



ACADEMY OF SCIENCES OF ALBANIA
SECTION OF NATURAL AND TECHNICAL SCIENCES
ARTIFICIAL INTELLIGENCE UNIT

THE INTERNATIONAL SCIENTIFIC CONFERENCE

“AI Horizon - A new era of creativity and innovation”

Tirana on 8-9 November 2024

ABSTRACTS BOOK



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Enhancing a Learning Management System (LMS) with AI-Driven Personalization (Case Study)

**Agon Memeti*¹, Florinda Imeri¹, Shkurte Luma-Osmani¹,
Florim Idrizi¹, Betim Çiço²**

¹ University of Tetova, North Macedonia; ² Epoka University, Tirana, Albania

The goal of this paper is to look at how we can use AI to personalize learning platforms in a way that improves the experience for students. Rather than a one-size-fits-all approach, the idea is to use machine learning to tailor content and recommendations to each individual user. The machine learning algorithms in the proposed framework will dynamically adapt to the changes pertaining to the learning experience based on the individual user's interactions. So as you interact with the system, it gets smarter about what kinds of things you might be interested in or find helpful and the specific proposal involves building this type of personalized AI into a learning management system using Blazor components. Blazor allows content to be dynamically updated in real-time, which suits this personalized approach. We present a practical use case of the University of Tetova. By this study, we would like to underline the potential of AI-driven personalization in LMS environments and the advantages of using Blazor for real-time, modular system integration.

Enhancing digital consumer interaction through generative AI

Ajkuna Mujo, Erarda Vuka
Mediterranean University of Albania

This paper explores the potential of using a conversational agent system architecture to enhance customer interaction and digital marketing efforts. By implementing a chatbot powered by generative AI. The proposed prototype is developed in a real-world telecommunications environment. To demonstrate the functionality of the system, a comprehensive analysis and integration of multiple technologies were carried out. These technologies included artificial intelligence, natural language processing, and knowledge bases, each contributing to the system's overall effectiveness. To evaluate the system's impact, a case study focusing on Vodafone's TOBi chatbot service was conducted, providing valuable insights into real-world applications. Additionally, the paper explores and discusses various challenges encountered during the implementation and integration phases, shedding light on obstacles and solutions in developing robust customer service AI tools.

An Exploration of Keyword Extraction Approaches and Eye-Tracking Solutions for the Albanian Language

Alba Haveriku, Nelda Kote, Elinda Kajo Meçe, Françeska Fone
Polytechnic University of Tirana, Albania

Keyword extraction is an essential technique for extracting the most important words or phrases from textual documents facilitating search, categorization, and summarization processes. Our work aims to examine and compare some of the primary keyword extraction methods for texts in Albanian language. These methods include frequency-based techniques, statistical methods, and advanced approaches utilizing machine learning and natural language processing (NLP) tools. We specifically explore the integration of RAKE, YAKE and KeyBERT models in the Albanian language and use evaluation metrics such as F1-score to compare the accuracy and suitability of these methods. The results achieved by the above-mentioned keyword extraction methods are compared with the data collected from webcam eye-tracking experiments to demonstrate the feasibility of using eye-tracking solutions for automatic keyword extraction. Our findings suggest that the application of advanced machine learning models and eye-tracking technology can significantly enhance the quality and effectiveness of information retrieval processes.

Cybersecurity Empowered by Generative AI: Strategies and Opportunities

Albina Bardhi¹, Kozeta Sevrani², Romina Muka²

¹ Hornbill Corp. Ltd., ² University of Tirana, Albania

This research explores the integration of Generative AI (GenAI) into existing cybersecurity frameworks, focusing on increasing cybersecurity awareness, making training better, automating tasks and finding new ways to prevent threats. With cyber threats growing more complex and frequent, traditional cybersecurity measures face limitations in handling the increasing volume of data and sophisticated attack techniques. This study explores the current applications of GenAI in cybersecurity and proposes a full conceptual framework for its adoption while addressing the ethical considerations that come with this technological advancement. The study combines several methods, including case studies, a survey of 120 industry professionals that work for companies that operate in Albania, demos of usage of GenAI in cybersecurity tasks and an expert interview. The survey identifies significant gaps in cybersecurity training and awareness for employees. Many companies have only basic cybersecurity protocols in place and there is a pressing need for AI-driven training programs and simulated cyber-attacks to improve employee readiness. The research shows that integrating GenAI into cybersecurity systems has the potential to automate many cybersecurity tasks, simulate sophisticated attack scenarios, make threat detection more accurate and generate synthetic data for training; all this contributing in making cyber systems more resilient. There are challenges like high implementation costs, regulatory restrictions, and the need for scalable solutions. The research stresses the importance of updated regulatory frameworks, like the AI Act, to accommodate these technological shifts. This study contributes to the field of cybersecurity by presenting a practical framework for integrating GenAI into current security practices, offering recommendations for future research on adversarial defense mechanisms, transparent AI systems, and cost-effective GenAI tools. It highlights the potential of GenAI in reinforcing cybersecurity defenses

and improving overall system readiness.

