

Creating Medical Datasets using Robot Process Automation

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Abstract
A dataset is a collection of information, usually structured in a format that can be used in research or training various applications such as machine learning. Datasets are fundamental to many analytical processes because they provide raw data that can be used in different applications. While some datasets are readily available, others must be specially curated. Creating a dataset often involves automated data collection methods, with web scraping being a popular technique. Web scraping employs scripts to extract data from online sources, demanding robust programming skills and considerable maintenance effort. It is important to note that the method can break site policies because it may violate terms of service agreements. A proposed solution for gathering the required information is to create a Robot Process Automation (RPA) flow, which collects information from various sources as a normal user would do manually. A use case of RPA flow involves using it to compile a medical dataset that contains information about clinical trials for various drugs. The dataset will be utilized in researching the effects of placebo drugs on people. The information is available on the clinicaltrails.gov site and the results of different trials can be downloaded manually as files. Automating this process can be done by creating a flow in UiPath by linking predefined activity blocks, which simplifies the creation and maintenance of the workflow. Running the flow will follow the steps that a normal user would do for downloading the results of different trials from the site. This approach eases data collection, allowing medical staff to generate datasets, without the need for deep technical skills, that can be used in different investigations. In conclusion, an RPA flow is a straightforward way to gather information for a dataset, circumventing the complexities of traditional programming-based approaches like web scraping.

Keywords: Datasets; Robot Process Automation; UiPath; Data Collection; Data Extraction

Convolutional Neural Network for Skin Cancer Risk Assessment through Skin Lesion Analysis

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Abstract
Mobile technology and artificial intelligence are opening new avenues for improving public health, particularly in the field of dermatology. This work presents the concept of a mobile application designed to assist in detecting potentially cancerous moles, with the aim of promoting early detection of skin cancer and reducing the burden on healthcare systems. Skin cancer is a growing public health issue worldwide, and in Romania, despite a relatively low incidence of melanoma, there are some of the highest mortality rates associated with this disease. This paradox highlights the need for effective methods for early diagnosis and rapid intervention. The proposed research investigation uses a Convolutional Neural Network (CNN) to classify images of moles based on their risk for skin cancer. Users can capture a photograph of the suspect mole, which the application then processes using a specialized CNN model. The model is trained with labeled datasets by expert dermatologists, using the HAM10000 dataset, which contains over 10,000 dermoscopic images of pigmented lesions. The application provides a preliminary classification into seven categories, indicating whether the mole is benign or malignant, with a target accuracy of at least 93%, aligning with other similar studies. This initiative can promote awareness and early detection of skin cancer, offering a preliminary screening tool that is easy for the use of general public.

Keywords: Convolutional Neural Network; Public health; Skin cancer

MindHealth – Application for Monitoring Mental Health and Detecting Depression

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Abstract
Depression is a prevalent mental illness affecting millions worldwide, often leading to significant morbidity and mortality. Increasing in recent decades, more and more people are affected by this pathology, which manifests itself from adolescence. At the same time, it is the cause of death of over 850,000 people every year. The studies carried out have proven that it is much better to prevent than to treat or, to start treating at an early stage of the pathology. In this sense, the progression of the pathology is greatly hindered. A good solution for preventing depression is to detect it before it starts or treat it at the time of its onset. But, most of the time, people do not know when to act at the right time or there is something stronger in them that prevents them from acting, this determines the evolution of depression. This study proposes a solution for monitoring mental health and detecting depression using wearable technology. These devices can track various metrics, including daily activity, sleep quality, heart activity and anxiety levels, which are very important in the process of monitoring mental health and have great significance in the process of detecting depression. Following the implementation of the solution, on a publicly available dataset, depression can be detected with 98% accuracy using artificial intelligence and provides a multi-level psyche monitoring. In conclusion, the specified solution brings a benefit in terms of monitoring the psyche, this is achieved through the daily evaluation of the well-being, but also through the monitoring of the physical parameters. At the same time, the proposed solution allows checking the existence of depression pathology, taking into account different essential parameters.

Keywords: Monitoring; Depression; Mental health; Wearable sensors

Fast Retinopathy Detection and Classification of Retinas into Healthy and Pathological using the Technique of Spatial Transformation

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Abstract
Diabetic retinopathy (DR) is a diabetic complication that affects the retina of the eye. Due to the accumulation of sugar in the blood, the blood vessels in the retina can bleed. This condition requires proper monitoring and treatment to prevent vision loss. Using the Spatial Transformer Network (STN) method connected to a convolutional neural network (CNN), retinal images are correctly aligned to accurately identify and diagnose lesions associated with this condition. The STN can learn to refocus the images to find the relevant areas that indicate the occurrence of microaneurysms, hemorrhages or exudates. This refocusing is achieved through spatial transformations, and the STN contributes to improved accuracy and efficiency in finding lesions. We used a public dataset which contains samples of fundus images of both the healthy eye and the eye with DR. In this study, we verify which neural architecture is the most performing and efficient, using performance evaluation metrics and execution times. The proposed technique, Trans-NeuroVision Area (TNVA), helps in the prompt detection and categorization of retinas into healthy and problem ones.

Keywords: Diabetic retinopathy; Image processing; Spatial Transformer Network; Interest zones; Convolutional neural network

A Novel Approach for Automatic Oral Disease Detection Trough the Help of Artificial Intelligence

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Abstract
This paper aims to provide a new model that can be used within the field of computer assisted medical imagistics. The main focus will be on artificial intelligence (AI) in concordance with oral diseases and how domain specialized as well as normal oral cavity pictures can further help doctors automatically determine patients prospects and premeditate dangerous diseases. Traditional diagnostic approaches often pose challenges in terms of accessibility, cost, and time, hindering timely intervention and exacerbating the impact of oral health issues. The introduction of AI into the medical field not only addresses these shortcomings but also opens up new avenues for enhanced precision and objectivity in diagnostics. By leveraging machine learning algorithms and pattern recognition, AI has the potential to revolutionize the accuracy and efficiency of disease detection, providing a valuable tool for healthcare professionals.
Two of the main problems that can be subtracted from our daily lives is the lack of care for oral health from patients as well as the unavailability of good services. This can be both fixed by providing a remote way of being diagnosed automatically. Most of the already proposed approaches are based on multiple types of pre-trained Convolutional Neural Networks models like VGG16, GoogLeNet Inception v3, DenseNet121, ResNet50, DarkNet53, etc., as well as the provision of labeled datasets. The datasets being used contain either clinically taken images like x-ray, radiographs, hyperspectral images or normal images that can be taken with any kind of camera, that had been labeled by medical specialists of the given domain. The main problem described within the paper will be that of Tonsil stones. Due to the common affected area of the oral cavity we will propose multiple multi-label classification models as well as describe the way we managed to collect data for training. As for the model we are currently experimenting with various pretrained models as well as attempting to build one from scratch. The dataset use for training currently contains 329 publicly available photos of the oral cavity that were labeled with the help of students from Victor Babeş University of Medicine. We expect to further enhance this number by applying GAAN and other data augmentation techniques. In the end we expect to have a model with accuracy greater than 90% that can detect tonsil stones, pharyngitis, tonsillitis and gastric reflux and have a demo of its functionality by hosting the model online and providing a mobile application for testing.

