



CAIAC'24

3rd International Cumhuriyet Artificial Intelligence
Applications Conference 2024

ABSTRACT BOOK

Editörler:

Prof. Dr. Serkan Akkoyun

Dr. Öğr. Üyesi Emre Delibaş

Dr. Öğr. Üyesi Abdulkadir Şeker



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Yeni Türkiye
STRATEJİK ARAŞTIRMA MERKEZİ





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Yeni Türkiye Stratejik Araştırma Merkezi

WELCOME TO CAIAC'24

International Cumhuriyet Artificial Intelligence Applications Conference'2024 (CAIAC'2024) will provide an excellent international forum for sharing knowledge and results in theory, methodology and applications of Artificial Intelligence. The Conference looks for significant contributions to all major fields of the Artificial Intelligence, Soft Computing in theoretical and practical aspects. The aim of the Conference is to provide a platform to the researchers and practitioners from both academia as well as industry to meet and share cutting-edge development in the field.

Authors are solicited to contribute to the Conference by submitting articles that illustrate research results, projects, surveying works and industrial experiences that describe significant advances in the listed areas but are not limited to.

Participation in the conference is free of charge and a book of abstracts will be published. CAIAC has been organized by Sivas Cumhuriyet University since 2021. This year, CAIAC'24 will be held online in cooperation with the Yeni Türkiye Strategic Research Center. The selected studies to be presented at the conference include articles in the Yeni Türkiye Artificial Intelligence Special Issue and The Sivas Cumhuriyet University Journal of Engineering Faculty.

Asst. Prof. Abdulkadir Şeker

Co-Chair of CAIAC'24

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Yenilenebilir Enerjide Yapay Zekâ Uygulamaları ile Uzun Dönem Elektrik Üretimi Tahmini: Sivas Örneği

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ABSTRACT

Yenilenebilir enerji kaynakları kullanılan elektrik şebekelerinde yük tahmini ve optimizasyonu, şebeke kararlılığı için oldukça önem arz etmektedir. Arz-Talep dengesinin verimli karşılanabilmesi ve enerji verimliliğinin sağlanabilmesi için, özellikle yapay zeka uygulamaları ile tahmin edilen sonuçlar, optimizasyonda iyileştirme imkanı sağlamaktadır. Yapay Sinir Ağları (YSA) metodları enerji üretimindeki büyük veri setlerini analiz etmek ve mevsimsel dalgalanmaları karşılamak için derin öğrenmeyi kullanarak yenilenebilir enerji tahmini için başarıyla kullanılmakta ve yüksek tahmin doğrulukları sağlamaktadır. Ek olarak enerji tahmininde uzun dönem tahmini yapabilmeyen yatırım planlaması konusunda ayrı bir öneme sahiptir. Özellikle Sivas gibi çeşitli iklim koşullarına sahip bölgelerde yapay zekanın kullanımı, enerji kaynaklarının optimizasyonunu sağlarken yenilenebilir enerji verilerindeki karakteristik kesintileri de azaltır. Bu çalışma, geleneksel tahmin tekniklerini geliştirmek için LSTM gibi metaheuristik algoritmaları içeren hibrit yapay zeka modellerini vurgularken, kök ortalama kare hata (RMSE) ve ortalama mutlak yüzde hatası (MAPE) gibi performans metriklerinde iyileşmeler sağlayan yöntem önerilerinde bulunmaktadır. Sivas örneği, Türkiye ortalaması üzerinde seyreden yüksek güneş enerjisi üretim potansiyeli olması sebebiyle seçilmiş, yerel iklim faktörleri, topografik unsurları ve popülasyon gibi belirli enerji gereksinimleri entegre edilerek, oluşturulan yapay zeka modelinde özelleştirilmiştir. Sonuçlar hibrit modellerin uzun dönem tahmin sonuçlarında daha verimli olduğunu göstermektedir. Bu çalışmalar ve gelecek çalışmalar ile, Türkiye'deki stratejik konumu ve özellikle yüksek güneş enerjisi üretim potansiyeli göz önüne alındığında, geliştirilecek çevre ve sürdürülebilirlik odaklı, gelişmiş gerçek zamanlı enerji analizleri, Sivas'ı yapay zeka destekli yenilenebilir enerji tahminleri için bir kıyaslama bölgesi haline getirilebilecektir.