Ontology based Responsible AI assessment framework

**Alex Ghimici, Alireza Modiriyan, Shima Hosseini Pour,
Navneet Kaur, Edlira Vakaj**

College of Computing, Birmingham City University, UK

One of the most controversial and talked about subjects around the world is usage of Artificial Intelligence (AI). The challenge in interacting with AI is not knowing whether they are responsible and biased towards the subject we are communicating with the specific model of the AI. To assess this, we have developed the AssessAI ontology to help identify if an AI is biased in different fields. Nowadays people that are following technological advances have most likely heard of ChatGPT and other types of generative AIs and use them daily. ChatGPT currently have over 180 million users and it is increasing every day. This is a relatively new advancement that helps creators, coders and whoever has a question to ask these AIs and get a response from them using the data they have been trained on. This paper helps people to understand whether the AI model they are using is ethical. Additionally, the other intent of this ontology is to bring awareness to companies, ontologists and taxonomist to introduce documents related to ethics. One of the problems is fairness when an AI tool is trained on biased or incomplete data. For example, this could lead to potential problems using these tools in order to go through applicants of a company or trying to detect fraudulent activity in financial services if the tool has gone through a biased dataset towards a specific race or gender. These biases often are unconsciously sneaking in the data. For instance, if the number of "good" applicants in the training dataset of a tool were more male than the female applicants this could lead into discrimination against the female applicants during the actual hiring process due to the dataset that was used.

Hyperparameter Optimization in CNN Using Genetic Algorithms: Case Study with Inception on Binary Classification Tasks

Ambra Korra, Anduel Kuqi, Indrit Enesi
Polytechnic University of Tirana, Albania

In computer vision, Inception algorithms as part of convolutional neural network architecture, are commonly applied for image classification tasks due to their efficiency in feature extraction and object detection. However, to achieve higher accuracy, fine-tuning the model parameters is necessary. This paper investigates the application of hyperparameter optimization in CNNs using a Genetic Algorithm (GA), which allows for an automated and efficient search through the hyperparameter space. Mainly, the study focuses on optimizing an InceptionV3-based model for binary classification tasks related to industrial defect detection, a critical application in quality control. Key hyperparameters such as dropout rate and learning rate were optimized through GA, with the model population evolving over several generations using crossover and mutation operations. Performance was evaluated based on validation accuracy, showing consistent improvement across generations. The best-performing model achieved 99.86% validation accuracy, demonstrating the effectiveness of GA optimization techniques in deep learning models for selecting the best hyperparameter values of dropout and learning rate. Our findings highlight the potential of these algorithms to enhance classification performance, particularly in industrial defect detection scenarios.

Multi-Year Action Design Research on Low-Code Platform Development Using Domain- Specific Languages

**Andrea Alberici¹, Nevila Baci¹, Eugenio Brentari²,
Kozeta Sevrani¹**

¹University of Tirana, Albania; ²Università degli Studi di Brescia, Italy

This paper presents the findings from a multi-year Action Design Research (ADR) project conducted from 2016 to 2020, focusing on the development of a low-code platform utilizing Domain-Specific Languages (DSLs). ADR, a research methodology that combines theory generation with researcher intervention to solve organizational problems, was employed to address the growing need for rapid application development across various business sectors. The research aimed to empower business users, often referred to as "citizen developers," to create complex applications with minimal coding knowledge. In the initial phase, we compiled a comprehensive knowledge base of approximately 5,000 business cases spanning diverse sectors. This repository served as a corpus for computational ontology, informing the identification of common patterns and requirements, guiding the design of specialized DSLs responding to specific business needs. A first outcome is the development of a DSL for document generation from relational databases. This proof-of-concept demonstrated the efficacy of DSLs in abstracting complex operations, making them accessible to non-technical users through a process of semantic abstraction and domain-specific syntax. The research yielded several significant findings. Primarily, we observed that DSLs significantly simplify complex tasks through domain-specific abstractions, enabling non-technical users to perform operations that traditionally required specialized programming knowledge, thereby reducing the cognitive load associated with software development. Furthermore, our study underscored the criticality of a robust business case repository in guiding the design of both individual DSLs and the overall low-code platform, serving as a

foundation for domain analysis and feature modeling. The research also revealed a synergistic effect when combining multiple, specialized DSLs, creating a flexible and powerful low-code development environment that leverages the principle of separation of concerns to manage complexity. Additionally, we identified notable challenges and opportunities in integrating traditional imperative programming paradigms with visual, declarative low-code approaches, particularly in areas of semantic consistency and execution model unification. This research contributes to the field of information systems by demonstrating the practical application of ADR in developing low-code platforms based on DSLs. It highlights the potential for DSLs to democratize application development within enterprises, opening new avenues for research in end-user development and rapid application creation methodologies. As of 2024, the project is going to be enhanced in light of recent advancements in Large Language Models (LLMs), as they present an exciting opportunity to further lower barriers to application development. The integration of LLMs with our DSL-based low-code platform could enable more intuitive, natural language-driven interfaces, potentially revolutionizing how business users engage with application development. Future research will explore how LLMs can augment DSL-based platforms, particularly in areas of code generation, semantic parsing, and context-aware assistance, thereby expanding the capabilities of citizen developers and further bridging the gap between natural language and executable code.

Generative AI-driven Framework for Adaptive 3D Modeling and Printing Optimization

Anduel Kuqi, Ambra Korra, Indrit Enesi

Polytechnic University of Tirana, Albania

Generative AI has emerged as a transformative technology in design and manufacturing, particularly in 3D modeling and additive manufacturing. This paper introduces a novel Generative AI-driven framework for optimizing 3D printing and modeling processes. The framework integrates real-time feedback, dynamic model generation, and adaptive printing control through a combination of Generative Adversarial Networks (GANs) and Reinforcement Learning (RL). To validate the effectiveness of the algorithm, synthetic data is used initially, followed by a discussion of real-world applications and potential datasets. The results show significant improvements in material efficiency, structural integrity, and production speed. The proposed framework sets a foundation for AI-enhanced additive manufacturing, with future work focusing on real-world implementation and scalability.

