DGITechChronicle

DGI TECH CHRONICLE

SIT EDITION

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EDITORIAL BOARD

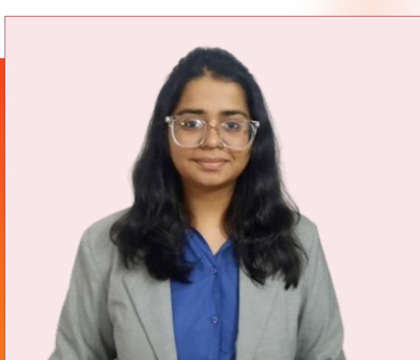
Dr. Aadarsh Malviya

Editor in Chief

In this issue, we delve into a captivating array of topics and developments, all tailored to the inquisitive minds of the future engineers. As an engineering college community, we stand at the forefront of technological breakthroughs, and it is our mission to empower you with the knowledge and insights to not only keep pace but to lead in this ever-accelerating race of innovation.

Nitish Kumar
(15206; CSIT)

Co- Editor



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Editor- Design

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Editor- Text

DGITechChronicle

CSIT EDITION

Department Vision and Mission

Department PEO, PSO and PO's

My Pen and Me: Students Articles

VISION

Promoting technologists by imparting profound knowledge in information technology, all while instilling ethics through specialized technical education.

MISSION

Delivering comprehensive knowledge in information technology, preparing technologists to excel in a rapidly evolving digital landscape.

Building a culture of honesty and responsibility in tech, promoting smart and ethical leadership.

Empowering individuals with specialized technical skills and ethical values to drive positive change and innovation in the tech industry.

Program Educational Objectives (PEO)

To enable graduates to think logically, pursue lifelong learning and will have the capacity to understand technical issues related to computing systems and to design optimal solutions.

To enable graduates to develop hardware and software systems by understanding the importance of social, business and environmental needs in the human context.

To enable graduates to gain employment in organizations and establish themselves as professionals by applying their technical skills to solve real world problems and meet the diversified needs of industry, academia and research.

Program Specific Outcome (PSO)

To adapt to emerging technologies and develop innovative solutions for existing and newer problems.

To create and apply appropriate techniques IT tools to complex engineering activities with an understanding of the limitations.

To manage complex IT projects with consideration of the human, financial, ethical and environmental factors.

Program Outcome (PO)

Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Modern tool usage: Create, select, and apply appropriate techniques, resources,& modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Green Internet of Things (IoT)

Vaibhav Pratap Singh
(15144; CSE)

Green Internet of Things (IoT) is a burgeoning field that aims to minimize the environmental footprint of IoT technologies while maximizing their societal benefits. This systematic review surveys the existing literature on Green IoT to provide a comprehensive understanding of its current state, challenges, and opportunities. By synthesizing peer-reviewed articles, conference papers, and technical reports, this review identifies key themes and trends in Green IoT research. It explores various aspects such as energy efficiency, resource optimization, sustainable design practices, and end-of-life management. Additionally, this study delves into the challenges hindering the widespread adoption of Green IoT, including interoperability issues, standardization concerns, and regulatory barriers. Furthermore, it highlights emerging technologies, methodologies, and strategies that hold promise for advancing the sustainability of IoT ecosystems. By consolidating insights from diverse sources, this review serves as a valuable resource for researchers, practitioners, policymakers, and industry stakeholders seeking to promote environmentally responsible IoT deployment.

Greener solutions

Different industry verticals use IoT technology to build greener solutions by optimising their operations for greater

Sustainability and lower energy costs:

Energy efficient homes by monitoring appliance usage in homes through affordable circuit-level electricity monitoring, real-time reporting, smart alerts and remote energy controls. IoT devices are necessary for keeping costs and energy usage down. The demand for long-range, low-power IoT enabled products with indoor and outdoor tracking capabilities has increased as it facilitates the homeowners to track their energ usage in real-time.

Smart lighting, demand-driven heating & cooling for improved comfort in homes as well as in offices, at the same time reducing energy consumption; in addition, energy Star certified thermostats that learn what temperature users prefer and build a schedule around that setting.

During the pandemic, as more employees worked from home, the overall energy consumption of New York City reduced approximately by 15% (Using IoT technology to help businesses thrive in a pandemic world). This decline is possibly due to the fact that commercial structures consume much more lighting per square foot than personal homes.Organisations in any industry can cut down their costs by adopting IoT devices which include smart thermostats, smart lighting and smart outlets to regulate indoor temperatures and remotely control electricity sources for energy saving and making buildings more sustainable.

Algorithmic Game Theory

Jayshree Upadhyay
(15068; CSE)

Algorithmic game theory is a field at the intersection of computer science, game theory, and economics. It focuses on studying strategic interactions among self -interested agents in computational settings.

Algorithmic Mechanism Design: This area deals with designing mechanisms (auctions, voting systems, etc.) that incentivize participants to act truthfully, while achieving desirable outcomes.

Equilibrium Computation: It involves the study of finding equilibrium points in games, such as Nash equilibria, correlated equilibria, or evolutionary stable strategies.

Price of Anarchy: This concept measures the inefficiency of equilibria in a system when agents act selfishly, compared to the socially optimal outcome. It provides insights into the robustness of decentralized systems.

