

International Conference on
Intelligent Information Systems Design
and
Indian Knowledge System Applications
(ICISDIKSA-2026)

Jointly Organised by
Madhav University, Sirohi
Sarvasumana Association, Bengaluru
ACS College of Engineering, Bengaluru

January 8-9, 2026

THEME:
IKS-The Next Gen

International Journal of Public Mental Health and Neurosciences

ISSN: 2394-4668 (Special Issue)

ORGANIZER	Jointly organized by Madhav University, Sirohi, Sarvasumana Association, Bengaluru and ACS College of Engineering, Bengaluru
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WELCOME

On behalf of Sarvasumana Association, Bengaluru, it is my great honor and pleasure to warmly welcome all delegates, researchers, academicians, industry professionals, and students to the **International Conference on Intelligent Information Systems Design and Indian Knowledge System Applications (ICISDIKSA-2026)**, scheduled on **January 8–9, 2026**.



In an era defined by rapid technological transformation, this conference arrives at a meaningful juncture. The theme, **“IKS – The Next Gen,”** reflects our collective aspiration to harmonize cutting-edge intelligent information systems with the timeless wisdom embedded in the Indian Knowledge Systems. Such integration is not only relevant but essential for building sustainable, ethical, and human-centric technological solutions for the future.

ICISDIKSA-2026 provides a unique interdisciplinary platform where ideas converge across domains such as artificial intelligence, data science, computational design, indigenous knowledge frameworks, philosophy, engineering, and applied sciences. We believe that dialogues fostered here will inspire innovative research directions, strengthen academic–industry collaborations, and encourage young minds to explore knowledge systems rooted in both tradition and modern science.

I sincerely acknowledge and appreciate the joint efforts of all organizing committee members, reviewers, session chairs, and volunteers whose dedication has made this conference possible. I also extend my heartfelt gratitude to all participants for contributing their valuable research, insights, and enthusiasm.

I am confident that ICISDIKSA-2026 will be an intellectually enriching experience and a memorable forum for knowledge exchange, collaboration, and innovation.

I wish the conference every success and hope you have a productive, inspiring, and pleasant time.

Padmashree murthy

Padmashree Murthy,

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FROM CHAIRMAN'S DESK

It is with immense pleasure and pride that I welcome you all to the **International Conference on Intelligent Information Systems Design and Indian Knowledge System Applications (ICISDIKSA-2026)**, being held on **January 8-9, 2026**.

ICISDIKSA-2026 has been envisioned as a meaningful academic forum that brings together scholars, researchers, educators, industry experts, and young innovators to deliberate on the convergence of **intelligent information systems** with the profound wisdom of **Indian Knowledge Systems (IKS)**. The conference theme, **"IKS – The Next Gen,"** highlights our commitment to exploring how ancient knowledge traditions can inform, guide, and enrich next-generation technologies and digital innovations.



In today's rapidly evolving technological landscape, it is essential to design systems that are not only intelligent and efficient but also ethical, sustainable, and socially relevant. This conference aims to foster such perspectives by encouraging interdisciplinary dialogue across computing, engineering, data science, artificial intelligence, humanities, and indigenous knowledge frameworks.

I sincerely appreciate the collaborative efforts of all the dedicated organizing committee, advisory board members, reviewers, and volunteers who have worked tirelessly to make this conference a reality. My special thanks also go to all the authors and participants whose contributions form the intellectual backbone of ICISDIKSA-2026.

I am confident that the discussions, paper presentations, and interactions during this conference will lead to valuable insights, long-term collaborations, and impactful research outcomes.

I wish all delegates a rewarding academic experience and a highly successful conference.

Yours sincerely,

Dr. R. Somashekhar,
Director (Research)



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Dear Members of the Organizing Committee,

I extend my warm congratulations to the entire organizing team for the successful conduct of the *Conference on Intelligent Information Systems Design and Indian Knowledge System Applications (ICISDIKSA-2026)*, held on January 8–9, 2026.

It has been an honor to participate in this thoughtfully curated conference and to deliver the concluding keynote. The academic rigor, interdisciplinary breadth, and seamless organization reflected throughout the sessions demonstrate a high standard of scholarly commitment and vision. The integration of intelligent information systems with Indian Knowledge System perspectives was both timely and intellectually enriching, as clearly reflected in the program and valedictory proceedings.

I commend Madhav University, Sarvasumana Association, ACS College of Engineering, and all committee members for their dedication and collaborative effort, with particular mention of Dr. Preenon Bagchi. I am confident that ICISDIKSA-2026 will have a lasting academic impact and will inspire continued dialogue and innovation in this important domain.