Classifying X's users with Hypergraph Neural Networks

Arbër Ceni, Alda Kika
University of Tirana, Albania

Social media platforms are used daily by millions of people. Every action a user takes on these platforms leaves a mark and often represents an interaction with another user. These interactions are typically modeled as a graph, where the initiating user is considered the first vertex and the recipient user is the second vertex. Several machine learning models have been trained and tested on these graphs with the purpose of classifying nodes or predicting edges. However, it is shown that graphs do not completely capture high order interactions (HOIs) and can be considered a subset of hypergraphs. In this paper we propose to model user interactions in a social media platform (X previously known as Twitter) as a hypergraph and run state of the art (SOTA) hypergraph neural networks (HNNs) to classify users (nodes) as being suspended from the platform or not. Results from this paper are compared with results gathered from graph neural networks (GNNs). Data used to train, evaluate and test the hypergraph models, were collected from X (previously Twitter) from November 2021 until July 2022.

Humans or AI: Who Will Win the Workplace of Tomorrow?

Artina Kamberi, Abdylmenaf Bexheti

South East European University, RNM

This paper investigates the impact of AI-related job loss, wage inequality, skill premiums, and employment rates on AI-related job growth across a diverse set of 20 developed, emerging, and developing economies from 2010 to 2024. Applying a fixed-effects panel regression model, we explore how labor market dynamics are reshaped by the adoption of artificial intelligence, focusing on both the displacement of jobs and the creation of new opportunities in AI-driven sectors. Our results reveal a strong positive relationship between AI-related job loss and job growth, indicating that while AI displaces certain jobs, it concurrently fosters employment in new areas. Conversely, we find that higher skill premiums are associated with slower AI job growth, suggesting that a shortage of skilled labor hinders the expansion of AI-related industries. Wage inequality, however, does not appear to significantly impact AI-related job creation, while higher overall employment rates support AI job growth, particularly in countries with robust labor market fundamentals. These findings highlight the importance of skill development, labor market flexibility, and macroeconomic stability in facilitating AI-driven job creation.

Reengineering Legacy Education Systems using Microservices and Machine Learning-Driven Optimization

**Blend Arifaj¹, Dhuartë Hyseni¹, Betim Çiço²
and Isak Shabani^{1*}**

¹ University of Prishtina, Kosova; ² Epoka University, Tirana, Albania

As the reliance on software systems increases, the modernization of legacy systems has become essential to meet current performance and scalability demands, particularly in the education sector. Legacy systems are often complex and costly to maintain, integrate, and enhance. Migrating to a microservice-based architecture, which decomposes the system into independent, modular units, offers a viable solution. However, the migration process is challenging, requiring careful analysis of system components and usage patterns. This paper introduces a novel migration framework that combines microservices architecture with machine learning techniques to analyse system logs, performance data, and source code. Machine learning models are employed to identify usage patterns, detect bottlenecks, and uncover system dependencies, enabling a data-driven approach to prioritizing features for migration. By leveraging ML, the framework automates the reengineering process, optimizing system performance and maintainability. The framework was applied to a real-life education system, yielding improvements in scalability, testability, and overall system efficiency.

Selecting a Neural Network Model with an Application to House Price Determinants in Albania

Blerina Vika¹, Ilir Vika²

¹ University of Tirana, Albania; ² Bank of Albania

Much of the early research in neural networks (NN) applications have been sponsored by financial services institutions, as they realized the potentiality of using artificial NNs in rating financial investment risks, forecasting economic indicators, and analyzing the relevance of explanatory variables (Trippi and Turban, 1993). The empirical literature on neural networks continues to enlarge in all fields of economics, yet the methodology used for the construction and specification of NN models still involves a lot of trial and error in order to identify the best structure that serves the matter in hand. Contrary to traditional econometric methods, neural networks can handle estimations that contain a much larger number of parameters than observations. Thus, the complexity of a neural network varies with the selection of the number of inputs (and their lags), hidden layers and neurons.

This article discusses the key issues faced in designing, specifying and validating a neural network structure to be used for analyzing or forecasting economic variables. After the methodological discussion, we demonstrate how the decisions are made in practice during the model selection procedure. As an illustration, we employ the long short-term memory (LSTM) network in an exercise that investigates the drivers of the recent surge in Albania's house prices. The latter are analyzed in relation to a number of theory-based indicators, such as GDP per capita, bank credit for real estate, foreign investment in housing market, home rental, interest rates, construction costs, urban population growth, and new house building permits. By varying the number of input lags (2, 4, 8, 16), hidden layers (1, 2, 3, 4), and nodes (16, 32, 64, 128, 256, 512, 1024), the total of candidate structures amount to 112 tested neural networks. The set of hyperparameters in

each network is chosen such that it yields the lowest out-of-sample forecast error (RMSE) over a validation sample of 48 quarters. Finally, all NN structures are tested for their forecast ability of house prices from 2017Q1 to 2023Q2, and then ranked accordingly from best to worst performing models. Looking at their resulting optimal values for hyperparameters it is suggested that when building a neural network, practitioners may want to focus on model structures that consist of a couple of input lags, three hidden layers, three dozens of neurons, and around 67,600 parameters.