Keywords: yapay zeka, elektrik üretimi, yenilenebilir enerji

Yapay Zekânın Şimdiki ve Gelecek Zamanı: Bir Değerlendirme

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ABSTRACT

Bu çalışmada, Stanford Üniversitesi tarafından yayınlanmış olan 'Artificial Intelligence Index Report 2024' adlı raporunu değerlendirerek; sağlanan veriler ışığında çeşitli çıkarımlar elde ettik. Çalışmamız, raporun içeriğini yansıtır biçimde 9 bölümden oluşmaktadır:

1. Yapay Zeka Konusundaki AR-GE Çalışmaları
2. Yapay Zekanın Teknik Başarıları
3. Sorumlu Yapay Zeka Kavramı
4. Yapay Zeka Ekonomisi
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6. Eğitimde Yapay Zeka
7. Yapay Zeka Politikaları ve Yönetimi
8. Yapay Zeka ve Çeşitlilik
9. Yapay Zeka ve Kamuoyu

Keywords: Yapay Zeka, Endeks Raporu

Artificial Intelligence Supported Computer Vision Prototype For Apple Grading Machines

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ABSTRACT

This study proposes a prototype for an artificial intelligence-based machine designed to classify apples stored in cold storage for a year with high speed and accuracy based on color (red and mixed color), defects (bruises, blemishes, branch marks), and weight (three categories). Turkey ranks 5th in the world in apple production, with the Isparta region standing out due to its significant production and storage capacity. Current classification systems are costly and insufficient, particularly in detecting defects. Visits and interviews conducted at cold storage facilities in Isparta revealed the inadequacies and high costs of existing sorting and packaging units (SPUs). It is also a well-known fact that manual sorting of apples increases costs and error rates. In this context, artificial intelligence-based sorting machines developed with local and national resources will enhance added value in apple production, reduce costs, and improve quality. The proposed prototype employs computer vision and deep learning techniques to classify apples in terms of weight, color, and defects. This technology is expected to bring significant innovation to Turkey's apple industry, boosting competitiveness in both domestic and international markets.

Keywords: Artificial Intelligence, Apple Grading

Yapay Zeka ve otonom dronlar

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ABSTRACT

Drones represent a rapidly developing industry. Devices initially designed for military purposes have evolved into a new area with a plethora of commercial applications. One of the biggest hindrances in the commercial developments of drones is legal uncertainty concerning the legal regimes applicable to the multitude of issues that arise with this new technology. This is especially prevalent in situations concerning autonomous drones (i.e. drones operating without a pilot). This article provides an overview of some of these uncertainties. A scenario based on the fictitious but plausible event of an autonomous drone falling from the sky and injuring people on the ground is analysed from the perspectives of both German and English private law. This working scenario is used to illustrate the problem of legal uncertainty facing developers, and the article provides valuable knowledge by mapping real uncertainties that impede the development of autonomous drone technology alongside providing multidisciplinary insights from law as well as software electronic and computer engineering.

Keywords: Artificial intelligence, autonomy, drones, liability, tort

Parkinson Hastalığının Erken Teşhisinde Derin Öğrenme: DenseNet201, ResNet50 Ve Inceptionv3 Modellerinin Analizi