With best wishes for the continued success of future editions.

Warm regards,

Prof. Dr. Gustavo Zubiate-Calleja
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Message from Principal ACS College of Engineering



It is with great pride and pleasure that I extend my heartfelt greetings to all participants, delegates, and distinguished guests of the **International Conference on Intelligent Information Systems Design and Indian Knowledge System Applications (ICISDIKSA – 2026)**, scheduled to be held on **8th and 9th January 2026**.

The convergence of **Intelligent Information Systems** with the profound wisdom of the **Indian Knowledge System** presents a unique opportunity to explore holistic approaches to modern scientific, technological, and educational challenges. The diversity of perspectives represented by researchers, academicians, and industry experts from across the globe is the true strength of this conference, and I am confident that the discussions and interactions will inspire new ideas and long-lasting collaborations.

I sincerely commend the organizing committee, keynote speakers, session chairs, and contributors for their dedication, commitment, and tireless efforts in making this prestigious international conference a reality. May ICISDIKSA – 2026 serve as a catalyst for innovation, strengthen academic partnerships, and pave the way for a more inclusive, knowledge-driven future.

I wish all participants an intellectually enriching and memorable conference experience.

With best wishes for the grand success of ICISDIKSA – 2026.

for 6/1/2026
Dr B.S. Shylaja

Principal, ACS College of Engineering, Bengaluru

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	<i>Dr. Satish Sankaye</i>
2	The Biological Laws of Adaptation and Their Mathematical Postulations
	<i>Prof. Dr. Gustavo R. Zubieta-Calleja</i>
3	Natural Language Processing and Current Trends
	<i>Dr. Deepali V. Sawane</i>

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PLENARY TALKS

सर्वसम्मना

GENERATIVE AI WITH INDIAN KNOWLEDGE SYSTEMS: CAPABILITIES, GROWTH, AND RESEARCH FRONTIERS

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Generative Artificial Intelligence (GenAI) has rapidly evolved as a foundational technology capable of mimicking the human to create the content in the form of text, speech, images, music, and structured knowledge. At the heart of modern Generative AI are **transformers**, which use attention mechanisms to understand relationships in data efficiently. These transformers power foundation models, which are trained once on massive datasets and then adapted for many tasks. Models like **GPT** were designed mainly for content generation, while **BERT** focuses on understanding language for tasks such as search and classification. To improve accuracy and reliability, **Retrieval-Augmented Generation (RAG)** combines language models with external knowledge sources. Further, AI agents enable models to plan, use tools, and perform actions autonomously. Together, these components form the core of today's Generative AI ecosystem.

Large Language Models and multimodal generative systems are dominating and its impact is progressively influencing education, research, healthcare, governance, and creative industries. However, most of these AI systems are built using data and ideas that mainly come from Western languages and cultures. In current scenario we would like to focus on how **Indian Knowledge Systems (IKS)** can play an important role in shaping the future of Generative AI in a more meaningful and Indian context. IKS constitute a rich and diverse corpus of structured, systematic knowledge developed over centuries, encompassing foundational texts such as the Vedas, Upanishads, Manusmriti, Charaka Samhita, and many others. IKS covers various domains such as Sanskrit grammar, Indian philosophy, Ayurveda, Yoga, astronomy, mathematics, music, and traditional ecology.

In terms of capabilities, Generative AI can be used to work with Indian languages, especially Sanskrit and other classical or regional languages. It can help in reading, translating, summarizing, and explaining ancient texts. In Indian music and arts, Generative AI can learn patterns like rāga and tāla to support music generation, teaching, and preservation. In Ayurveda and traditional medicine, Generative AI can assist in organizing knowledge from classical texts and support research and learning, while respecting ethical boundaries.

The growth dimension focuses on India's emerging GenAI ecosystem which has marked Rs 85 billion in 2024 is set to expand approximately **Rs. 671.83 billion** by **2030** is now aligned with NEP-2020 and the national IKS initiative, highlighting opportunities in education, digital humanities, healthcare, cultural preservation, and indigenous innovation. IKS-driven GenAI has the potential to support personalized learning, preservation of endangered knowledge traditions, decision-support systems in traditional medicine, and India-centric foundation models that reflect linguistic and cultural diversity.

Looking ahead, key research frontiers, awaits to explore hybrid symbolic–neural architectures inspired by IKS rule systems, multilingual and low-resource foundation models, multimodal generative frameworks for Indian arts, and ethical AI grounded in Indian philosophical concepts such as dharma, nyāya, and karma. These directions will open new interdisciplinary research pathways for computer science, linguistics, humanities, and social sciences.