Keywords: Oral diseases; Convolutional Neural Networks; Tonsil Stones; Data Augmentation

A Comprehensive Medical Hospital Management System Software Solution for Business Optimization

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Abstract
The efficient management of hospital operations is a critical aspect of providing quality patient care while maintaining financial sustainability. This work introduces novel Medical Hospital Management System (HMS) software, specifically designed to cater to the unique needs of hospitals and healthcare businesses. The software offers a wide range of features, including patient registration, appointment scheduling, electronic medical records, billing and invoicing, inventory management, and analytics and reporting. By automating and streamlining these processes, the Medical HMS software aims to improve operational efficiency, reduce errors, and enhance patient satisfaction. Our work describes the software's architecture, features, and benefits, drawing on real-world examples and case studies to demonstrate its effectiveness. The results show that the Medical HMS software significantly reduces administrative overhead, improves patient flow, and increases revenue for hospitals and healthcare businesses. The paper concludes with a discussion of the software's potential impact on the healthcare industry and its future development directions.

Keywords: Hospital Management Software (HMS); Electronic Health Records (EHRs); Patient Registration; Integrated EHRs

Gold and Silver-Decorated Conducting Polymer Coatings with Electroactive, Biocompatible, and Antibacterial Characteristics

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Abstract
The formation of multifunctional materials that demonstrate electrochemical capabilities, possess antibacterial attributes, and support cell adhesion stems from ongoing advancements in electrotherapy technologies. A significant challenge lies in formulating a material that can effectively counteract bacterial proliferation without adversely affecting mammalian cells. This study focused on modifying the surface of the conducting polymer, poly(3,4-ethylenedioxythiophene) (PEDOT), by integrating gold and silver particles. The modified PEDOT-Au/Ag surface displayed pronounced selective toxicity against E. coli while preserving its biocompatibility with normal human dermal fibroblasts. The physical characteristics of the PEDOT-Au/Ag surface, including its roughness and wettability, facilitated cell adhesion, while the inclusion of silver particles and the uneven surface contributed to its antibacterial properties. The cytotoxic potential of silver was mitigated through the incorporation of gold particles on the PEDOT surface. Consequently, PEDOT-Au/Ag surface has been identified as an advantageous candidate for enhancing electrotherapeutic applications due to its exceptional biological properties and electroactivity.

Keywords: Conducting polymers; Biocompatibility; Antibacterial properties

Completeness and Accuracy of Artificial Intelligence Chatbot Responses on Cardiovascular and Oncological Disease Information

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Abstract
Background and Aim: AI-powered chatbots are expected to revolutionize patients' access to health information but their ability to provide comprehensive and scientifically accurate answers is insufficiently known. The study aimed to assess the completeness and accuracy of information regarding two cardiovascular and two oncological diseases of high interest to health information seekers. *Materials and Methods:* The completeness and accuracy of the information about acute myocardial infarction, peripheral artery disease, colorectal and gastric cancer provided by three AI chatbots (ChatGPT–Open AI, Gemini–Google, Llama–Meta) were evaluated against an evidence-based information quality benchmark on a scale ranging from 0 to 10. Chatbot prompting followed two basic scenarios, plausible for most users: (A) a single broad-scoped question; (B) a series of focused questions covering basic information about disease definition, causes, risk factors, symptoms, treatment and prevention. Responses were rated against evidence-based, disease-specific quality benchmarks following a predefined procedure. Data were collected between October 2023 and May 2024. Overall and chatbot-specific mean completeness, and accuracy scores were calculated. *Results:* Scenario A yielded an overall completeness score of 5.4, while bot-specific scores were 6.3 for ChatGPT, 5.1 for Gemini, and 5.0 for Llama. The overall accuracy score was 6.6, and bot-specific scores were 7.0 for ChatGPT, 6.1 for Gemini, and 6.5 for Llama. Scenario B showed an overall accuracy score of 8.1 with the following bot-specific accuracy scores: ChatGPT 8.6, Gemini 8.2, and Llama 7.6. The completeness score was not applicable within the second scenario. *Conclusions:* The overall completeness of the information provided by the three studied AI-powered chatbots about the four investigated diseases was moderate. The overall accuracy scores were high in case of the first scenario and very high in the second one. ChatGPT performed slightly better than the other two bots on both quality measures.

Keywords: Consumer Health Informatics; Internet Use; Data Accuracy; Artificial Intelligence; Disinformation

Inhalation Injuries in Burns

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Abstract
Introduction: Severe burns affect multiple organ systems, triggering catabolic reactions in the body. Advances in burn care and antimicrobial therapies improve survival rates, but inhalation injuries significantly reduce survival rates, accounting for up to 90% of burn-related mortality, although present in only 1/3 of patients. These findings underscore the need for a standardized approach in diagnosis and treatment. *Research Aim*: Retrospective analysis of burn cases involving respiratory tract involvement and highlighting current methods of diagnosis and treatment. *Materials and Methods*: Our study represents a retrospective one conducted on a cohort of 93 patients diagnosed clinically with respiratory tract burns, hospitalized between 2020 and 2022 at the IMSP Traumatology and Orthopedics Clinical Hospital, with an average age of 47.32 years. Demographic, clinical, and outcome data were collected and analyzed in detail. *Results*: The study revealed a predominance of patients aged 41-60 years, with the majority being males (75.9%). Common mechanisms of burn injury included gas cylinder explosion (23.7%) and fires (22.6%). Severe burns (86.1% grade 3) were frequent, with large affected areas (46.2% >50%). Clinical manifestations included cutaneous lesions and respiratory symptoms. Diagnosis primarily involved clinical examination and chest radiography (92.5%). Treatment involved complex procedures and life support, with a favorable recovery rate of 91.4%. *Conclusions*: Burns in the facial, head, and neck regions present a high risk of respiratory tract involvement. Clinical diagnosis and chest radiography remain the predominantly used evaluation methods, although bronchoscopy may be underutilized. Treatment involves complex life support strategies, highlighting the importance of a multidisciplinary approach in managing these cases.

Keywords: Severe burns; Inhalation injuries; Clinical diagnosis; Life-saving treatment; Survival

Intensive Therapy in Combustion

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Abstract

Introduction: Thermal burns are skin injuries caused by excessive heat, typically from contact with hot surfaces, hot liquids, steam or flame. Most burns are minor and can be treated as outpatients or at local hospitals. About 6.5% of all burn patients receive treatment in specialized burn centers. Decision to transfer and treat in centres for burns is based on the extent of the burned body surface, the depth of the burns and individual patient characteristics such as age, other injuries or other problems medical. *Research Aim*: Conducting a comprehensive research with the description of the etiopathogenesis, clinical diagnosis, infusion therapy, and antibiotic therapy in the management of the patient in burn injury. *Materials and Methods:* To achieve the objectives, a retrospective study was conducted based on the medical records of patients hospitalized and treated in the period from January 1, 2022, to December 31, 2022, in the Traumatology and Orthopedics Department of the Clinical Hospital in Chișinău, with the diagnosis of burns. *Results*: The research showed a predominance among men (59.15%). The burning mechanism is mostly fire (68.85%), with upper (64.6%) and lower (62.83%) limb localization. Patients most often receive 1 to 10 plasma infusions for healing (48.67%). Cefuroxime and ceftriaxone are used for antibiotic therapy (both 38.9%). 78% of the total number of patients survive. *Conclusions*: Burns have both a medical and social negative impact that needs to be addressed through intensive care. Treatment results in the studied patients showed that 78% of them survive, which is a good outcome for such a serious disease.