Improving Medical Diagnosis with Deep Learning Models in Two Medical Image Analysis

Bora Tafa and Bekir Karlik

Epoka University, Tirana, Albania

This study investigates the use of deep learning techniques to analyze medical images and identify disorders, highlighting the transformative impact of these technologies on medical diagnoses. It also examines several approaches to improve generalization, such as using extensive and diverse datasets and complex training methods. One of the major obstacles to medical diagnostic methods, especially for rare disorders, is the lack of data. Therefore, this study addresses methods to mitigate this problem, including generating synthetic data using strategies such as transfer learning, data augmentation, and generative adversarial networks (GANs). The study observed that using different deep learning architectures, such as ResNet, Inception, and DenseNet, significantly improved the diagnostic accuracy and efficiency of disease identification across various imaging modalities, including MRI, CT, X-ray, and ultrasound.

Integration of AI (Artificial Intelligence) with Cloud Services and its impact in the economic performance of the industry

Dardan Madani

University of Vlora, Albania

In this paper it will be treated the impact of cloud services integration with AI in the economic growth of companies. Furthermore, it will be covered the history of Artificial Intelligence and cloud technology which are by itself modern approaches in the IT industry. Moreover this paper will go deep in the scientific and technical explanation of AI and cloud technologies and how they impact the revenue of businesses. The development of cloud technologies represent a huge milestone achieved by the tech companies and the integration with AI has made its impact crucial in different fields of life. This article will be focusing deep in the role that this two tech innovations have played in the increase of incomes for many companies worldwide. Furthermore, in this paper will be visualized the proportion in which companies use AI and cloud technologies subsequently it is to be taken in consideration even the job places opened by the cloud services and AI providers. In the end the main purpose of this article is to make a scientific research on the importance of cloud and AI technologies in boosting economic growth among companies and how they have developed over time.

Physical Informed Neural Networks (PINN) an alternative for solution of large scale PDE: Some applications

Dashnor Hoxha

University of Orléans, FRANCE

The Machine Learning (ML) and Deep Learning (DL) technics are used on many fields of human activity and AI breaks out as a indispensable tool of everyday activity as well as a phenomena of society. The mathematical physics problems have been always a field of dynamic research that gave rise of various numerical methods. The use of ML and DL has been in last decades enter also in the developing of promising technics to tackle the challenging Multiphysics problems. In particular the advancing Differentiation and use of high optimized libraries for ML such a TensorFlow and Kerias have favorized the developing of a branch of Deep Learning, known as Physical Inspired Neural Networks (PINNs). The principles of such approach introduced in [1] are presented and then an implementation of its , is used to tackle a direct problem of thermal consolidation a challenging multiphysics problem. It is shown that despite the good accuracy more work is needed yet to enforce learning, especially when on boundary of the domain. Then, the versatility of PINN methods to abord inversed problems is demonstrated through a problem of thermal resistance identification from noisy, in field data measurements. The perspectives on the use of PINN on Discovery Physics problem close the paper.

On an overview of state-of-the-art research on AI in western Balkans

Dimitrios A. Karras

Kapodistrian University of Athens, Greece;
Epoka University, Tirana, Albania

This article offers a thorough overview of the most recent artificial intelligence (AI) research conducted in the Western Balkans, which include Serbia, Albania, Bosnia and Herzegovina, Croatia, Kosovo, Montenegro, North Macedonia, and Montenegro. In terms of published scholarly research, being indexed in significant research indices that include peer-reviewed research, the study primarily looks at published scholarly research aiming at highlighting key areas of innovation, eminent research institutions, and cooperative activities within the region. It examines the research of AI in a variety of fields in Western Balkans according to indexed publications, highlighting the challenges, difficulties, and chances that researchers in the Western Balkans face as it comes out from state-of-the-art literature review. The significance of international partnerships and collaborations as well as the importance of government financing and legislation in influencing the AI research ecosystem, are also briefly discussed in this study. Through an analysis of previous developments and the identification of upcoming trends, this article seeks to contribute to the global dialog on AI development and its social implications by offering insightful information about the future paths of AI research in the Western Balkans in a preliminary comparison with relevant EU research highlights and developments.

The Role of Artificial Intelligence in Transforming Financial Technologies (FinTech)

Dolantina Hyka, Elion Shabanaj, Jurgjen Meçaj, Festim Kodra
Mediterranean University of Albania, Albania

Artificial Intelligence (AI) has become a driving force behind the rapid evolution of financial technologies (FinTech). This paper explores the application of AI in FinTech, with an emphasis on key areas such as fraud detection, personalized financial services, and risk management. AI techniques, including machine learning and natural language processing, are being utilized to enhance operational efficiency, automate financial processes, and improve customer experiences. However, alongside these innovations, AI introduces challenges related to data privacy, algorithmic biases, and regulatory compliance. Our research provides insights into the recent advancements, challenges, and future directions for AI-driven solutions in the financial sector.

A systematic review of Machine Learning Algorithms in IoT-based Personalized Online Learning Systems

Edlir Spaho, Betim Çiço

Epoka University, Tirana, Albania

The rapid evolution of technology and the increasing prevalence of the Internet of Things (IoT) have significantly transformed educational paradigms, giving rise to Personalized Online Learning (POL) algorithms. This paper systematically explores POL algorithms utilized in IoT-based personalized online learning systems, emphasizing their potential to enhance learner engagement and deliver individualized educational experiences. We present a comprehensive framework that integrates adaptive learning algorithms with IoT data, including environmental context, physiological responses, and learner profiles, to create dynamic content tailored to individual student's unique needs. Additionally, we address the challenges and ethical considerations related to data privacy and algorithmic bias in IoT-driven personalized learning environments. Our findings suggest that IoT-enhanced POL systems can effectively contribute to the personalization of online education by accurately classifying learners, generating adaptive learning paths or content, managing human variability, and providing a responsive and effective learning environment that meets individual needs.