STUDENTS ARTICLES

The Ultimate Guide of Algorithmic Game Theory and Computational Mechanism Design

Network Games: Games where players interact through a network, such as routing games, congestion games, or network formation games.

Algorithmic Aspects of Auctions: Study of auction mechanisms and algorithms for their implementation,considering computational efficiency, revenue maximization, and fairness.

Computational Complexity of Games: Investigating the computational complexity of solving games, particularly in cases where finding optimal strategies is computationally hard.

Learning in Games: Studying how agents can learn or adapt their strategies over time in dynamic environments, often using techniques from machine learning and reinforcement learning.

Social Networks and Influence Maximization: Analyzing strategic behavior and influence spread in social networks, with applications in viral marketing, opinion dynamics, etc.

Game-Theoretic Analysis of Online Markets: Considering strategic behavior in online platforms, such as sponsored search auctions, ad allocation mechanisms, and peer-to-peer systems.

Algorithmic Fairness in Game Theory: Investigating fairness considerations within game-theoretic frameworks, ensuring equitable outcomes for participants.

Algorithmic game theory is not only theoretical but also has practical applications in various domains, including economics, computer science, political science, and sociology. It provides tools and insights for designing efficient and robust systems in scenarios involving strategic decision-making by self-interested agents.

Information retrieval (IR)

STUDENTS ARTICLES

Chirag Mittal
(15040; CSE)

Information retrieval (IR) is the process of obtaining relevant information from a large collection of data. It's a field at the intersection of computer science, information science, and library science. The goal of information retrieval is to provide users with the most relevant documents or resources in response to their queries or information needs.

Here are some key aspects and techniques within information retrieval:

Document Representation: Documents are typically represented in a structured format suitable for processing by computers. Common representations include bag-of-words models, term-frequency-inverse-document-frequency (TF-IDF) representations, and more advanced techniques like word embeddings or document embeddings.

Indexing: To efficiently retrieve relevant documents, an index is built over the collection of documents. This index maps terms (words or phrases) to the documents that contain them. Inverted indexes are commonly used, where each term points to the documents in which it appears.

Query Processing: When a user submits a query, the system processes it to identify the relevant documents. This involves parsing the query, identifying terms, and using the index to locate relevant documents. Techniques like Boolean retrieval, vector space models, and probabilistic models are commonly used.

Ranking and Retrieval Models: Once relevant documents are identified, they need to be ranked based on their relevance to the query. Various retrieval models are used for ranking, including TF-IDF weighting, BM25, language models, and machine learning-based approaches like learning-to-rank algorithms.

Evaluation: Evaluating the effectiveness of an information retrieval system is crucial. Metrics such as precision, recall, F1-score, mean average precision (MAP), and normalized discounted cumulative gain (nDCG) are used to assess the performance of retrieval systems.

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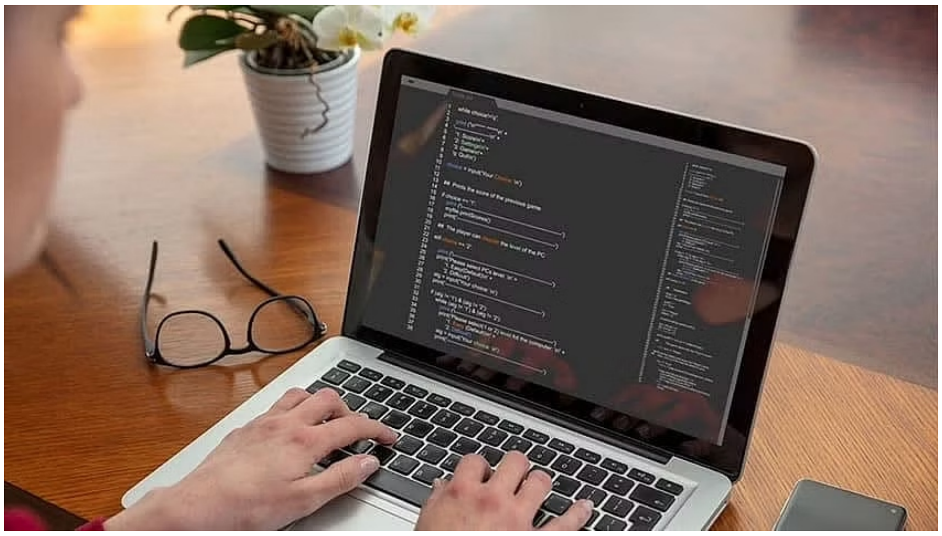

Relevance Feedback: In interactive information retrieval systems, users may provide feedback on the relevance of retrieved documents. This feedback can be used to refine subsequent queries and improve retrieval accuracy.

Query Expansion: Techniques such as pseudo-relevance feedback and term expansion aim to improve retrieval effectiveness by expanding the original query with additional terms related to the user's information needs.

Web Search and Information Retrieval: Web search engines use specialized techniques to index and retrieve information from the vast amount of data available on the World Wide Web. PageRank, link analysis algorithms, and crawling techniques are essential components of web search engines.

Information Retrieval Applications: Information retrieval techniques are used in various applications, including web search engines, enterprise search systems, digital libraries, recommendation systems, question answering systems, and more.

Information retrieval continues to evolve with advances in natural language processing, machine learning, and deep learning, enabling more sophisticated techniques for understanding and retrieving relevant information from diverse data sources