Keywords: Burns; Intensive care; Treatment; Plasma

Selection and Use of Online Learning Resources by Medical Students – Study Protocol

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Abstract

Background and Aim: Online learning resources have become increasingly used in medical education as they have experienced rapid development in recent years. With the increase of digital platforms, medical students now have access to an extensive array of educational materials, so it becomes necessary to understand how medical students navigate, select, and use these digital tools, to be able to develop new online learning methods or to improve the existing ones. This study will aim to determine the preferences and criteria used by medical students in selecting and using online learning resources, as well as the impact of these e-learning resources on their academic performance. *Material and Methods:* The study will be cross-sectional, where eligible participants will be medical students from the Romanian study section, ranging from the first to the sixth year of study, enrolled in one of any medical universities in Romania. Students who are studying medicine in English or French language, or those who are studying another specialty, will not be included. We will invite participants to take part in the study by distributing an anonymous online questionnaire through social media platforms. The questions will address what types of online learning resources students access, their selection criteria, as well as their perceptions of the usefulness and reliability of different types of resources. *Discussion:* The findings will provide a deeper understanding of how medical students select and use online learning resources. The results could be used to enhance medical education programs or to develop online learning resources according to the needs and preferences of the students.

Keywords: Online learning resources; Medical education; Medical students; Educational materials; E-learning

Age-Related Macular Degeneration: Therapeutic Strategies and Future Approaches

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Abstract
Age-related macular degeneration (AMD) is a chronic and progressive retinal degenerative disease of the macula that affects the elderly and causes impairment of central vision. AMD is a multifactorial disease that encompasses a complex interplay between aging, environmental risk factors, and genetic susceptibility. Chronic inflammation, lipid deposition, oxidative stress, and impaired extracellular matrix maintenance are strongly implicated in the pathogenesis of AMD. Advanced AMD can be classified into two types: dry and wet. Although dry AMD accounts for the majority of diagnosed cases, wet AMD is responsible for the majority of severe vision loss and usually occurs within weeks or months. Although neovascularization was the most common cause of severe vision loss, geographic atrophy, the most advanced form of dry AMD, can also cause significant vision loss. The medical treatment of neovascular AMD has seen significant progress due to the introduction of vascular endothelial growth factor (anti-VEGF) inhibitors, which have dramatically changed the prognosis of the disease. Research does not prove the need to change treatment methods in every patient, there may be occasions when patients with AMD show a more robust response to one anti-VEGF agent than another. Clinicians may consider alternatives to switching, such as increasing injection frequency, when managing a patient who appears to be unresponsive to therapy. In this regard, it may be helpful to have a patient return for evaluation 1 to 2 weeks after injection with repeat testing to assess whether there has been a reduction in subretinal fluid or retinal edema shortly after anti-VEGF injection.

Keywords: Age-related Macular Degeneration (AMD); Neovascular AMD; Neovascularization; Vascular endothelial growth factor (VEGF); Anti-VEGF

Effectiveness of Virtual Reality Mindfulness Intervention for Students with Symptoms of Depression

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Abstract

Background and Aim: Mindfulness-based cognitive-behavioral therapy (MBCBT) proved efficacy in addressing mental health psychopathology. Concurrently, virtual reality (VR) technology offer interactive and immersive environments that simulate real-life experiences. In this study, we compared mindfulness interventions delivered in VR and online on students with symptoms of depression, examining clinical efficacy and mindfulness awareness levels. *Materials and Methods*: We are conducting a prospective experimental analytical study targeting students enrolled in undergraduate, master's, or doctoral programs. Students enrolled at nursing program at Iuliu Haţieganu University of Medicine and Pharmacy Cluj-Napoca, or at the Faculty of Psychology and Educational Sciences of Babeş-Bolyai University Cluj-Napoca were invited (online via social media or by teaching staff) to participate. The study is conducted from January to June 2024. Participants were randomly assigned to the MBCBT intervention in VR group or the online psychotherapeutic intervention group. We assessed depressive symptoms and mindfulness awareness pre- and post-intervention using the Beck Depression Inventory version II (BDI-II) and the Mindful Attention Awareness Scale (MAAS). Refusal to participate, withdrawal of consent, and absence of depression symptoms were the main exclusion criteria. *Results:* To date, 43 eligible participants have been randomized into intervention groups, with nine undergoing VR intervention, seven undergoing online intervention, and the rest awaiting intervention. The average age of participants is 26.9 years, with a majority from urban areas, predominantly unmarried, and students enrolled at the Iuliu Haţieganu University of Medicine and Pharmacy. VR intervention has shown a greater impact on depression symptoms, with a 17.9% lower average BDI score compared to online intervention. Participants in the VR group also demonstrated a higher mindfulness awareness, with a 10.63% higher average MASS score, compared to the online intervention group. *Conclusion:* To date, VR mindfulness psychotherapeutic intervention appears superior to online delivery; however, further validation on a larger sample is warranted.

Keywords: Mindfulness-based cognitive-behavioral therapy (MBCBT)*;*Virtual reality (VR)*;* Depression symptoms*;* Psychotherapeutic intervention

Overview on Open-Source Multimodal Deep Learning Methods used For Lung Cancer Survival Prognosis

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Abstract

Background and Aim: The recent surge in data availability from various life science domains and the latest development of deep learning algorithms allow the use of these heterogeneous data combined. These multimodal data are an enabler of cancer research whereby the character of data heterogeneity would allow a better performance of multimodal deep learning algorithms. An application of this analysis is targeted to lung cancer survival prediction. *Materials and Methods*: The latest literature exposes multimodal deep learning solutions as the next step in integrating and analyzing heterogeneous data. This article provides an overview on existing open-source deep learning algorithms applied on multimodal datasets for lung cancers survival prediction. The study was done on PubMed Central and comprised 53 articles. *Results*: From the selected articles we remark a great diversity of datasets types ranging from image types to omic data and very different algorithmic architectures. *Conclusions*: Major steps are marked for multimodal deep learning and it is still necessary future work to exploit its full potential.