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ABSTRACT

Parkinson hastalığı, motor sistemini etkileyen konuşma ve hareketlerde yavaşlama, titreme ve buna bağlı olarak fiziksel aktivitelerde bir takım anormalliğe sebep olan dejeneratif bir nörolojik hastalıktır. Parkinson hastalığı Alzheimer hastalığından sonra dünyada en çok rastlanan nörolojik hastalıktır. Parkinson hastalığının henüz bilinen bir tedavisi bulunmamaktadır. En etkili tedavi yöntemi erken teşhistir. Özellikle derin öğrenme yaklaşımları kullanılarak Parkinson hastalığı erken teşhisi konusunda birçok araştırma yapılmıştır. Derin öğrenme yöntemleri ile Parkinson hastalığının zaman ve maliyet açısından birçok kolaylık sağlamaktadır. Parkinson hastalığının erken teşhisi ve tedaviye başlanması açısından önemli bir adım olarak değerlendirilmektedir. Derin öğrenme modellerinin kullanımıyla daha doğru ve güvenilir tanı süreçleri gerçekleştirilebileceği ve hastalığın ilerlemesinin önceden tespit edilebilir. Parkinson hastalığı tanı sürecinde kullanılmak üzere derin öğrenme ve transfer öğrenme yöntemleri kullanılmıştır. İncelenen modeller arasında Inception V3, DenseNet201 ve ResNet50 yer almaktadır. Bu modeller, MRI görüntülerini kullanarak Parkinson hastası olan ve olmayan bireyleri sınıflandırmak için eğitilmiştir. Sonuçlar, DenseNet201 modelinin %95 doğruluk oranı, ResNet50 modelinin %98,14 doğruluk oranı ve Inception V3 modelinin %94,15 doğruluk oranı elde ettiğini göstermektedir. Bu bulgular, derin öğrenme ve transfer öğrenme yöntemlerinin Parkinson hastalığı tanısında etkili bir araç olabileceğini ortaya koymaktadır.

Keywords: Parkinson hastalığı, Transfer Öğrenme, DenseNet201, Inception V3, ResNet50, Evrimsel Sinir

Elimination of Motion Effect in Children's Dental X-Ray Images in Pediatric Dentistry

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ABSTRACT

The aim of this study is to eliminate distortions in dental X-ray images of patients who apply to the Department of Pediatric Dentistry due to children's movements during the imaging process, to facilitate the diagnosis of the specialist, and to prevent children from receiving excessive doses of radiation without having to take X-ray images again. Dental X-Ray image from the Children's Dental Panoramic Radiographs dataset via Kaggle was used. The Cheetah Optimization Algorithm and the Lucy-Richardson method, which is frequently preferred for blur removal, were combined with a new approach to eliminate motion effects on dental X-ray images. By comparing the blurred and enhanced images, the analysis performance was evaluated with PSNR (peak signal to noise ratio) and SSIM (structural similarity index) indices. The proposed approach was applied to a blurred child dental X-ray image of 200 x 400 pixels. The enhanced and blurred images were compared. PSNR and SSIM values of enhanced image were found 33.3146 dB and 0.9310, respectively. In particular, the Lucy-Richardson method was used to reveal more details in the image, which was to provide accurate diagnosis of dental structures and caries. The enhanced image was also examined by a pediatric dentist, and performance was evaluated not only in terms of measurement indices but also in terms of image integrity and detail. In this study, motion distortion on child dental X-ray images has been successfully eliminated with the proposed artificial intelligence-based approach. Additionally, the Lucy-Richardson method increased performance by revealing more details in the image. As a result, the goal of less radiation for pediatric patients and easier diagnosis for specialists has been achieved. In further studies, more effective solutions will be produced by combining deep learning, optimization and Lucy-Richardson method.

Keywords: x-ray, lucy-richardson, PSNR, SSIM

Türkiye’de Yapay Zekâ Alanında Güncel Gelişmeler: Yapay Zekânın Neresindeyiz? Gelecek Vizyonumuz

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ABSTRACT

Dünyada özellikle teknoloji lideri ülkelerin ve işletmelerin Ar-Ge çalışmalarıyla geliştirilen dijital teknolojiler (akıllı robotlar, artırılmış gerçeklik, büyük veri ve analizi, bulut teknolojisi, nesnelerin interneti, simülasyon teknolojisi, yapay gerçeklik vb.), hem kamu sektörü hem de özel sektörde örgütlerin dijital dönüşümünü hızlandırmıştır. Dijital teknoloji çağına uyum sağlamak, kurum ve kuruluşların dijital teknolojileri anlamaya ve kullanıma hazır hale getirilmesine bağlıdır. Bu çalışmada Türkiye’de yapay zekâ (YZ) alanında atılan sektörel adımlar genel itibariyle ele alınacak, Türkiye’de YZ ile ilgili hazırlanan akademik çalışmaların sonuçlarına değinilecek ve Türkiye’nin YZ çalışmalarının geliştirilmesine dair öneriler sunulacaktır.