By positioning Indian Knowledge Systems as an active contributor to the future of Generative AI, this significant envisions a paradigm where technological innovation is informed by indigenous wisdom—leading to inclusive, explainable, and globally relevant AI systems rooted in India's intellectual heritage.

To summarize, the relationship between IKS and GenAI is like providing a master architect with a heritage-rich blueprint. While the AI provides the modern construction tools (the framework), IKS serves as the blueprint and guiding principles that ensure the final structure is not only functional but also stays true to its cultural roots and ethical foundations

THE BIOLOGICAL LAWS OF ADAPTATION AND THEIR MATHEMATICAL POSTULATIONS

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Adaptation is the most critical life-sustaining biological mechanism. Much like a non-stopping heartbeat, adaptation is a constant, every-second activity that persists throughout life. While physics has evolved remarkably through the understanding of physical mechanisms and the development of physical laws based on logic, experimentation, and mathematics, the establishment of fundamental principles in biology has lagged. We propose eight theoretical Biological Laws of Adaptation based on current knowledge, previous observations, physics, mathematics, and philosophy. Physiological adaptation to high altitude serves as an excellent model for interpreting adaptation to any change, i.e., all events that occur as part of life itself. The human organism (and that of all living beings) must constantly adapt to changes in environmental conditions, human interactions, exposure to toxins, and aggression from bacteria, fungi, viruses, insects, and animals. Survival in the face of conflict, struggles, and environmental changes, such as global warming, also requires permanent adaptation.

We postulate the following Biological Laws of Adaptation:

1st Biological Law of Adaptation:

Adaptation (A) is directly proportional to time (t) and inversely proportional to change (Δ).

2nd Biological Law of Adaptation:

Adaptation is the inverse of Entropy.

3rd Biological Law of Adaptation:

The energy of living organisms is temporary and limited.

4th Biological Law of Adaptation:

The adaptation time frames vary based on equilibrium gap: tissue and cell signaling rebuilding capacity, genetic and epigenetic biochemical changes, system access to essential resources, immunity, and neuro-psychological proficiency.

5th Biological Law of Adaptation:

Adaptation efficiency is shown through reproductive success and longevity.

6th Biological Law of Adaptation:

Adaptation has a metabolic threshold limit that, if surpassed, is lethal.

7th Biological Law of Adaptation:

Adaptation always follows the least-energy-expenditure rule for a given species or race.

8th Biological Law of Adaptation:

Loss of adaptation can only lead to death.



NATURAL LANGUAGE PROCESSING AND CURRENT TRENDS

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Natural Language Processing (NLP) is a rapidly advancing field of Artificial Intelligence that focuses on enabling machines to understand, interpret, and generate human language. Over the past decade, NLP has moved from rule-based and statistical approaches to data-driven deep learning models, significantly improving the performance of language-based applications. Today, NLP plays a critical role in areas such as search engines, virtual assistants, machine translation, sentiment analysis, healthcare analytics, and intelligent decision support systems.

This keynote presents an overview of NLP fundamentals while emphasizing the **current trends driving innovation** in the field. It highlights the rise of transformer-based architectures and large language models, which have revolutionized tasks like text summarization, question answering, and conversational AI. Emerging directions such as multilingual and low-resource language processing, prompt-based learning, retrieval-augmented systems, and multimodal language models are also discussed.

In addition to technological progress, the keynote addresses key challenges, including data bias, ethical and responsible AI, explain ability, privacy concerns, and the computational cost of large-scale models. By combining technical insights with real-world applications and future perspectives, this session offers a comprehensive understanding of the evolving NLP landscape. The talk aims to inform and inspire researchers, practitioners, and leaders to effectively and responsibly harness NLP technologies in a rapidly changing digital world.



PRESENTATION ABSTRACTS

SYNTHESIS AND CHARACTERIZATION OF PEG-STABILIZED GOLD NANOPARTICLES FOR SENSITIVE DETECTION OF WATER POLLUTANTS AND VOLATILE ORGANIC COMPOUNDS IN BIOMEDICAL APPLICATIONS