Keywords: Multimodal; Deep learning; Lung cancer; Open-source GitHub

Assessment of Preoperative and Postoperative Anxiety using Specific Scales and the Role of Cognitive Restructuring Therapy and Relaxation Exercises to Reduce Anxiety

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Abstract
Introduction: Most patients are anxious in the preoperative period, being a natural reaction to predictable and potentially threatening situations. A growing number of studies have indicated that preoperative anxiety can be associated with increased and worse perioperative outcomes, including impaired wound healing, nausea, vomiting, postoperative pain, etc. *Material and Method:* The study group includes a number of 65 patients treated at the level of the Surgery II SCJU BH department, where a surgical intervention was performed. We divided the patients into 2 groups, 37 non-oncological patients, 28 oncological patients. We evaluated preoperative anxiety in patients. We used 3 scales APAIS, ASSQ, Questionnaire for evaluating the quality of life of patients in the preoperative and postoperative period VMM, through which the patient's anxiety level can be evaluated, which can be related to both the procedure and the anesthesia. In the group of patients with preoperative anxiety, we used the "step" interventions entitled: cognitive restructuring. At the end of this "step" I also taught a relaxation/ distraction exercise (to imagine themselves in their favorite place and to focus on the aspects of that place). *Results:* In the preoperative period, the anxiety level of patients, related to anesthesia and surgical intervention, is high, and in the postoperative period, related to recovery and the fear of complications. Patients also communicate various concerns related to the hospital, procedures, complications, family, job. In the patients with high levels of anxiety in the preoperative period, we performed cognitive restructuring and relaxation interventions, and the level of anxiety decreased in the postoperative period. *Conclusion:* Anxiety in the preoperative and postoperative period can be reduced by using some evaluation scales and by providing specific interventions, such as restructuring cognitive and relaxation techniques, which allow a good postoperative recovery.

Keywords: Anxiety; Preoperative; Postoperative; Cognitive restructuring; Relaxation techniques

The Impact of Digitization of Intensive Care Services on Patient Safety in the Pius Brânzeu Emergency County Hospital in Timişoara

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Abstract
This thorough analysis explains the various effects of using digital technology for anesthesia and intensive care services at Pius Brânzeu (P.B.) Emergency County Hospital, emphasizing how it improves patient safety. Digital technology in healthcare, especially in critical and changing areas like anesthesia and intensive care, has both positive and negative aspects. The digitization initiative seeks to improve patient monitoring accuracy by using cutting-edge technologies such as EEG, BIS, and cardiovascular output measurements, which are essential for patient care during surgery. By allowing instant, centralized data integration, these systems increase the accuracy of monitoring and enable prompt clinical decisions, thereby potentially lowering the risk of critical incidents that traditionally occurred due to late or missed identifications of physiological abnormalities. However, the transition to electronic health records (EHRs) and digital monitoring tools introduces new challenges, primarily concerning data management, system reliability, and user interaction with complex interfaces. Concerns about the human factors integration of computerized physician order entry (CPOE) systems exemplify potential setbacks, including the risk of increased medication errors and the failure of technology during critical use. Studies have shown that digital health technology can lead to significant improvements in patient safety and outcomes. For example, a study published in the *Journal of the American Medical Association* found that EHRs were associated with a 17% reduction in medication errors. Another study, published in the *Journal of Clinical Anesthesia*, found that CPOE was associated with a 50% reduction in anesthesia-related errors. Furthermore, this move towards digital solutions poses serious security and privacy challenges. The danger of data access and breaches by unauthorized parties could threaten patient confidentiality and safety, requiring strong cybersecurity policies. Moreover, the effective use of digital technologies relies greatly on extensive training programs for healthcare professionals to ensure competence and reduce risks related to new system interfaces. The hospital's method also involves thorough system checks and partnerships between IT and healthcare teams to ensure successful execution and flexibility to the evolving technological environment. These tactics aim to protect patient data accuracy and maintain the standard of clinical care. In the end, while the digital transformation of anesthesia and intensive care offers great potential for improving patient safety and care quality, it demands careful attention to possible risks, user education, and constant system assessment to achieve its full benefits and ensure lasting enhancements in patient outcomes.

Keywords: Digital health; Electronic health records (EHRs); Patient safety

LabTracker: Navigating Laboratory Test Results with Ease and Understanding

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Abstract
Laboratory test results can be challenging to interpret, which is a big problem for the great majority of the population. In the usual laboratory tests, the patient can find abbreviations of tests performed and a lot of medical terms that are hard to understand. The proposed system's objective is to help patients understand laboratory test results and keep track of their health. To achieve this, we developed an application that can scan a laboratory test result using a pre-trained Convolutional Neural Network-based Optical Character Recognition tool (OCR) in order to extract the data. The application translates the abbreviations of each test performed and stores the processed data locally. The application also provides explanations for each test's normal range, making it easier for patients to understand their results. Additionally, the application's data visualization feature enables patients to track their progress over time and make informed decisions regarding their health. With the ability to share results with healthcare providers, patients can receive professional medical advice and treatment based on their test results. The application's adaptability is a key strength. It can effectively handle different types of laboratory tests from various medical institutions, regardless of the analysis methods used. This ensures a comprehensive and reliable health-tracking experience for the user.

Keywords: Laboratory tests results; Abbreviations and medical terms; Data visualization; Optical Character Recognition (OCR)

AidLink

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Abstract
Background and Aim: First minutes of a medical emergency are the most crucial ones, and the first aid must be given as soon as possible. Identifying this issue, we aimed to develop a mobile app that connects all individuals who have first aid knowledge and notifies them if there is a nearby emergency. *Methods:* The development of the system took over eight months. Within this time, we developed the app and started working in collaboration with OncoGen Institute to receive expert medical advice related to our app's first aid guide but also providing valuable advice regarding the app features. *Results:* Until this moment, the app can notify nearby certified first aid responses if there is an incident nearby, providing details about it. Furthermore, the app displays a map of all defibrillators in Romania and has an integrated interactive first aid guide for revisioning the steps if necessary. For identifying incidents, we are looking forward collaborating with Romanian Special Telecommunication Service to receive all on-street emergencies. *Conclusion:* Initial feedback has been a positive one, suggesting that AidLink will have a significant impact on society, reducing the time a victim receives first aid.

Keywords: Emergency; First-aid; App; Society

Optimizing the Specifications of a Fall Detection System

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Abstract
This study aims to optimize the parameters of an IoT-based automatic fall detection system, specially adapted for the ongoing NeuroPredict core project. Given the increasing global aging population, falls among seniors have become a significant public health issue due to their high incidence rates and consequential impacts. Conventional fall detection systems often use environmental sensors and computer vision techniques, but these approaches have inherent drawbacks like privacy concerns and user discomfort, hindering their widespread adoption and acceptance. The study employed the Gait Band, a device with an accelerometer positioned around the waist. Accelerometer data were collected during various activities, including simulated falls, walking, jumping, and sitting on a chair. A comparative analysis was performed using two methodologies: the threshold method and machine learning (ML) algorithms. The ML algorithms used were Support Vector Machines (SVM) and k-Nearest Neighbors (KNN). The threshold method utilized an empirical approach to select parameter values. This comparison aimed to assess each approach's effectiveness in terms of sensitivity and specificity for fall detection. The ML algorithms demonstrated sensitivities ranging from 90.0% to 95.0% and specificities between 94.0% and 97.0%, highlighting their nuanced capabilities in identifying falls accurately. In contrast, threshold-based approaches generally showed lower precision and adaptability compared to ML models, resulting in less accurate outcomes. The SVM algorithm demonstrated slightly higher sensitivity and specificity values compared to the KNN algorithm, suggesting better overall performance in distinguishing between positive and negative cases. In addition to evaluating sensitivity and specificity, the choice between ML algorithms and threshold-based approaches in fall detection systems should also account for factors like computational complexity and real-time classification speed. This research highlights the importance of assessing various performance metrics and practical application considerations to optimize the deployment of ML algorithms versus threshold-based criteria in real-world settings for effective fall detection.