Keywords: Artificial Intelligence, Gelecek

Artificial Intelligence-Based Human Resources Management Applications: Challenges Awaiting Businesses

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ABSTRACT

Artificial intelligence (AI)-based applications are being integrated into human resources management (HRM) systems and applications in order to manage the local and international human resources (HR) of enterprises. This integration offers significant opportunities in the areas of decision-making, resource utilization and problem solving (Budhwar et al., 2022). Intelligent automation technologies such as AI and robotics offer a new approach to managing HR and improving business performance (Vrontis et al., 2023). In order for the HR department to fulfill its role in the development of the entire organization, the use of new technologies and the development of technological approaches have become a potential need (Saini & Tarkar, 2022) and even a necessity. In the existing literature, AI is examined in relation to legal and ethical issues in addition to the "strategic planning, recruitment and placement, training and development, performance management, compensation management, human relations management" functions of the HR Life Cycle (Gélinas et al., 2022). The effects of intelligent automation technologies on HRM activities such as recruitment, training and job performance; focuses on HRM strategies such as job switching, human-robot/AI collaboration, decision-making and learning opportunities (Vrontis et al., 2023). In various industries and organizational functions where HR and robots work together as team members, HR leaders and departments face challenges due to the close interaction between AI and HR. Before HR is organized in the same teams with robots, it is important to develop organizational support mechanisms such as providing training opportunities, ensuring a feasible level of technological competence and facilitating the environment (Arslan et al., 2022). With the use of AI in the field of HRM, HRM costs can be reduced; HRM efficiency and quality can be improved and the digital transformation of HRM can be promoted. On the other hand, the use of AI in the field of HRM leads to challenges such as the negative impact of HR through the automation of low-income jobs, equipment maintenance costs, increased digital competence and the need for qualified HR (Qiu & Zhao, 2018). There is a significant gap between the promises of AI in the field of HRM and the reality of its applications (Tambe et al., 2019). Although academic studies on intelligent automation are rapidly increasing, a comprehensive understanding of the impacts of these technologies on the organizational and individual level of HRM has not yet been developed (Vrontis et al., 2023). The use of AI in HRM applications faces other challenges such as possible negative employee reactions to management decisions through data-based algorithms, accountability related to ethical and legal constraints such as fairness, the complexity of HR phenomena, and the limitations imposed by small data sets. It is argued that these challenges can be overcome with principles such as employee contributions, causal reasoning, and randomization (Tambe et al., 2019). It is emphasized that in order for AI to fully realize its promise in the field of HRM, working data infrastructure, data governance frameworks, and a data-driven culture are important (Saraswathi et al., 2023). Despite the increasing academic interest, research on AI-based technologies for HRM is limited and fragmented; more research is needed to understand human-AI interactions and their role in businesses (Budhwar et al., 2022). This study aims to examine the challenges addressed in the recent prominent literature on AI and HRM in the context of developing AI-based HRM applications.

Keywords: Artificial Intelligence, Robotics, Human Resources Management

Use of Artificial Intelligence and Big Data Management in Healthcare Institutions

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ABSTRACT

Medical AI is one of the hot topics in the research and applied fields of medicine. Various research mentions privacy as a major ethical challenge for medical uses of AI. The good news is most of the AI tools are designed to replace physicians but to assist them. This reduces ethical challenges, while not eliminating all. Researchers state that although we are far from consensus in ethical uses of medical AI, we have more or less an agreement on key principles. If the medical data to be used to train AI is from a narrow sample of patients, it can err with larger groups. On the other hand, some other problems can be due to users. Thus, development of AI literacy is necessary. In other words, they have to learn which AI tools to use for various purposes. When we consider early versions of medical AI, we realize that they made sense for explanation and teaching, but fail as an assistant for clinical practice, but this situation has been changing rapidly. Medical students are highly positive of medical AI, and believe that it will not replace but complement human doctors. There is a realistic anxiety that in a group of medical areas, especially radiology, AI will outperform human doctors. AI anxiety can also be due to perceived difficulty to use AI. A solution to ethical problems in medical AI is a trustworthy AI model.

Keywords: AI, Medical AI, medical uses of AI, ethical uses of AI, ethics issues in medical AI.