Usage of Description Logics for Data Integration: A Short Introduction

Edlira Cani

Epoka University. Tirana, Albania

Data integration is the problem of accessing in real time from a single point multiple heterogeneous and autonomous data sources. Solutions have been suggested since the early 90s. Description Logics (DLs) is proposed and proved to be of value in this problem. DLs formalize the representation of knowledge and reasoning in AI systems. In data integration, they can be used in the unification of data sources content and semantics in a common language. Logical inference can be used in query answering. To provide a general picture on DLs for data integration a short introduction is given in this paper by reviewing papers of the field. Ontologies, formalized using DLs, are used to provide the syntax and mainly the semantics of the sources in a global schema. The system has been referred to as Ontology-based data integration or access (OBDA). Virtual knowledge graphs are being combined with ontologies to provide virtualization of the data sources as interconnection of ontology concepts and concrete data. The user poses the query over the global schema and the system translates the query into the language of the sources using the mappings. DLs in data integration is a rich research field with future directions in data federation, knowledge graphs usage, explanations of query answering, etc.

Ai Based Actual System Developments at UBT Smart City

Edmond Hajrizi

University for Business and Technology, Prishtina, Kosova

We are living in the times of convergence revolution which represents a very high dynamic and complex environments. This requires a new solution for education, research, and developments. This solution is requiring high complex and very dynamic oriented models which in many cases is not easier to create even for testing purposes. To support this causa UBT – University for Business and Technology has created its own model called UBT 5S – Small Scale Smart Selfsustained System or short UBT Smart City. UBT Smart City represents now an Entrepreneurial Smart and Sustainable Innovation based Ecosystem. This model represents a dynamic complex system and is created to use as test bad system for smart and selfsustained solutions for education, innovation, and development. Made from different components for life and different technologies UBT Smart City create a great opportunity to use Artificial Intelligence for development different Solutions too. Selected Cases of using AI through system-based design approaches are presented in this paper to see the opportunities which UBT Smart City Ecosystem offered for different proposes Health, Education, Infrastructure, Sport, and Governance.

Development of a Smart City Platform: IoT Integration and AI-Driven Predictive Analytics for Environmental Sustainability

Edmond Hajrizi, Besnik Qehaja, Blerim Zylfiu, Elton Boshnjaku
University for Business and Technology, Prishtina, Kosova

The rapid advancement of technology has transformed various aspects of daily life, giving rise to the concept of “smart” systems. From smartphones to smart homes and workplaces, technology has evolved to enhance efficiency and convenience. One of the most significant developments in this domain is the emergence of smart cities, which leverage a network of interconnected IoT devices and sensors to collect real-time data, improving urban management, public services, and the overall quality of life for citizens. This study focuses on the development of a platform for the UBT Smart City, designed to manage and visualize real-time data from various IoT sensors. In addition to providing a flexible solution for smart city management, the platform’s sensor data will be used to train machine learning models for applications such as air quality prediction, energy consumption prediction and agricultural monitoring. These AI-driven insights will further optimize resource usage and promote sustainability initiatives. This research highlights the potential of IoT and AI integration in creating smarter, more sustainable urban environments, and offers practical insights into the implementation of advanced technologies within urban and academic settings.

Evaluation of visualization tools

Emiranda Loka, Alda Kika
University of Tirana, Albania

This abstract provides an overview of the scope of evaluation for data visualization and business intelligence tools, specifically focusing on Tableau, Power BI, and Looker. These tools are extensively utilized in various industries to transform raw data into actionable insights through visualization. The scope of evaluation encompasses the strengths and weaknesses of each tool, considering factors such as user-friendliness, scalability, integration capabilities, and visualization options. Tableau is recognized for its intuitive interface, extensive visualization options, and robust calculation engine, while Power BI excels in its seamless integration with the Microsoft ecosystem, scalability, and natural language querying capabilities. On the other hand, Looker stands out for its emphasis on data governance, centralized data models, and SQL-based approach. The abstract highlights the importance of carefully evaluating these tools based on organizational requirements, user preferences, and budget considerations to determine the best fit for data visualization and analysis needs. Through this evaluation, organizations can harness the full potential of these tools to drive informed decision-making and unlock actionable insights from their data.

The impact of AI in Albanian Education System through 3D modeling

Ernaso Kerbizi

University of Durres, Albania

The traditional education system in Albania, has often been complex, difficult and stressful for the students, causing lack of interest and motivation from their side. To make this process easier, more interesting and interactive, various reforms have been introduced during recent years aiming at modernizing and improving educational quality. These reforms focus mainly on teacher training and curriculum development, but also on investment in technology and innovation. Yet, the effect of these changes is still limited, and the potential has not been fully realized. The scope of this paper is to focus mainly on the impact of introducing artificial intelligence (AI), as one of the needed key components of applied technology in Albanian education system through 3D modeling. Even though the integration of AI in education through 3D modeling is still in the beginning phase, yet it has shown great potential to enhance the learning/teaching process, by providing personalized learning experience for the students and improving efficiency and support with useful tools and real-time simulations in 3D. Nevertheless, the use of AI needs to be provided carefully, as it can create new challenges like lack of adequate knowledge from the teachers, privacy/data security concerns, ethical issues, lack of reliability etc.