Keywords*:* Fall detection; Internet of Things (IoT); Machine Learning (ML); Elderly care

Cyberbullying Experienced by University Students: A Study Protocol

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Abstract
Background: Bullying first appeared in scientific literature in 1897[1] and according to APA Dictionary of Psychology it is "persistent threatening and aggressive physical behavior or verbal abuse directed toward other people, especially those who are younger, smaller, weaker, or in some other situation of relative disadvantage"[2]. The internet and digital technology advancements have not only entrenched but also metamorphosed this phenomenon into a new form of manifestation known as cyberbullying[3], defined as "verbally threatening or harassing behavior conducted through such electronic technology as cell phones, e-mail, and text messaging"[2]. Young people perceive differently cyberbullying in different cultures and environments and its repercussions include a spectrum of psychological distress, from anxiety to suicidal ideation[4]. *The aim of the study* encompasses a tripartite nature. In the primary instance, it investigates the overarching effects of cyberbullying on the psychological well-being of college students. As a secondary point, the dissimilarities pertaining to gender, age, socio-economic background, and educational affiliations are examined. Furthermore, it focuses on the extent to which the students exhibit diminished levels of concentration and reduced focus on their academic achievements. *Methods*: This population-based cross-sectional study will include respondents aged 18 or above regardless of sex or gender, with diverse socioeconomic statuses, and enrolled in Romanian universities. The instruments that will be used consist of self-administered online surveys, comprising a sociodemographic questionnaire, also assessing the academic level, a cyberbullying questionnaire survey, simultaneously evaluating patterns of internet utilization, and the 21-item Depression Anxiety Stress Scale (DASS-21). *Discussion*: The study delves into the intricacies surrounding cyberbullying and its potential multifaceted repercussions within college students. Given the dynamic evolution of digital communication and its profound influence on interpersonal dynamics, the study's significance resides in the promise of the findings to shed light on the challenges posed by this contemporary manifestation of aggression.

Keywords: Cyberbullying; Undergraduate students; Survey; Study protocol

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An Assessment of Online Information Quality about Gastrointestinal Cancers

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Abstract
Background and Aim: Gastric cancer is an important malignancy worldwide due to high lethality, and it accounted for 20% of all cancers in 2017. Because the internet is increasingly used for health information, it is necessary to have tools that establish the quality of medical-related sites. Much of the information found on the Internet is non-compliant, posing a danger to patients and putting their lives at risk. The study aimed to evaluate the quality of the information about the treatment of gastric, hepatic, pancreatic, and colorectal cancer using the Brief Discern instrument and to test if the Brief Discern scores correlated with the websites' credibility, completeness, and accuracy. *Materials and Methods*: This study included the first 25 websites listed on Google for each cancer, employing the most common search terms. Web sources were assessed using the Brief Discern, a six-question tool derived from the DISCERN instrument, which was developed to help patients to assess the quality of written information concerning treatment. Brief DISCERN scores can range from 5 for the poorest websites to 30. Credibility, completeness, and accuracy of information were graded on a scale from 0 to 10. *Results*: The mean Brief DISCERN score of the study sample was 19.0 (SD=5.7). The subsamples had the following mean Brief DISCERN scores: gastric cancer 21.7 (SD=5.0); colorectal cancer 16.4 (SD=6.4); hepatic cancer 18.7 (SD=5.4), and pancreatic cancer 19.0 (SD=5.0). The Kruskal-Wallis test showed a statistically significant difference (p=0.0137). The Brief DISCERN scores were correlated with the credibility (rho=0.3059, p=0.002) and completeness scores (rho=0.3952, p<0.0001), but not with the accuracy scores (rho=0.1009, p=0.3180). *Conclusions*: The Brief DISCERN evaluation suggested an intermediate level of information quality. Statistically significant differences were observed between subsamples, gastric cancer having the highest score. Finally, the Brief DISCERN scores were weakly correlated with credibility and completeness.

Keywords: Gastrointestinal neoplasms; Consumer health informatics; Internet use; Data accuracy

Brain-Computer Interface Control System for People with Disabilities

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Abstract
Continuous evolution in neuroscience and neurotechnology underlines the need for continuous updating of knowledge, with significant implications for individuals, society and healthcare professionals. Brain-computer interface (BCI) is one of these emerging technologies, facilitating direct communication between the brain and external devices, avoiding the usual neuromuscular pathways. Brain-computer interface CI is not limited to the medical field, but has extensive applications in various aspects of human life, including entertainment, gaming, education, self-control, and marketing. However, along with its benefits, BCI also presents challenges, including technological, neurological, and ethical ones. This abstract summarizes the importance and diversity of BCIs' use in human-machine interaction, highlighting their implications in various fields and highlighting the challenges associated with this promising technology. In the paper, we used EEG (Electroencephalogram) as the primary method of recording brain electrical activity in real time. EEG is a non-invasive technology that uses electrodes placed on the scalp to detect and record electrical signals emitted by neural activity in the brain. To use the EEG in the context of BCI headphones for controlling people with disabilities, we selected a standard set of electrodes and applied a special conductive gel to ensure good conductivity of electrical signals. We took care to position the electrodes at strategic points of the scalp according to the international electroencephalography system (10-20) to record signals from cortical regions relevant for motor control and communication. We developed testing protocols and experimental paradigms that involved participants performing specific tasks, such as controlling a cursor on a screen or selecting mental commands, while recording their brain's EEG activity. We used an EEG amplifier to amplify and filter the recorded signals and specialized software to analyzeand interpret EEG data to detect specific patterns and signals that indicate movement intentions or mental commands. The results obtained from the EEG recording were used to train algorithms to decode participants' intentions and calibrate the BCI headphones so that they correctly transmit the commands generated by EEG signals. By using EEG in this work, we were able to provide an efficient and accurate interface between brain activity and BCI headphones, allowing participants to control devices with great accuracy and reliability.

Keywords: Brain-Computer Interface (BCI); Electroencephalogram (EEG); Neuroscience; Marketing; Software