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Raja⁵, K Amuthanantham⁶

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Gold nanoparticles (AuNPs) possess exceptional optical and chemical attributes, rendering them highly suitable for environmental surveillance and biomedical diagnostics. When stabilized with polyethylene glycol (PEG), these nanoparticles achieve enhanced colloidal stability and biocompatibility, facilitating their use in detecting emerging contaminants in water and volatile organic compounds (VOCs) in exhaled breath. This integration of nanotechnology addresses the demand for efficient, non-invasive sensing platforms in water quality assessment and early disease identification, leveraging recent advancements in nanomaterial functionalization for real-time monitoring. Water sources are increasingly tainted by novel pollutants, including heavy metals, pharmaceuticals, and industrial chemicals, which pose severe threats to ecosystems and human health. Conventional detection techniques are often laborious, costly, and lack portability. Concurrently, respiratory ailments like chronic obstructive pulmonary disease and lung cancer necessitate

non-invasive diagnostic tools, where VOC biomarkers offer potential but require sensitive, selective sensors to enable timely intervention without invasive procedures. PEG-capped AuNPs were synthesized via chemical reduction in an alkaline medium (pH 11), employing chloroauric acid (HAuCl_4) as the precursor and PEG-6000 at concentrations of 6-24 wt% as the stabilizer. Characterization encompassed Fourier Transform Infrared Spectroscopy (FTIR) to verify surface functionalization and Dynamic Light Scattering (DLS) for assessing particle size distribution and stability. The nanoparticles were subsequently applied to tap water samples, with pollutant detection evaluated through UV-Vis absorbance spectroscopy to measure interactions and sensitivity variations based on PEG concentration. FTIR analysis confirmed robust PEG-AuNP interactions, evidenced by characteristic peaks at 1645 cm^{-1} , 2870 cm^{-1} , 1350 cm^{-1} , and 1100 cm^{-1} , indicating successful stabilization. DLS revealed hydrodynamic diameters of 9.9 nm at 12 wt% PEG and 15.5 nm at 24 wt% PEG, with higher concentrations yielding superior dispersion and reduced aggregation.

Keywords

Gold Nanoparticles, PEG Stabilization, Water Pollutant Detection, VOC Sensing, Nanomaterial Characterization

DEMYSTIFYING THE DATABRICKS ECOSYSTEM: AN INDUSTRY-ORIENTED GUIDE TO LAKEHOUSE ARCHITECTURE

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The exponential growth in data has created a need for platforms capable of storing both structured & unstructured data, effectively processing the data, analyzing, and creating machine learning models. Traditional data lakes and warehouses often lack the flexibility and performance to provide these capabilities. So, the new Lakehouse paradigm is introduced. Databricks is an implementation of the Lakehouse paradigm that is cloud-native and built upon Apache Spark. However, there is a lack of substantial academic work describing the ecosystem. This paper presents a comprehensive description of the Databricks ecosystem, showing it both as an architecture and as a platform already in use. We will go through the main components of Databricks architecture, including Delta Lake, Unity Catalog, cluster management, Azure integrations, and discuss their roles in creating secure, scalable, and cost-effective data engineering workflows. We also present an experiment that is designed to bridge the gap between theory and practice by demonstrating the ingestion of data, feature engineering, and basic fraud detection. We utilized a synthetic dataset of financial transactions. The experimental procedure and metrics such as query latency, processing throughput, speed, and performance results are described in detail offering a reproducible benchmark for evaluating similar workloads in Databricks. This work is designed to function as a technical resource for individuals in

industry, data engineers, and researchers who are interested in working with the Databricks environment for large-scale analytics.

Keywords: Databricks, Lakehouse, Delta Lake, Data Engineering, PySpark, Unity Catalog, MLflow, Azure Synapse, Data Factory, Power BI, Real-time Analytics, Cloud Data Platforms, Fraud Detection, Performance Benchmarking, Industry Use Case.



END-TO-END DATA ANALYSIS OF BRAZILIAN E-COMMERCE TRANSACTIONS

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E-commerce platforms produce substantial and varied amounts of data, which create opportunities for deriving insights about customers, products, and logistics through complete analytical procedures. This article offers an end- to-end data analysis of the Brazilian E-Commerce public dataset, which integrates multi-dimensional data types, including orders, customers, sellers, products, payments, and reviews. The study incorporates several steps like data preprocessing, feature engineering, exploratory analysis, and advanced modeling in statistics to uncover complex patterns in customer behaviors, purchase dynamics, and delivery performance. This study also offers a wide variety of analytical procedures, including cohort analysis, RFM (Recency–Frequency–Monetary) modeling, time-series forecasting, and sentiment analysis. The study also promotes metric-focused visualizations, such as churn curves, sales trend decomposition, customer lifetime value forecasts, and anomalies detection plots. Overall, the results identify key factors affecting revenue, customer satisfaction, and operational efficiency, producing a structured analytical framework for e-commerce in large datasets as well as to assist in the business strategy of the company.