A Comprehensive Comparison of Large Language Models: LLaMA and GPT

**Fisnik Spahija¹, Dhuratë Hyseni^{1*}, Isak Shabani¹,
Nora Sadiku Dushi¹, Betim Çiço²**

¹University of Prishtina, Kosova; ²Epoka University Tirana, Albania

From answering simple questions to building software applications with ease, LLMs have quickly advanced into becoming a necessity for today's reality. They have shown their intent to continue encapsulating our lives with qualitative and rapid information. GPT and LLaMA have undoubtedly garnered attention for their practical applicability and accuracy they provide. This study serves as a comparison of LLaMA 2 7B and GPT-2, analyzing their architectures, training techniques, design choices and performance metrics. Evaluations include text classification, question answering, named entity recognition, and inference time, measured using standardized datasets. Results show that LLaMA 2 achieves higher accuracy in classification tasks (90.1% on MRPC and 94.3% on SST-2), question answering (F1 score of 88.73% and Exact Match score of 81.4% on SQuAD v1.1), and named entity recognition (F1 score of 92.4% on CoNLL-2003), compared to GPT-2's respective scores of 88.9%, 93.1%, 85.5%, 78.1%, and 90.8%. Additionally, LLaMA 2 demonstrates better computational efficiency with a response time of 120 ms per query versus GPT-2's 150 ms.

Using AI techniques into hybrid classroom teaching

Frida Gjermeni, Manjola Zeneli, Uendi Cerma

University of Durres, Albania

This paper examines the integration of artificial intelligence (AI) techniques into hybrid classroom teaching, focusing on enhancing educational outcomes and student engagement. As institutions increasingly adopt hybrid models that combine in-person and online learning, the need to address unique challenges in these environments becomes critical. There are various AI tools, including adaptive learning systems and intelligent tutoring systems, that personalize learning experiences and support educators in real-time decision-making. Through case studies and empirical research, the study analyzes the impact of AI on student performance, motivation, and collaboration. Findings indicate that AI can improve instructional strategies and facilitate differentiated learning, catering to diverse student needs. The paper also addresses the importance of teacher training and the ethical implications of AI, such as data privacy and algorithmic bias. In conclusion, there are provided recommendations for effectively implementing AI in hybrid teaching frameworks, emphasizing the potential of these technologies to transform education by making learning more accessible and tailored to individual needs. The integration of AI in hybrid classrooms promises the enhance of educational outcomes and better prepare students for a digital future.

Comparing AI Methodologies Using Analytical Statistics

Ketjona Shameti, Betim Cico
Epoka University, Tirana, Albania

AI has changed a lot of sectors and brought innovative approaches to difficult problems. However, a systematic and combinatorial approach is required for the effective implementation of AI initiatives to stay informed about the most recent developments in the industry. There are two frameworks, the CRISP-DM and OSEM, that serve as a high-level explanation of the data science project development cycle. The basis for the six-phase approach known as the Cross Industry Standard Process for Data Mining (CRISP-DM) is the provision of a thorough strategy, putting a focus on business goals all the way along with the project. Conversely, though OSEM framework is more focused on data, processing and in-investigating the data prior to modeling. In our study, we have analyzed both frameworks and compared them in every phase to determine which one is more accurate in terms of prediction and in terms of the model compatibility. One study case was used in our empirical investigation, which we performed. According to the experiment conducted, it was recommended that CRISP-DM provides a better result in terms of both prediction and compatibility.

Balancing Model Efficiency And Accuracy in 3D MRI Image Segmentation

Kevin Hoxhalli, Arban Uka, Florenc Skuka

Epoka University, Tirana, Albania

Medical image analysis using computational techniques constitutes an essential area in providing precise quantitative results in a short time to deduce patient condition. The detection, segmentation and shape parameters of tumors (including volume, area, eccentricity etc) is now being implemented using deep learning techniques. Optimization of resources have to be considered during the dataset preparation, the training steps, and the testing steps. Models that are trained based on a manually labelled datasets can be used by medical practitioners to evaluate new patient data. Here in this work we report brain tumor segmentation on BraTS 2020 dataset using different architectures and then we use quantization to reduce the size of the trained models. A comprehensive evaluation framework was utilized to assess segmentation performance across whole tumor (WT), tumor core (TC), and enhancing tumor (ET) regions. Results demonstrated the robust performance of the baseline 3D U-Net, achieving high accuracy (91.19%) across all tumor regions. However, Att_EquiUnet, using the CBAM attention module, showed improvements in boundary localization as evidenced by reduced Hausdorff distances. 16-bit quantization emerged as an optimal compromise, achieving a 75% reduction in model size while maintaining accuracy and even slightly improving sensitivity in some cases. 8-bit quantization, while further reducing model size (to 6.4%), incurred a more pronounced accuracy loss, raising concerns about its suitability for clinical use.

A comparison between Gaussian Processes and LSTM networks on implementing physics-guided machine learning models for traffic state prediction

**Kleona Binjaku¹, Elinda Kajo Meçe¹,
Cecilia Pasquale², Simona Sacone²**

¹ Polytechnic University of Tirana, Albania, ² University of Genoa, Italy

Optimizing urban transportation systems requires accurate traffic state prediction. In this work, we propose and compare two physics-guided machine learning approaches for freeway traffic prediction: a physics-regularized Gaussian Process (GP) and a physics-informed Long Short-Term Memory (LSTM) network. The GP model integrates information from the METANET traffic flow model into its regularization process, while the LSTM incorporates METANET constraints directly into its objective function. We compare the prediction accuracy, computational efficiency, and implementation complexity of both models. The trade-offs between these two methods for a real case study are clarified by our findings.