The Possibilities of Bronchoscopy in the Diagnosis of Bronchopulmonary Cancer

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Abstract
Aim: Our research aimed to study the informativeness of bronchoscopic examination in detecting bronchopulmonary cancer. *Materials and Methods:* A cohort of patients with suspected bronchopulmonary cancer was examined. These patients were admitted for bronchoscopy at the Thoraco-abdominal Surgery Department of the IMSP Oncological Institute of the Republic of Moldova during the year 2023. We included patients with suspected bronchopulmonary cancer who needed diagnostic bronchoscopy in the study. Patients with suspected bronchopulmonary cancer requiring diagnostic bronchoscopy but with severe cardiac and respiratory insufficiency, patients who have not timely interrupted anticoagulant/antiplatelet medication, or those with abnormal results in coagulation tests were excluded. *Results*: We evaluated 146 hospitalized patients with age from 37 to 85 years, and an average of 66.35 years. Most evaluated patients were men (107, 73.3%). In central lung cancer, the most frequently reported findings were tumoral infiltration of the bronchial wall in 40 patients (46.5%), followed by endobronchial tumor formation in 21 patients (24.4%), hyperemia and thickening of the bronchial mucosa in 12 cases (14.0 %), and narrowing of the bronchial lumen, which was observed in 8 patients (9.3%). Among the endobronchial signs detected in patients with peripheral lung cancer, hyperemia and thickening of the mucosa were found in 29 patients (48.3%), tumoral infiltration of the bronchial wall in 11 patients (18.3%), bronchial compression in 10 cases each (16.7%), tumor process described in 4 patients (6.7%), local narrowing of the bronchial tree in 5 patients (8.3%), and tracheal deformation in one patient (1.7%). We found that bronchopulmonary cancer was confirmed through cytological examination in 62.9% of cases. Following the histopathological analysis of the biopsy material obtained through bronchoscopy, bronchopulmonary cancer was morphologically confirmed in 82.6% of cases. Among the histological types of lung cancer, squamous cell carcinoma was diagnosed in 47.8% of cases, small cell carcinoma in 18.8%, and adenocarcinoma in 15.94% of cases. Among the complications reported following diagnostic bronchoscopy in patients with lung cancer, hemorrhage occurred in 3.42% of patients. *Conclusions*: Lung cancer can progress asymptomatically for an extended period and becomes clinically apparent in advanced stages. Radiological investigations such as chest radiography and computed tomography play a crucial role in detecting bronchopulmonary cancer. Radiological imaging reveals the localization, dimensions of pulmonary opacity, its connections with the tracheobronchial tree, the blood vessels of the pulmonary hilum and mediastinum, pleura, and other anatomical structures of the chest. Bronchoscopic examination is pivotal for patients suspected of bronchopulmonary cancer, providing direct visualization of macroscopic tracheobronchial changes and enabling the collection of samples through biopsy.

Keywords: Lung cancer; Bronchoscopy; Bronchopulmonary cancer; Radiological investigations; Histopathological analysis

Telemedicine in Liver Cirrhosis is Associated with High Patient Satisfaction

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Abstract
Background and Aim: The use of telemedicine in hepatology still represents a challenge. The objective of the study was to evaluate the effectiveness of telemedicine in the prevention of decompensated liver cirrhosis and to evaluate the satisfaction of the patient who used this strategy. *Methods:* Consecutive telemedicine consultations performed to a team of hepatologists at a tertiary medical center were included. Email, WhatsApp or telephone were used as tools to interact, depending on the patient's preferences. Consultations were considered to be resolved via telemedicine when an adequate diagnosis and follow-up was achieved without the need to refer the patient to hospital. Patient satisfaction with telemedicine was assessed using the Telemedicine Satisfaction Questionnaire. *Results:* Out of 114 patients approached, 89 agreed to use telemedicine. 58.4% had liver cirrhosis, while 41.6% were scheduled for a follow-up appointment due to decompensation of liver cirrhosis. The most common conditions resolved by telemedicine were ascites (66.2%), hepatic encephalopathy (12.35%), antiviral therapy monitoring (43.8%), and toxic liver injury (14.6%). 53.9% rated their experience as "good" or "excellent". Satisfied patients were younger ($p < 0.05$). Women were more satisfied than men ($p = 0.05$). *Conclusions:* Our results show the effectiveness of telemedicine in severe liver diseases, especially for the monitoring and surveillance of patients with liver cirrhosis. A high degree of liver patient satisfaction was identified when using teleconsultation.

Keywords: Telemedicine; Liver cirrhosis; Telehepatology

Computational Study of the Effects of Polycyclic Aromatic Hydrocarbons on Human Health and the Environment

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Abstract
Industrialization and urban expansion have accelerated pollution from human activities, including the release of polycyclic aromatic hydrocarbons (PAHs), which pose significant environmental and health risks. This study aims to computationally assess the physicochemical properties, pharmacokinetic and pharmacodynamic profiles, and correlations among these factors for a set of 9 PAH compounds. Utilizing the PubChem database, we retrieved SMILES files and physicochemical properties for these compounds. In silico analysis of absorption, distribution, metabolism, excretion, and toxicity (ADMET) profiles was conducted using the pkCSM, ProTox II, and admetSAR 2.0 databases. Additionally, ecotoxicity predictions were made with admetSAR 2.0, while bioactivity was assessed using Molinspiration software. Correlations between physicochemical properties and biological activities were established to develop a mathematical model, with Excel used for calculations. Molecular targets were predicted using the SuperPred database. PAHs, characterized as small, hydrophilic molecules with negative partition coefficients, demonstrate moderate water solubility. They adhere to Lipinski and Veber's drug-likeness rules but not the Muegge rule. PAHs exhibit high gastrointestinal absorption and easily penetrate the blood-brain barrier, impacting central nervous system function. They undergo rapid metabolism and function as both substrates and inhibitors, with concentration playing a crucial role. Most compounds display low total clearance, indicating challenges in elimination. PAHs have adverse effects on human health, including skin and eye issues, mutagenicity, carcinogenicity, and immunotoxicity, though they do not induce cytotoxic or hepatotoxic effects according to databases. Naphthalene shows the lowest bioactivity score for various drug targets. Ecotoxicity assessments reveal toxicity to certain organisms but low biodegradability overall. The best statistics of univariate correlation are shown by the partition coefficient correlated with blood-brain barrier permeability. DNA-(apurinic or apyrimidinic site) lyase is the predicted target for these compounds. Computational methods offer efficient avenues for designing safer compounds and decreasing existing toxic effects compared to traditional analyses.

Keywords: Bioinformatics; Polycyclic aromatic hydrocarbons; Human health; Environment

Machine Learning Models for the Diagnosis of Parkinson using Audio Signals

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Abstract
Parkinson's disease is one of the most common neural diseases among the population. An important discomfort that patients experience is related to changes in speech, with an impact on prosody, articulation, and phonation. This paper analyzes supervised machine learning methods using audio signals for the diagnosis of Parkinson's disease. In this context, two main types of classifiers are designed: a Random Forest classifier using Fourier features, and a convolutional neural network that processes Mel-spectrograms. Mel-spectrograms provide a relevant description of the audio signals, with details on the low frequencies, in compatibility with the receptive range of the human ear. To ensure a proper configuration of the Mel-spectrograms, this paper proposes a genetic algorithm that determines the number of frequency bands and the frequency range. These parameters are the most influential according to preliminary experimental investigations. Thus, the genetic algorithm allows the generation of relevant data to the input of the neural model. The experimental results indicate better accuracy for convolutional neural models based on optimized Mel-spectrograms.