Keywords: Data analysis, Brazilian E-Commerce dataset, Customer behaviour; Product demand, RFM modelling, Cohort analysis, Time-series forecasting, Sentiment analysis,

Anomaly detection, Metric-driven visualization, customer segmentation, delivery logistics,
Geo Analysis.



DATA AUGMENTATION TECHNIQUES FOR CONVOLUTIONAL NEURAL NETWORK–BASED VOCAL PITCH ESTIMATION IN CARNATIC MUSIC

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Vocal pitch estimation is an important part of analysis and preservation of Carnatic music where microtonal variations and ornamental movements define the melodic identity. However, the detection of accurate and stable pitch is still a challenge because of the diversity in vocal styles, recording conditions and the limited availability of annotated data. This paper proposes a conceptual framework for vocal pitch estimation based on convolution neural network architecture (CNN) with the help of data augmentation techniques to improve the model robustness and generalization. The proposed design makes use of time stretching, pitch change and spectrogram transformation to simulate various vocal expressions while retaining the tonal and temporal details of Carnatic music. Mel-frequency cepstral coefficients (MFCCs) are used as the basic input features for feature representation and constant-Q transform (CQT) is proposed as a complementary feature for the better harmonic information. An analytic dynamic-thresholding stabilization is proposed in order to stabilize the pitch contour and reduce the frequency jitter. The performance of the framework is shown in an illustrative way through analytical trends and expectations supported by literature, and it can be seen that the pitch-tracking accuracy, the contour transitions, and the noise tolerance are better than those of traditional rule-based approaches. This study gives a mathematically grounded and literature supported basis for the future implementation of CNN-based pitch estimation systems with the applications in music education, performance analysis and digital preservation of Indian classical traditions.

Keywords: vocal pitch estimation, Carnatic music, convolutional neural network, data augmentation, time stretching, pitch shifting, spectrogram enhancement, mel-frequency

cepstral coefficients, constant-Q transform, dynamic thresholding, pitch contour estimation



A COMPREHENSIVE REVIEW ON BREATH ANALYZER AS A POINT-OF-CARE DEVICE FOR VOC-BASED LUNG CANCER RISK PREDICTION USING DEEP LEARNING

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All over the world, lung cancer is one of the most widespread causes of cancer-associated deaths, and this problem is largely supported by the late diagnosis of this disease and the shortcomings of the currently used screening method like low-dose computed tomography (LDCT). Breath analysis has become an emerging diagnostic option that is non-invasive, fast, and economically efficient in identifying the disease specific volatile organic compounds (VOCs) in the exhaled air. The review gives a concise summary of the recent developments in electronic nose (E-Nose) devices, nanomaterial sensors, and deep learning (DL) algorithms in the early detection and risk prediction of lung cancer. The paper clearly explains how E-Nose architectures have evolved over the years beginning with the traditional metal oxide semiconductor (MOS) arrays to the current plasmonic nanostructures and graphene and the hybrid nanostructures, and how they have increased sensitivity and selectivity towards VOCs biomarkers at the trace level. The use of convolutional and recurrent neural networks as advanced DL frameworks has also seen a

dramatic increase in the accuracy of breathprint classification and real-time inference in portable point-of-care (POC) devices. Meta-analyses and clinical trials have shown a high diagnostic accuracy of > 90 and high chances of early-stage (Stage I) diagnosis. Nevertheless, there are obstacles to the attainment of a standardized breath collection, cross-cohort validation, and sensor reproducibility in real-life settings. The conclusion of the review lays out future directions about the research on multimodal integration, Explainable AI (XAI) to promote clinical interpretability, and large-scale clinical validation. Taken together, these inventions make POC breath analyzers a disruptive technology in the field of individual, convenient, and proactive lung cancer diagnosis.

Keywords: Exhaled Breath (EB), Volatile Organic Compounds (VOCs), Nanomaterials, Biosensors.



IN-SILICO ANALYSIS OF THE PHYTOCHEMICALS IN THE EXTRACTS OF SEEDS FROM *MICHELIA CHAMPACA* L.