Artificial Intelligence in Forensic Sciences

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ABSTRACT

In this article, the uses of AI for forensic sciences are reviewed and discussed. First topic is the coverage of the topic. Second is digital forensics which is the precursor to AI use in forensic investigations. AI for sex, age etc. identification was the next topic. A few machine learning examples are mentioned, but the field includes much more than a few machine learning articles. Forensic phonetics is discussed as an emerging theme. Finally, miscellaneous issues were presented for future considerations.

Keywords: AI, forensic sciences, forensic AI, AI in forensic sciences, digital forensics.

Looking at Artificial Intelligence on the Axis of Gender Equality: Automation Industry Example

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ABSTRACT

Artificial Intelligence (AI) and automation are among the most significant technological innovations shaping the future of labor markets, generating profound social and economic transformations, particularly in developing economies. However, this transformation carries the risk of exacerbating existing gender inequalities. Women, especially those in low-skilled occupations and with limited access to technological resources, are disproportionately affected by the processes of automation. This is particularly evident in sectors such as textiles, agriculture, and services, where women are heavily employed and where automation threatens significant job displacement. As automation rapidly develops, the demand for highly skilled labor increases. However, the underrepresentation of women in STEM (Science, Technology, Engineering, and Mathematics) fields prevents them from benefiting equally from these new opportunities. In developing economies, restricted access to digital skills development programs further increases women's vulnerability in the labor market. In this context, expanding digital literacy programs is critical to enhancing employment opportunities for women. To mitigate the gendered impacts of automation, policy development must focus on creating gender-sensitive strategies. Flexible work models, STEM-focused education programs for women, and strengthened social protection mechanisms are vital for promoting gender equality in the workforce. Both the United Nations Women's Unit and the International Labour Organization emphasize the need for such gender-responsive policies to ensure equal participation of women in the evolving labor market. In this context, dissemination of digital literacy programs is critical to increase employment opportunities, especially for women. It should also be emphasized that policies should be developed in the context of balancing the effects of automation on gender equality. Although flexible working models, programs that encourage women's greater participation in STEM fields, and social protection mechanisms provide opportunities for women to participate more equally in the workforce, there are still question marks regarding their rights-based nature. In this regard, especially the United Nations Women and the International Labor Organization emphasize the need for gender equality-based policies and state that these policies play a critical role in supporting women's participation in the workforce. It is important to evaluate the effects of AI and automation on labor markets from a gender equality perspective in developing economies. Digital transformation processes need to be designed to reduce gender-based inequalities. In order for women to take a stronger place in the workforce, it is inevitable to increase their access to STEM fields, include them in digital skill development programs and implement gender-sensitive workforce policies. This study aims to develop policy recommendations focused on gender equality by comprehensively analyzing the gender-based effects of automation in developing economies. In order to achieve this aim, first the connection between artificial intelligence and gender will be established, and then it will be interpreted around sociological facts specific to the automation sector, on the axis of workforce and labor distribution relations.

Keywords: AI, Automation, Gender Equality, Women's Employment, Digital Transformation, Developing Economies, Labor Market Policies.

Using the Random Forest Model to Improve Lung Cancer Diagnosis and Prognosis: A Pilot Study

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ABSTRACT

Humanity is witnessing the coming together of the healthcare system and the IoT network, which has a complex structure created by advanced technology and technological devices, and the increase in the number of this unity every day. This study primarily highlights the effectiveness of the Random Forest model in analyzing data sets and recognizing trends. The study demonstrated a level of sensitivity in detecting the stages of lung cancer and predicting disease progression. This accuracy offers particularly personalized settings in both clinical and other settings. Additionally, classification processes have been created to allow this personalization process. Here, the effectiveness of the random forest algorithm was used in the detection of lung cancer, which is an important problem area in the healthcare system, and successful results were obtained. These results can be of great insight to healthcare professionals as a decision support system. It involves examining performance indicators such as accuracy and precision, as well as recall and F1 score measurements, to measure the effectiveness of the model. This study emphasizes that it is a useful resource for healthcare professionals in creating a diagnosis and treatment strategy for cancer, organizing the priority order of patients, and also effectively continuing patient treatment and care. This research has the potential to shed light on the future years as it can be applied in clinical settings that can improve lung cancer treatment with a holistic approach supported by data analysis.

Keywords: Lung cancer prediction, lung cancer classification, machine learning, random forest.