Keywords: Machine learning; Neural networks; Genetic Algorithms; Signal processing; Medical applications

Quality Parameters of the Self-Report Scale of Patients' Beliefs about Drug Therapy

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Abstract
Background and Aim: Pharmacists in community pharmacies are experts in drug therapy, being in direct and regular contact with patients. Their beliefs about drugs, the need for medication therapy and medication adherence can be influenced by pharmacists' advice. Thus, we aim to develop and validate a questionnaire about drug therapy to be applied to patients. *Materials and Methods:* The questionnaire was based on the "Beliefs about Medicines Questionnaire" and the "Medication Adherence Report Scale" of Horne et al. The response scale was a five-category Likert type. The quality parameters of the self-report scale were highlighted through sequential exploratory study of the mixed method. A cross-sectional study was conducted on 809 patients from Romania, aged between 18 and 87 years (mean age 35.81±13.52), 190 men and 619 women, between January and June 2023. The questionnaire with 14 items was completed on google form [https://docs.google.com/forms/d/e/1FAIpQLSdzU2tQQKphyqbHNbDWOTzWL-Hf5XBbUA6FeU9rZFf0MLlPLQ/viewform]. Statistical analysis was done in SPSS 27.0. *Results:* Good values show Inter-rater Agreement (72%), Item Content Validity for clarity (92%) and relevance (88%). Very good values indicate Scale Content Validity for clarity (96.2%), relevance (93.9%) and completeness (100%). Cronbach's alpha shows an acceptable internal consistency of the items (α=0.795). The factorial analysis highlights three factors (with Eigen values > 1.0), corresponding to the domains of the questionnaire. The mean score of beliefs about medicines is 3.49±0.57; the mean score of beliefs about drug treatment is 2.85±0.95; the average score of medication adherence is 2.67±0.73; significant statistical differences were found depending on the characteristics of the patients (p≤0.05). *Conclusions:* The self-report scale of patients' beliefs about drug therapy met the quality parameters for our results in order to be sustainable. Patients were partially convinced of the importance of drug therapy, they were not convinced of the need for treatment, but they were adherent to the prescribed drugs.

Keywords: Questionnaire; Validation; Beliefs about drug therapy; Medication adherence

The Importance of Spirometry in Bronchial Asthma Management and the Predictive Value of FEV1 and MMEF Parameters for Future Exacerbations

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Abstract
Introduction and Aim: Asthma is the most common chronic disease during childhood. However, recent studies have shown a suboptimal control of asthma, which lies in poor asthma monitoring. This consists of both the assessment of symptoms control (questionnaires) and assessment of the risk for future exacerbations (functional respiratory tests). Spirometry is the most common respiratory test, but according to multiple studies, it seems to be globally underused in asthma monitoring. This is why we considered necessary a study that shows the correlation between spirometry parameters and symptomatology, along with the risk for future exacerbations of asthmatic patients. *Material and Method*: It is a cohort, observational, retrospective study. It was carried out in the Emergency Clinical Hospital for Children in Cluj-Napoca, Pediatric Clinic III. For this study, the closed circuit method of spirometry was used. The size of the sample was of 184 children with asthma diagnosis, of who 28 patients were randomly selected and their evolution was followed for 2 years (January 2022- December 2023). *Results*: The comparison between the values of FEV1 for patients with controlled (C) and uncontrolled (NC) symptomatology. Only 10% showed significant lower values (<80%) in the NC group compared to the C group ($p=0.015$), while 63% of patients in the NC group had low MMEF values but with no significant difference from group C (0.090). The number of exacerbations during two years was tracked in correlation with the values of spirometry parameters. The regression model was acceptable negative but statistically insignificant ($p=0.070$) for MMEF values (Spearman Multiple correlation coefficient $\varrho=-0.30$). *Conclusions*: The use of spirometry is extremely important, because the symptoms do not always correspond to the impairment of lung function. FEV1 can be considered a parameter that correlates with the severity of asthma at the time of the spirometry, while MMEF values may be associated more with the progression of the disease.

Keywords: Bronchial asthma; Spirometry; Asthma monitoring; Exacerbations

Prediction of Type 2 Diabetes Mellitus with an Enhanced k-Fold Cross-Validation Method

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Abstract

Background and Aim: Multiple models available for predicting the development of Type II Diabetes Mellitus (T2DM) contain at least seven predictors (Cambridge Score – 7; QDScore – 10; QDiabetes – at least 16), some of which require invasive techniques. Our aim was to identify, if any, a predictive model based on observations or non-invasive measurements with minimum number of predictors for T2DM. *Materials and Methods:* We used the NAGALA study, a prospective follow-up study conducted on Japanese population with observations and measurements (e.g., blood pressure or ultrasound non-alcoholic fatty liver disease - NAFLD) as input data and logistic regression analysis as method. We divided the database in 12 balanced folds, and we then recombined the folds in a 9:3 ratio to create 220 pairs of training-testing sets. We employed a layer-based approach, adding each predictor to the model akin to a forward stepwise algorithm. In each layer, we maximized the standardized accuracy (defined as the mean of sensitivity and specificity). *Results:* We analyzed 15464 patients, of which 373 (2.41%) developed T2DM. The median follow-up time was 5.39 years. The final model included the following predictors, in order: NAFLD, alcohol consumption, age, and obesity (body mass index over 25kg/m^2). In testing, the model obtained a mean standardized accuracy of 73.9% (on testing sets), and after training the reported model on the entire dataset, the final model had a sensitivity of 77.5% [95%CI 73.2% to 81.7%] (where CI = confidence interval) and a specificity of 71.7% [95%CI 71% to 72.4%] (on the entire dataset). *Conclusion*: The final model has limited clinical usability. Future research should compare the reliability of this method against standard methods, as well as its robustness when predictors are correlated.

Keywords: Diabetes Mellitus type 2 (T2DM); Non-Alcoholic Fatty Liver Disease (NAFLD); Statistics; Logistic models; Reproducibility of results

Candelilla Wax-Based Oleogels: A New Perspective in Solid Fat Production

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Abstract
The research aimed to obtain and characterize new fats with zero trans and low saturated fatty acid content. Natural candelilla wax was used as an oleogelator in a percentage of 9% to build oleogel systems based on vegetable oils. Candelilla wax (DW) was used because it has a high oil binding power in a stable gel structure. Candelilla wax (CW) is a natural plant wax derived from Euphorbia antisyphilitica Zucc, which is grown in the arid regions of northern Mexico. Notably, CW has emerged as a promising potential substance for use in the development of food formulations. Furthermore, as a food additive, CW application may guarantee safe and high-quality foods. Oleogels were obtained using olive oil, grape seed oil, sunflower oil, walnut oil and hemp seed oil. All the obtained oleogels were analyzed physically, chemically, rheological and texturally. The property of the oleogels to expel oil during the storage of the oleogels was determined, the peroxide index, the color, the elastic and viscous properties of the oleogels and the textural properties were determined. All formulations presented similar color parameters in CIEL*a*b* space, viscosity high and texture parameters specific to hard oleogels. Oleogelation is an alternative process to improve the nutritional properties of food by creating soft-matter structures with the same functionality as commercial fats (shortenings). Candelilla wax lipids have been found to have great potential for use as trans-fat substitutes in the development of good quality food products.