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In the traditional system of medicines, plants are the primary source for treatment of various ailments. This study focuses on the possibility of the health benefits of seeds from *Michelia champaca* L. The seeds were subjected to qualitative and quantitative tests and observed to contain a wide range of phytochemicals. The extracts were obtained by maceration and qualitative and quantitative tests were performed. These tests revealed the presence of six phytochemicals. Further, the identification and validation of these phytochemicals from the seeds of *Michelia champaca* L. was carried out by using in-silico techniques. This was initiated by using SwissADME and Toxtree softwares. The SwissADME software predicted dodecanoic acid, 1-methylethyl ester as a more potent phytochemical as it satisfied several crucial parameters of lead likeliness. Whereas analysis from the Toxtree software, four compounds i.e. hexadecanoic acid methyl ester, 12,15-octadecadienoic acid, methyl ester dodecanoic acid 1- methylethyl ester, 7,10 octadecadienoic acid methyl ester was predicted to be less toxic. The presence of chemical compounds in the seeds contributes to their medicinal properties, offering insight into the interaction between various bioactive components and the human body. This study highlights the need to reconsider the potential of *Michelia champaca* L. seeds, as they are a valuable source of bioactive compounds with significant potential for drug development and nutritional improvement. Consequently, the findings underscore the pharmacological

promise of *Michelia champaca* L. and emphasize the importance of exploring underutilized natural resources for their potential health benefits in functional foods and medicine.

Keywords: *Michelia champaca* L, ADME, Phytochemical





सर्वसुमना

REAL-TIME VIRTUAL TRY-ON FOR FASHION E-COMMERCE USING DIFFUSION-BASED GENERATIVE MODELS

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This study aims to offer a new avenue for improving the virtual online shopping experience in real time with a novel virtual try-on system developed using the OTTDiffusion generative model on Hugging Face. By fusing advanced diffusion-based image synthesis with robust e-commerce platforms, this solution allows users to visualize clothing items over their images with high visual credence. Through this system, the public can interactively upload their personal pictures and choose from several catalog garments or upload their apparel images from external sources to create a highly personalized and innovative shopping experience. The system has a modern front end that allows seamless browsing, previewing, and purchasing of items while managing secure image processing, model inference, and result rendering at near-real-time speeds. This architecture addresses the crux of online fashion retail challenges, such as reducing return rates, increasing consumer confidence, and augmenting engagement. In addition, the flexible try-on framework paves the way for future extensions into multi-garment visualization, 3D fitting and augmentation overlays. It covers the technical design considerations, integration strategies, and deployment considerations for an AI-driven solution such as this, which is increasingly becoming a research domain at the intersection of computer vision, generative models, and intelligent retail technologies.

Keywords: Virtual try-on, diffusion models, generative AI, e-commerce, OTTDiffusion, fashion technology, image synthesis, user personalization, intelligent retail systems, human-computer interaction

SPEECH EMOTION RECOGNITION USING CONSTANT-Q TRANSFORM AND DEEP LEARNING

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In today's digital world, machines are evolving beyond basic speech-to-text systems. This project develops an emotionally aware solution that recognizes both spoken words and the underlying emotions. The system combines Constant-Q Transform (CQT) for capturing time frequency audio features with Recurrent Neural Networks (RNNs) to analyze and classify emotional tones in real-time. By integrating emotional audio analysis into traditional speech recognition, it detects emotions including happiness, sadness, anger, fear, and neutrality directly from raw voice signals.

The model is trained on diverse emotional datasets and fine-tuned to recognize subtle variations in pitch, tone, and energy levels. Audio signals are transformed into spectrogram-like representations using CQT, then processed through RNN layers to capture temporal dynamics of emotional speech. A Django-based user interface provides an interactive platform where users can upload audio files or record voice directly through browsers. The system outputs transcribed text with identified emotions, visual cues, and probability scores.

This integration of audio signal processing, deep learning, and web technology creates a powerful tool with applications in mental health monitoring, therapy support, virtual assistants, call centers, and education.

Keywords: Speech Emotion Recognition, Constant-Q Transform, Recurrent Neural Networks, Deep Learning, Emotion Classification

CAPTURING SUBTLE MORPHOLOGICAL DIFFERENCES IN BLOOD CELLS WITH INVOLUTION-BASED NETWORKS

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Accurate classification of blood cells is required when diagnosing blood-related illnesses. But classifying very fine-grained blood cells is a complex task. Due to subtle differences between classes that are clinically significant, categorizing blood cells is more complex than classifying Stanford Cars or CUB-200 bird species. Traditional convolutional neural networks (CNNs) often struggle to capture nuanced patterns. Involution, an emerging approach, possesses capabilities to capture location-specific and fine-grained features. In this paper, we evaluate the performance of involution-based architectures against CNNs while classifying blood cells. Overall, we found that involution consistently outperformed CNNs in distinguishing very fine morphological patterns between images, making it an effective model for fully automated hematologic diagnostics.