Short-Term Electric Energy Load Forecast of Sivas- Central 1st Organized Industrial Zone Using Artificial Intelligence Method and Meteorological Data

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ABSTRACT

Efficient, high-quality and safe electricity production is very important for maintaining the supply-demand balance in the electricity market. Therefore, electricity producers and electricity suppliers need to make good planning, and for planning studies, unrealized consumption values need to be estimated. Hourly and daily estimates are called short-term estimates. Correct short-term estimates protect producer and supplier companies from errors, imbalance costs and customer losses. In order to establish a healthy and accurate estimate model, the data used is as important as the method chosen. Important input data of the estimate models; hourly temperature, hourly relative humidity and daily total precipitation data were obtained from our provincial Meteorology Directorate. In this study, it is aimed to estimate the short-term electricity consumption of Sivas-Central 1st Organized Industrial Zone using artificial intelligence methods (LSTM) with the help of past electricity consumption data and meteorological data.

Keywords: LSTM, RNN, Artificial intelligence, Machine Learning.

Artificial Intelligence in the Energy Sector

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ABSTRACT

While trying to meet the energy needs that emerge depend on increasing demands in energy consumption which rises in parallel of recently technological advancements, in addition to arising the efficiency, the needs such as lowering the cost and augmenting the reliability for grid and materials which are used in processes of energy generation, transmission and distribution emerge. The ability to integrate artificial intelligence applications, which are used in many fields and consist of various algorithms, into the energy sector enables the energy systems to be used more effectively and with less loss. This work presents the history of artificial intelligence, learning models, types of algorithms and artificial intelligence applications in the energy sector.

Keywords: Artificial Intelligence, Energy

The Comparison of Original HDI and Simulated HDI of EU Countries: Measuring the Impact of COVID-19

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ABSTRACT

The Human Development Index (HDI) is a pivotal indicator in gauging the extent of development and living standards across countries. However, the global pandemic of the Coronavirus disease 2019 (Covid-19) is believed to exert a deleterious influence on these indices. It is therefore important to understand the effects of the pandemic on HDI and how HDI would be shaped in a scenario without the pandemic. In this context, the HDI data for the years 1995-2019 were subjected to linear regression analysis, and the HDI values for 2020, 2021 and 2022, when the effects of the pandemic were observed, were estimated. Furthermore, the original HDI indicators were compared for these years. The study demonstrates that in the absence of the pandemic, the HDI values of the countries would continue the upward trajectory observed in previous years. Furthermore, despite the initial negative effects, it was observed that the Netherlands and Portugal reached the simulated HDI values by 2022, indicating that the Netherlands and Portugal were able to overcome the significant slowdown or decline in HDI caused by the pandemic. The original HDI values of Austria, Croatia, Cyprus, Denmark, Finland, France, Greece, Ireland, Italy, Spain, Sweden and Sweden were only approximated by the simulated HDI values by 2022. In other EU countries, the impact of the pandemic on HDI is observed to be long-lasting. The study offers a valuable contribution to the existing literature on the effects of the pandemic on human development in terms of sustainability.

Keywords: Human Development Index (HDI), COVID-19, Linear Regression Analysis

Predicting The Direction of Bitcoin Price Fluctuation Using Machine Learning Models

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ABSTRACT

In the financial sector, the economic and social events of the past have shaken trust and this trust is trying to be regained through the internet and computer technologies. Emerging in the 19th century, financial technology has led to a new economic understanding with digital money and especially bitcoin. The decentralized structure of bitcoin and the encryption systems used for security play an important role in preventing fraud and have become the center of attention of investors. As its value has increased, studies on price predictions have naturally increased. This study aims to predict the impact of data obtained from digital economy news sites on bitcoin price using natural language processing and machine learning techniques. In line with this goal, text vectorization was performed with the TF-IDF statistical method. Classification models such as Logistic Regression, Decision Trees, Random Forest, Support Vector Machines and K-Nearest Neighbor were applied to the obtained output. The data set used consists of 31,037 rows and 7 columns. Within the columns, the direction of bitcoin price fluctuation (-1: Negative, 0: Neutral, 1, Positive) labeled in the sentiment column is to be predicted from the news texts under the text heading. For this purpose, empty or repetitive values in the data set were checked and edited. Text preprocessing was applied on the data to be used as input in the Text field. Text preprocessing was finalized by converting the data to lowercase, removing numbers, special characters and spaces, and removing words that may be noise called stopwords (the, a, is, etc. words) from the data. According to the results of the performance of different machine learning models in predicting the direction of Bitcoin price fluctuation, the Logistic Regression model showed the highest performance with an Accuracy of 86.39%, recall of 86.39%, precision of 86.74% and F1 score of 86.17%. Considering that an unbalanced data set is used, it can be said that precision, recall and F1 score results are more reliable. Accuracy value is significant in balanced data sets. According to the result evaluation, the K-Nearest Neighbor model showed the lowest performance in predicting bitcoin price fluctuation, while the results of the other models are close to each other. However, Logistic Regression and Decision Tree models show the best performance with the highest values.