AI Applications in Banking Risk Management: Exploring Key Trends and Barriers

Majlinda Godolja, Laureta Domi
University of Tirana, Albania

As the banking sector faces complex risks, from financial volatility to cybersecurity threats, traditional risk management approaches are becoming inadequate. Artificial Intelligence (AI) has emerged as a transformative technology, offering faster, more accurate, and scalable solutions that enhance risk management. This literature review examines key AI applications in banking, focusing on fraud detection, credit risk assessment, market risk forecasting, and cybersecurity protection. By reviewing recent studies, this paper highlights how AI-powered systems leverage machine learning and big data analytics to detect fraud in real-time, assess creditworthiness, and forecast risks. These innovations improve efficiency, reduce risks, and enable banks to adopt proactive risk management. However, the literature identifies challenges, such as data privacy concerns, model transparency, and integration with legacy systems. Additionally, regulatory requirements for AI governance add complexity. Emerging trends, such as Explainable AI (XAI) and blockchain integration, are poised to enhance transparency, security, and personalization. The review concludes that while AI offers significant improvements in banking risk management, a balanced approach that addresses both its advantages and challenges is essential for successful adoption.

Latent Dirichlet Allocation in Natural Language Processing, A statistical review

Milena Shehu, Areti Stringa
University of Tirana, Albania

Latent Dirichlet Allocation, also known as LDA, is a generative probabilistic model in the domain of Natural Language Processing (NLP), that is frequently used for the purpose of discovering latent thematic structures that are concealed inside large text datasets. The first part of the paper is a Literature Review of LDA Applied in NLP. This review addresses LDA's most important improvements to the NLP field and demonstrates how well it works at finding semantic structures in unstructured text. Next, the paper discusses Parameter Estimation Methods. It covers methods like Variational Inference and Gibbs Sampling that are used to guess how topics are spread out across texts and words. These methods are tested to see how well they work with big datasets and how quickly they can be computed. In the Hyperparameter Tuning section, we explore what happens when we change important hyperparameters like the Dirichlet priors: topic-document distribution and word-topic distribution. We also discuss ways to improve model performance, such as grid search and Bayesian optimization. Finally, the paper addresses the limitations of LDA, such as the assumption of "bag-of-words," the fact that topics can only be roughly understood, the use of "Dirichlet priors," the ability to scale, and the sensitivity to hyperparameters. The purpose of this work is to give researchers and practitioners with a comprehensive understanding of the statistical mechanics of LDA and to guide its application in a variety of domains.

Women in AI jobs in Albania: perspectives from the Generation Y and Generation Z

Oliana Sula

University of Durres, Albania

Women's participation in STEM (Science, Technology, Engineering and Mathematics) in Europe is higher for CEE (Central Eastern European) countries than Western European countries, even if it has decreased as of 2024. In Albania, there is no official data about women's participation in STEM jobs even though the majority of leadership positions in the ICT (Information and Communication Technologies) are held by women. AI (Artificial Intelligence) has often been considered the main cause of job reduction in the future especially for women. Women's participation in AI jobs worldwide remains low. The majority of Generation Y and Generation Z users have embraced the use of AI tools for their daily tasks but they still fear AI in terms of job losses. Women and girls of Generation Y and Generation Z use and work less in AI. This study aims to explore the perspectives of women and girls of Generation Y and Generation Z in AI jobs in Albania. This study employs qualitative methods. 10 semi-structured interviews were conducted with women and girls from Generation Y and Generation Z. The study shows that there are still barriers in AI jobs especially in terms of gender bias, discrimination, and lack of transparency.

A Data-Driven Approach to Optimizing Crop Selection Based on Environmental and Soil Factors

Paola Shasivari, Aida Shasivari, Nelda Kote, Elinda Kajo Meçe
Polytechnic University of Tirana, Albania

As global agriculture faces rising challenges from climate change, resource scarcity, and the need to support a growing population, data-driven approaches offer a transformative solution. This study presents a machine learning-based crop recommendation system that assists farmers in selecting the most suitable crops based on environmental and soil factors, while ensuring data privacy and digital sovereignty. By analyzing key variables, such as soil nutrients (Nitrogen, Phosphorus, Potassium), temperature, humidity, rainfall, and soil pH, the system delivers precise crop recommendations using machine learning models, including Decision Trees, Random Forests, Support Vector Machines (SVM), and K-Nearest Neighbors (KNN). The study emphasizes the integration of privacy-preserving mechanisms, such as federated learning, to safeguard sensitive agricultural data, ensuring compliance with data sovereignty regulations. This approach ensures that farmers maintain control over their local data, supporting sustainable agricultural practices and protecting their autonomy in the face of increasing digital dependence.

AI Tools from a Teacher's Perspective: Implementation Case of Albania

Romina Agaçi¹, Besa Shahini²

¹ University of Vlora, Albania; ² University of Tirana, Albania

Nowadays, the trending topic remains artificial intelligence (AI), which affects every area of our lives. AI applications have a huge impact in the education systems worldwide. The aim of this paper we focused on is to introduce teachers to this technology and support them on how to appropriately use AI tools and platforms, while correctly integrating them into curricula. In this way, finding more contemporary methods of AI in the learning and teaching process will enhance students' engagement in learning, the support for personalized learning, universal access, and the learning experience. But at the same time, AI technology will facilitate many teaching processes. AI is making continuous progress worldwide, but in Albania, its implementation is just starting. The paper presents the impact of artificial intelligence in education by defining the benefits of using AI tools and platforms in teaching, as well as the challenges faced by educational institutions, teachers, and students with their implementation in the classroom. We will illustrate some of these AI tools that will be beneficial and intriguing. In conclusion, we will show the present condition of AI deployment in Albanian education and the opportunities and challenges presented.