Keywords: Involution, CNNS, ResNet, Rednet, VGG, GoogleNet, INN-50, fine-grained image classification, blood cell classification, hematology, medical image analysis, deep learning, morphological feature learning, diagnostic automation, biomedical imaging, pattern recognition

GREEN AI: A COMPREHENSIVE SURVEY ON SUSTAINABLE AND ECO-EFFICIENT ARTIFICIAL INTELLIGENCE PRACTICES

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Artificial Intelligence (AI) have become a major focus of innovation, yet with significant environmental costs. Constructing and deploying large-scale AI models requires significant and deep computational and processing power, which leads to high energy consumption and ultimately carbon emissions. Green AI is another paradigm in AI which emphasizes energy efficiency, resource efficiency and environmental responsibility concerning AI research and applications. We provide a thorough review and discussion of Green AI practices evolved from early model compression practices and solutions to the most current ways of training and deploying AI in a sustainable way. We organize and categorize eco-friendly practices in four categories, (i) algorithm efficiency by pruning, quantization, distillation, and efficient architectures (ii), efficiency in hardware with specialized accelerators, neuromorphic chips, and low-powered edge-devices, (iii) efficiency in software and frameworks using low-precision training, adaptive scheduling, and optimized resource intensive compilers, and (iv) systemic and reporting practices such as carbon footprint measurement, energy aware benchmarks, and policy. Case studies shown in NLP, computer vision and edge IoT, demonstrate that sustainable AI enables users to evaluate

performance gains relative to ecological trade-offs. Finally, we discuss future directions in the area, focusing on the efficiency in diffusion models, federated sustainable learning, standardized reporting of energy consumption. The ambition of this review paper is a thorough overview of the Green AI topic to encourage future research on energy-efficient artificial intelligence.

Keywords: Green AI, Sustainable Computing, Eco-Efficient AI, Energy-Efficient AI, Model Compression, Knowledge Distillation, Pruning, Quantization, Edge AI, TinyML, Carbon Footprint of AI, Responsible AI, Federated Green AI, Efficient Transformers, Neuromorphic Computing



AI-POWERED EMAIL SUMMARIZATION AND ASSISTANT SYSTEM FOR INTERNSHIP AND JOB OFFER MANAGEMENT USING LLMS

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As students and other professionals become so dependent on email for internship and job opportunities, managing the confusing and unstructured communication becomes quite a challenge. This research presents an AI-backed email assistant that leverages large language models (LLMs) to convert unstructured email body and attachment contents into clear, concise summaries and structured data representations. It extracts essential information in JSON, classifies emails by intention—for instance, internship, job, or other—matches resume against job postings, and then provides an RAG-based conversational chatbot for user queries. An interactive dashboard is also provided for major due dates and offers comparison. In evaluations, our LLM-based summarizer achieved substantially higher relevance than template methods, and combined extraction showed improved overall precision. Simulated user tests demonstrate 65%-time savings in email triage and decision-making, proving the potential of unified AI assistance in career email handling. The system successfully identifies and triages internship/job offers with over 90% accuracy, significantly improving user decision-making speed.

Keywords: Email summarization, Internship offer extraction, AI assistant, Resume matching, LLMs, Deadline detection, Gmail automation, RAG chatbot

VIGILNET: AN ADAPTIVE CONTEXT-BASED LOSSLESS DATA COMPRESSION FRAMEWORK FOR IOT-ENABLED WOMEN'S SAFETY SYSTEMS

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The rapid growth of Internet of Things (IoT) devices in women's safety applications has led to an unprecedented surge in data generation. Managing and processing this data efficiently while ensuring real-time response in emergencies remains a significant challenge. This paper introduces VigilNet, a multi-layered IoT-based safety framework integrating an Adaptive Context-Based Lossless Data Compression (ACLDC) module. VigilNet comprises an IoT Sensing Layer that collects real-time safety data using wearable sensors, GPS trackers, and biometric devices; an Edge Computing Layer for preliminary data processing; and an Adaptive Compression Module for optimizing data transmission based on priority levels. The compressed data is securely transmitted and stored in the cloud, enabling rapid emergency response and forensic analysis. Experimental results demonstrate that the ACLDC module significantly reduces data size without compromising critical information, ensuring efficient bandwidth utilization and real-time responsiveness. This research highlights the potential of adaptive compression in enhancing IoT-enabled safety solutions.

Keywords: Women Safety, Edge Computing, Adaptive Compression, IoT, Data Management.

COMPUTATIONAL SCREENING OF *PSIDIUM GUAJAVA* AND *CARICA PAPAYA* PHYTOCHEMICALS FOR ANTI-GOUT ACTIVITY VIA XANTHINE OXIDASE INHIBITION

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Gout, a metabolic disorder characterized by hyperuricemia is an effect of dysregulation of the de-novo purine pathway, caused by the hyperactivity of Xanthine oxidase (XOD), the fundamental enzyme accountable for uric acid formation. This study investigated the anti-hyperuricemic potential of phytochemicals from *Psidium guajava* and *Carica papaya* through comprehensive in-silico analysis.