Keywords: Artificial Intelligence, Bitcoin, Machine Learning, Natural Language Processing, Stock

ISO/IEC 25010 Classification of Software Quality Metrics Using User Feedback

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ABSTRACT

Software quality indicates how effective and efficient a software is. Various standards should be used to evaluate software quality. One of the most important internationally recognized standards for measuring software quality is the ISO/IEC 25010 software quality standard. With this standard, the quality of a software product is evaluated by eight different metrics. These metrics are functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability and portability. There is no established evaluation criterion for the determination of metric values. In this study, the relationship between user feedback and the metrics of the ISO/IEC 25010 software quality standard was tried to be determined. Machine learning (ML) and natural language processing (NLP) techniques were used to classify user comments. After the data preprocessing stage, vectors of user comments were extracted with the Tf-Idf method for NLP. As a machine learning method, classification was performed using five different models: Extra Trees Classifier (ETC), Gaussian Process Classifier (GPC), MLP Classifier (MLPC), Bernoulli Naive Bayes Classifier (BNBC) and Support Vector Classifier (SVC). Our aim is to show how quality metrics can be classified multiclass using user feedback. The dataset used is unbalanced, containing 1681 user comments classified by software experts. Synthetic Minority Oversampling Technique (SMOTE) was used to eliminate the imbalance in the dataset. The same classification models were applied to the unbalanced and balanced datasets and the results were compared. Accuracy values obtained with unbalanced dataset: GPC: 73% accuracy, 80% precision, 73% recall and 70% f1-score; MLPC: 80% accuracy, 79% precision, 80% recall and 79% f1-score; ETC: 86% accuracy, 87% precision, 86% recall and 85% f1-score; BNBC: 58% accuracy, 61% precision, 58% recall and 52% f1-score; SVC: 80% accuracy, 85% precision, 80% recall and 78% f1-score. Results after applying SMOTE: GPC: 86% accuracy, 87% precision, 86% recall and 86% f1-score; MLPC: 81% accuracy, 81% precision, 81% recall and 81% f1-score; ETC: 87% accuracy, 87% precision, 87% recall and 87% f1-score; BNBC: 72% accuracy, 74% precision, 72% recall and 72% f1-score; SVC: 80% accuracy, 85% precision, 80% recall and 79% f1-score. According to the results obtained, the best classification model is the Extra Trees Classifier model, which provides the highest accuracy rate with 87% according to the dataset with SMOTE. The results show that ML and NLP methods can be used effectively in the classification process of software quality metrics.

Keywords: Software Quality, Machine Learning, Natural Language Processing, ISO/IEC 25010, SMOTE.

AI System Automatically Adjusts Seats and Desks with Ergonomic Criteria for Children

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ABSTRACT

Sitting posture is a factor that needs more attention for children. There are many children with hunchbacks, adolescent idiopathic scoliosis (AIS), myopia due to sitting in the wrong posture and inappropriate desk position. This has worsened because of the emergence of technological devices in life. Therefore, the purpose of this research paper is to provide a direction for furniture design combined with AI that can improve and ensure children's development. The contents, as determined by the meta-analysis approach, include suitable sitting posture for children's development, how to incorporate AI into table and chair design, and automatic AI system in the interior. The results emphasize the adjustment of sitting posture and sitting distance between table and chair for each individual to create the best fit. Applying AI in the interior helps to monitor and adjust the appropriate sitting posture and health problems caused by faulty sitting habits.