AI and Human Skills: The Essential Professional Reskilling

Valentina Ndou

University of Salento, Lecce, Italy

Artificial intelligence (AI) is no longer a futuristic concept; it has become an integral part of our daily lives. As highlighted by today's speakers, the presence of AI is increasingly prominent, and its impact is profound. Unlike previous technological innovations, the rapid integration of AI into our professional environments demands a critical examination of how to implement these technologies effectively and responsibly. The potential of AI to create value is immense. It can enhance productivity, efficiency, and generate economic, social, and environmental benefits. For instance, consider a company that receives 200,000 resumes annually; an automated AI screening process could significantly reduce the time spent on candidate selection, alleviating stress and allowing employees to focus on tasks requiring creativity and empathy. In healthcare, generative AI could free up three hours daily for doctors, potentially enabling them to assist an additional 500 million patients globally by 2030. This represents a significant shift in service capacity and resource allocation, improving healthcare access worldwide. From the customer's perspective, approximately 36% of individuals now prefer AI for financial advice, indicating a growing trust in technology for critical decision-making. As we assess the labor market's evolving landscape, we must consider how to prepare for these shifts. The World Economic Forum projects that by 2025, about 85 million jobs will be displaced by AI, but 97 million new roles will emerge. This transformation does not merely involve job loss; it signifies a comprehensive redefinition of work itself. For instance, big data and AI specialists are expected to see employment growth of approximately 30% by 2027. Yet, there is a significant skills gap, with a 48% discrepancy between required and available skills. The emerging narrative is one of collaboration, with AI acting as a "co-pilot" rather than a replacement for human roles. This prompts critical questions about accountability, especially in sectors like healthcare. As AI

integrates into various professions, it becomes essential to consider how we prepare for these changes. Upskilling and reskilling are vital to ensure individuals possess the competencies demanded by an evolving job market. However, challenges remain, such as the disparity in educational offerings across countries—Germany currently offers 146 AI-related programs, while Italy has only 66. Investing in training and reskilling is not merely beneficial; it is essential for navigating future challenges and leveraging AI opportunities. To prepare for the future of work, key competencies must be developed, including expertise in digital tools, AI, data analysis, and programming, alongside crucial soft skills. Continuous learning will be imperative, transforming education from a finite phase into an ongoing process to keep pace with technological advancements. For this transition to be successful, flexible and continuous training programs must be promoted. Organizations have a crucial role in preparing employees for the future by investing in training and facilitating transitions into emerging roles. A hybrid approach is necessary, combining top-down support from management with insights from those familiar with operational processes to co-design training that meets actual needs. Ethical use of AI is paramount. We must ensure that AI adoption not only boosts productivity but also enhances worker well-being and equitably distributes benefits. Collaborations between governments, educational institutions, and businesses are essential to develop comprehensive reskilling models that integrate on-the-job training, online courses, and internships. AI presents both challenges and opportunities, serving as a catalyst for rethinking the relationship between individuals, work, and society. This transformation requires deep reflection on how we perceive work and leisure. For younger generations, navigating these changes will be crucial for professional success and finding their place in an ever-evolving society. In conclusion, it is vital that we engage in discussions that prepare us to tackle the challenges and seize the opportunities presented by AI. Together, we can create a future where AI and human skills coexist harmoniously, generating value and improving the quality of life for all. Thank you for your attention, and I hope this discussion inspires collaborative efforts to address the evolving landscape of work.

How has digitalization impacted the management of public finance? The case of Albania

Vanina Kalemi (Jakupi)

Ministry of Finance

The digitalization of IT systems has greatly improved Albania's public finance management in a number of important areas, particularly in data management, which enables better analysis, forecasting, and reporting in each of the stages of public finance management. These significant advancements enable the public to access the financial public data, allowing citizens to keep an eye on the government expenditures and revenues and fostering an atmosphere that is suitable for management delegation. With this article, the author aims to assess the effectiveness of IT systems used in public finance in improving efficiency, transparency, and accountability in Albanian public finance management. The author examined the existing literature and publications on IT systems used, with a dedicated focus in Albania's public finance. The author is concentrated on central government IT systems used in public finance sector. During the examinations, the author reviewed relevant legal context of the central government and national and international reports to identify key themes related to challenges and benefits of the performance of public finance management IT systems. This article is subject of limitations such as limited access to certain departments and available information. This paper presents findings in a comprehensive report, highlighting specific improvements in public finance management attributed to IT systems and offering recommendations for policy and practice in Albania. In conclusion, a framework of plans, rules, policies, and new institutions has made the use of information technology for public finance innovation more important in recent years. Albania, on the other hand, has advanced significantly in this field and now provides a variety of online public services via several platforms. Albania's IT systems have a big influence on public finance management since they automate procedures by decreasing manual labor, which speeds up

transactions and improves resource allocation. Public inspection of procurement procedures is made possible by systems like e-Procurement, which lower corruption and boost public confidence. Current financial data from the Financial Management Systems facilitates prompt decision-making and improved public fund oversight. In this sense, the tracking and reporting enhance accountability, which facilitates the detection and resolution of financial irregularities. By streamlining tax collection, the Tax Administration System improves compliance and increases government revenue. All things considered, these systems improve Albania's public finance management's efficacy and integrity. The report makes suggestions for enhancing the infrastructure to enable inclusive service access, prioritizing both the growth of rural areas and those with special needs. Further improvements in digital infrastructure, data security, and support for vulnerable citizens are needed to ensure that digitization is a comprehensive and effective instrument.