The availability of phytochemicals in *P. guajava* and *C. papaya*, they underwent structural identification analysis wherein their structures were repossess from PubChem and they were screened using Rule of Five by Lipinski and further the pharmacokinetic profiling was done via SwissADME.

Twelve compounds met the criteria for further evaluation, while those violating RO5 were excluded. The molecular target Xanthine oxidase was modelled using SWISS-MODEL and substantiated by Ramachandran plot analysis (96.9% residues in favoured regions), a MolProbity score of 0.81, and a QMEAN score of 0.28, confirming structural integrity suitable for molecular docking.

The docking studies were meticulously executed using CB-DOCK, with Allopurinol acting as the positive control (−6.1 kcal/mol). Among the tested phytochemicals, flavonoid glycoside (−10.4 kcal/mol), quercetin (−9.7 kcal/mol), and kaempferol (−9.2 kcal/mol) exhibited the strongest binding affinities, forming multiple stabilizing interactions—hydrogen bonds, hydrophobic, ionic, and π -stacking—within the enzyme's active site, particularly with residues Glu332, Trp336, Glu428, Arg426, Lys422, and Asp430. These interactions suggest effective inhibition of XOD and potential reduction of uric acid synthesis.

Overall, the findings demonstrate that selected phytochemicals, especially flavonoid glycoside, quercetin, and kaempferol, may serve as promising natural xanthine oxidase

inhibitors. Furthermore, the in-vitro warranted the validation of their therapeutic potential in managing hyperuricemia leading to gout.

Key words: Gout, Hyperuricemia, Xanthine oxidase inhibitor, *Psidium guajava*, *Carica papaya* , Molecular docking





सर्वसुमना

OPTIMIZING IOT SENSOR DATA MANAGEMENT FOR WOMEN'S SAFETY: A VIGILNET-BASED DYNAMIC DATA STREAM SIMPLIFICATION APPROACH

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The growing data volume from Internet of Things (IoT) devices in women's safety applications requires advanced data management strategies for efficient processing and real-time responsiveness. This research introduces Dynamic Data Stream Simplification (DDSS) within the VigilNet system, a method designed to optimize sensor data handling. DDSS employs edge computing to filter and preprocess data at the source, transmitting only essential information for further analysis. This reduces bandwidth usage, storage needs, and latency, while improving system responsiveness for real-time threat detection. Experimental results demonstrate that DDSS achieves 95.4% Critical Data Retention Efficiency (CDRE) and 97.2% Data Reconstruction Integrity (DRI), ensuring high data accuracy while optimizing resource utilization. The approach enhances scalability and reliability, reducing network congestion and improving computational efficiency. By prioritizing critical data, DDSS strengthens threat detection accuracy and system performance, making it an effective solution for real-time women's safety monitoring applications.

Keywords: IoT, Edge Computing, Dynamic Data Stream Simplification (DDSS), Real-Time Threat Detection, Women's Safety Applications.

CONNECTED MINDS, INCLUSIVE FUTURES: BRIDGING DIGITAL GAPS IN HIGHER EDUCATION

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The inclusion of digital media in higher education has proven to be a critical determinant of equitable learning opportunities, particularly in an era marked by rapid technological advancement. The accessibility of digital tools, reliable connectivity to the internet combined with adequate digital literacy skills, ensures that students from diverse socio-economic backgrounds can participate fully in academic activities. However, persistent disparities—often termed the “digital divide”—continue to affect marginalized and rural populations, thereby hindering their academic success and long-term personal development. Bridging this gap in future education requires strategic investments in infrastructure, inclusive curriculum design, and targeted support systems that address not only technical proficiency but also students’ emotional and social needs. For adolescents, who are at a sensitive stage of cognitive, social, and emotional growth, digital exclusion can exacerbate feelings of isolation, academic stress, and reduced self-efficacy, contributing to negative mental health outcomes. Conversely, a digitally inclusive higher education ecosystem fosters connectedness, resilience, and confidence, providing adolescents with the skills and support needed to thrive academically and psychologically. By ensuring universal access, promoting digital competence, and integrating mental health support within educational frameworks, future education can narrow the digital gap while safeguarding and enhancing adolescent mental well-being.

Key words: Digital Learning, Inclusive Education, Adolescent Mental Health, Policy Implication.