Keywords: AI system, ergonomic for children, automatic AI, furniture design, child development, adolescent idiopathic scoliosis (AIS).

Yapay Zeka ve Görsel İletişim Tasarımına Etkisi

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ABSTRACT

Çalışma, yapay zekânın tarihsel gelişiminden başlayarak, günümüzdeki görsel iletişim tasarımı üzerindeki etkilerini kapsamlı bir şekilde ele almaktadır. Yapay zekâ, insan zekâsını taklit eden sistemlerin geliştirilmesini hedefleyen bir alan olarak tanımlanmakta ve özellikle görsel iletişimde yaratıcılığı destekleyen uygulamalara odaklanmaktadır. Makale, yapay zekâ teknolojilerinin grafik tasarım, prototip oluşturma, kullanıcı deneyimi tasarımı, video prodüksiyonu gibi alanlarda tasarım süreçlerini hızlandırma, maliyetleri azaltma ve estetik değerleri artırma potansiyeline vurgu yapmaktadır. Görsel iletişim tarihine değinerek, mağara resimlerinden modern grafik tasarım teknolojilerine kadar uzanan süreçte yaratıcılığın ve teknolojinin etkileşimi incelenmektedir. Yapay zekânın görsel iletişimde tasarımcıların iş yükünü hafifletirken yaratıcılığı nasıl desteklediği tartışılmakta, aynı zamanda bu teknolojinin insan dokunuşunun yerini tam olarak alamayacağı belirtilmektedir. Makale ayrıca, yapay zekâ destekli araçların grafik tasarımda sağladığı faydaları ve bu araçların sektöre sunduğu yeni imkanları örneklerle açıklamaktadır. Sonuç olarak, yapay zekânın tasarım süreçlerini dönüştürme potansiyeli vurgulanırken, insan yaratıcılığı ve özgünlüğünün korunması gerektiği ifade edilmektedir.

Keywords: Yapay Zeka, Görsel İletişim, Grafik Tasarım

Bekenbey AI: Innovative Solutions at the Intersection of Deep Learning and Law

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ABSTRACT

This research introduces a cutting-edge integration of generative artificial intelligence (AI) within the realm of law, creating a sophisticated application tailored for legal professionals, organizations, and the public. The Bekenbey AI model showcased in this study is distinguished by its substantial potential, with key performance metrics such as accuracy, precision, recall, F1- score, ROUGE, and BLEU scores illustrating its adeptness at legal analytics. The model demonstrates exceptional precision and adaptability across various legal sectors and frameworks, establishing it as an indispensable asset for modern legal challenges. The findings suggest that the Bekenbey AI proficiently handles and interprets legal texts, significantly aiding the progression of legal systems. The model's efficiency escalates with the expansion of dataset sizes, emphasizing its capacity for extensive data analysis. Ongoing enhancements are focused on increasing the model's precision and extending its functionality to a wider array of legal contexts. To the best of our knowledge, this study represents the first instance of combining the domains of artificial intelligence and law using real data.

Keywords: Advanced Generative AI, Deep Learning Innovations, Bekenbey AI Model, AI Applications in Law, Legal Framework Analysis, Legal Document Examination.

The Use of Gazebo and AirSim in Simulation Based Autonomous UAV Development: A Detailed Review

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ABSTRACT

Simulation technologies play a crucial role in the safe testing of complex environmental conditions during the development of unmanned aerial vehicles (UAVs). This study provides an in-depth analysis of the Gazebo and AirSim simulation platforms to enhance UAV performance. Gazebo realistically simulates physical world conditions, allowing for sensor integration and testing of flight dynamics, while AirSim offers high-resolution visual data used primarily for training deep learning algorithms. The findings indicate that both platforms make significant contributions to the development of UAV systems in critical areas such as autonomous navigation, obstacle detection, and energy efficiency. In conclusion, simulations are highlighted as key tools in optimizing UAV performance in real-world conditions and ensuring the safe execution of autonomous missions.

Keywords: UAVs, Simulation technologies, Gazebo, AirSim, Autonomous navigation, Obstacle detection, Deep learning, Collision avoidance.