Keywords: Oleogelation process; Physicochemical properties; Oils; Rheological properties

Hospital Management System Based on a Multi-Agent Architecture

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Abstract
The Colonoscopy Hospital Scheduling and Recommendation (COLHSAR) system is a sophisticated framework designed to improve the management of medical procedures and patient care in hospital settings. This paper elucidates the architecture, functionality and interconnectivity of the agents within the COLHSAR system, emphasizing their role in optimizing resource utilization, improving patient scheduling and providing personalized medical recommendations. Through a detailed examination of each agent's responsibilities and interactions, this study illustrates how COLHSAR integrates various components such as patient management, resource allocation, specialist coordination, and data processing to streamline hospital operations and improve healthcare delivery. In addition, this paper discusses the importance of collaboration and synergy between agents in achieving the system's goals, including efficient scheduling of procedures, timely medical interventions, and tailored patient care. By elucidating the intricate workings of the COLHSAR system, this research contributes to a deeper understanding of its functionality and potential impact on healthcare management and patient outcomes.

Keywords: Multi-agent architecture; Hospital management system: scheduling; Patients

Personalised Rehabilitation Programmes: Tailoring Recovery Through Artificial Intelligence

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Abstract

Background and Aim: Traditional rehabilitation approaches often adopt a standardized method that may not adequately address the diverse needs of individual patients. This research aims to introduce and demonstrate a novel application designed to shift rehabilitation towards a more personalized methodology, utilizing artificial intelligence (AI) to tailor recovery plans specifically for individual patient profiles. *Materials and Methods:* Our study revolves around the development and functionality of a cutting-edge app that utilizes AI to analyze a variety of patient data, including medical history, physical assessments, and real-time progress updates. The app designs personalized rehabilitation plans by adjusting exercise routines and intensity levels to each patient's unique physical condition and recovery trajectory. Additionally, the app incorporates AI-driven virtual rehabilitation assistants that provide real-time guidance and feedback, ensuring exercises are performed correctly and adapting the regimen based on immediate patient progress. *Results:* The application could significantly enhance the rehabilitation experience by making it more dynamic and adaptive. Patients using the app can have a quicker recovery time, reduced injury rates, and greater engagement with their rehabilitation programs. *Conclusion:* The development of this AI-powered app represents a transformative step in rehabilitation, offering a more personalized and effective approach to patient recovery. The upcoming presentation will detail the app's implementation process, showcasing its features and the underlying AI technology that supports its operations. This research underscores the app's capacity to revolutionize rehabilitation, emphasizing the importance of personalized treatment plans in promoting patient well-being and faster recovery.

Keywords: Personalised rehabilitation; Artificial Intelligence; Tailored recovery; Dynamic adaptation

Melanoma Detection using Transfer Learning

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Abstract
Melanoma is, in most cases, caused by unprotected, long exposure to ultraviolet light; it is included among the rare types of cancer, but when diagnosed late it can be deadly. Along with the challenge of giving a proper diagnosis, in the context of its increased incidence throughout the years, comes the problem of medical care access. There are people living in isolated, low-income areas that do not have the opportunity to seek proper medical investigations. In these remote areas medical care often translates to going to the general practitioner for treatment. Taking this information into account, a tool to support the general practitioners in deciding if further investigations are needed would be highly beneficial and could help reduce costs and resources on both sides. As it is a hard task to develop reliable prediction models from scratch, the chosen method was to perform transfer learning on an existing network using Deep Network Designer in MATLAB. This process involved choosing which pretrained network to use as a starting point, in this case SqueezeNet, and then specializing it for its designated task. The dermoscopic images used were from the ISIC database, 600 images were selected (300 melanoma and 300 non-melanoma formations, confirmed through biopsy). Every image was rotated at 90°, 180° and 270°, resulting in a total of 2400 images (1200 melanoma and 1200 non-melanoma formations). By doing this, the number of images given as input is maximized, while also feeding the network with 4 different perspectives of the same lesion. The dataset was randomly split into training (70%), validation (20%), and testing (10%) data. The overall accuracy on the testing data (240 images) was ≈91%. Further gathering more dermoscopic images for training and testing might perfect the results, making the model as reliable as possible.

Keywords: Melanoma; Melanoma detection; Transfer Learning; Dermatology

Improving Medical Device Management and Streamlining Workflow in Healthcare Facilities

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Abstract
The medical sector has experienced significant transformations in recent years due to advancements in technology and digital innovation. Effective management of medical devices has emerged as a crucial component of upholding healthcare standards. Simultaneously, biomedical engineers play a pivotal role in maintaining medical devices to ensure their optimal functionality and constant availability to patients. Currently, many healthcare facilities often rely on manual and fragmented processes for medical device management, scheduling, tracking, and documenting maintenance activities, leading to inefficiencies, increased downtime, and potential safety risks for patients. The aim of this paper is to highlight the benefits of implementing a computerized system for the management of medical devices and to create a basic variant of this system. To create the system, regulations, and recommendations at the national and international levels were researched and various technologies were used for a minimum viable product, such as Figma, React, and Python Flask. Implementing a computerized system streamlines workflow management, facilitates proactive maintenance scheduling, and ensures compliance with regulatory standards. This minimizes equipment downtime and extends the lifespan of medical devices, ultimately enhancing patient care and safety. Furthermore, the implementation of a computerized system for medical device management aligns with the broader initiative of promoting European Health Data Spaces. By digitizing maintenance data and integrating it into European Health Data Spaces, healthcare facilities can unlock the power of data, and contribute valuable insights into equipment utilization, performance trends, and maintenance needs. This data can facilitate evidence-based decision-making, optimize resource allocation, and drive continuous improvement initiatives across the healthcare ecosystem. In conclusion, the integration of computerized systems for medical device management offers streamlined workflows, proactive maintenance scheduling, and regulatory compliance, ultimately improving patient care and safety while aligning with broader initiatives like European Health Data Spaces.

Keywords: Medical device; Management; Digitalization; Maintenance

Surgical Treatment of Deep Burns

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Abstract
Introduction: Deep burns, primarily caused by thermal exposure such as fire and hot liquids, result in severe tissue injuries with enduring consequences, prompting extensive research into their etiology, treatment, and ramifications. Surgical intervention is pivotal, though its efficacy varies based on diverse factors. Technological advancements and global collaboration are paramount for enhancing treatment efficacy and patient outcomes. *Research Aim*: The research aim involves a retrospective analysis of burn cases, particularly those involving respiratory tract involvement, with a focus on elucidating current diagnostic and treatment modalities. *Materials and Methods*: A patient cohort of 110 individuals, predominantly male (ratio 3:1), aged 40-80, underwent examination. Key criteria evaluated encompassed gender, age, pre-treatment diagnosis, intervals between surgeries, hospitalization duration, burn severity and extent, blood transfusions, burn types and locations, treatment modalities, and post-treatment complications. *Result:* Findings revealed a male predominance and increased susceptibility among individuals aged 40-60 and 60-80. Surgical approaches varied, encompassing excisional debridement, skin grafting, and, in some cases, amputation. Common causes of deep burns, such as fire and hot liquids, were identified, along with associated complications like infections and coagulation abnormalities. Effective management of these complications, including systemic inflammatory response syndrome and post-hemorrhagic anemia, proved pivotal for optimal patient outcomes. *Conclusions:* In conclusion, deep burns pose significant challenges, particularly for middle-aged and older individuals. Surgical interventions necessitate individualized and comprehensive approaches. Efficient management of associated complications is imperative for ensuring optimal patient recovery.

Keywords: Deep burns; Surgical treatment; Thermal exposure; Complications

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