



**The 34th Annual Conference
of the
International Information Management Association
IIMA 2023**

**23 – 25 October
Las Vegas, United States**

BOOKLET OF ABSTRACTS

ABSTRACTS OF KEYNOTES

*Keynote by **Anand Sheombar**: “Reflections on tensions between a sustainable technology-driven world and today’s digital utopia-dystopia.”*

The keynote addresses the tensions we face in today’s digital world where dis/misinformation, aka ‘fake news’, advances in machine learning, artificial intelligence, and cyber-surveillance are present. Drawing from illustrative examples from research projects on online hate speech in Europe and globally, research on the impact on digital rights for African citizens by the ever-growing digital surveillance capabilities of some African governments, and research on making sense of digital transformation by civil society, Anand Sheombar will discuss the implications this has on International Technology and Information Management research (and practice). How can we address these challenges? Are we aware of them as researchers? Can we ensure that a sustainable technology-driven world is also a just world?

*Keynote by **Paul Kemppainen** (SISU Enlightened Protection): “The Protection 2.0 Era - Taking Unthinkable Risks/Fighting for What You Believe In.”*

Paul Kemppainen - who often goes by the military nickname ‘K9’ (based on his last name) - is an outlier in the security space whose breadth and depth of experience are unmatched: he was a Naval officer, Secret Service Agent, Staff Officer with the CIA (focused on terrorism), he oversaw security and intelligence for the National Park Service (safeguarding our nation’s monuments and icons), and he spent nearly a decade building a security program from scratch for Elon Musk’s rocket company SpaceX.

These days he owns a high-end security services firm in Las Vegas, Nevada called SISU Enlightened Protection - recipient of the Vegas Chamber’s 2023 Emerging Business of the Year Award. He’s passionate about the art of protection, the evolving security landscape, and disrupting the traditional security paradigm. His unique journey, stories of adventure (successes and failures), refreshing counter-optic, and cutting-edge thinking are sure to inspire you and your organization.

ABSTRACTS OF FULL PAPER SUBMISSIONS

Forecasting Gasoline Price with Time Series Models

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ABSTRACT

This research forecasts the gasoline price in U.S. and analyzes its managerial implications by means of both univariate and multivariate time series forecasting models. Gasoline price forecast is among the most difficulty time series variables during its importance to the economy and extremely volatile nature. The average regular gasoline price in U.S. reached \$5.06 per gallon in the month of June 2022, as opposed to \$3.41 at the beginning of 2022, a 48% increase. While gasoline prices had been rising over the first half of 2022 due to supply chain disruptions as a result of global Covid 19 lockdowns and the Russia invasion of Ukraine since February 24, 2022, they then surprisingly came down in the second half of 2022 to \$3.85 in November 2022, which has caught many consumers and business organizations off-guard. Both univariate time series forecasting models, such as exponential smoothing and autoregressive integrated moving average, and multivariate time series forecasting models, such as time series regression models, are used in this research with the data for the period January 2002 through November 2022. We find that the time series regression model with trend, season, GDP, CPI, and crude oil price turns out to be the best forecasting model both on the training data and the testing data, even with the testing data containing significant turning points. Managerial implications and future research directions are also discussed.

Examining the Relevance of Indian Logical Traditions and Present-day AI Developments

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ABSTRACT

This paper is an essay on the differences between “formal” Western logic and Indian logical traditions and how the latter impacts present-day AI developments. Upon the colonization of India, Western philosophers often dismissed Indian logical constructs as being underdeveloped or clumsy. Others, however, saw such denigration as emanating from Western racial prejudice rather than objectivity. This debate has persisted. I discuss the salient aspects of this debate, and then focus on the inductive aspects of Indian logic. This is especially relevant to the present, when there is an explosion of artificial intelligence based applications. I discuss the salient features of the new developments in Generative AI, and then attempt to show how the models in Generative AI are connected to Indian logic with its focus on inductive reasoning rather than deductive reasoning. It is useful for students and researchers of present-day AI to be aware of alternate systems of logic, which may be useful in developing newer AI models and applications.

Towards a Domain – Specific Comparative Analysis of Data Mining Tools

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ABSTRACT

Advancement in technology has brought in widespread adoption and utilization of data mining tools. Successful implementation of data mining requires a careful assessment of the various data mining tools. Although several works have compared data mining tools based on usability, opensource, integrated data mining tools for statistical analysis, big/small scale, and data visualization, none of them has suggested the tools for various industry-sectors. This paper attempts to provide a comparative study of various data mining tools based on popularity and usage among various industry-sectors such as business, education, and healthcare. The factors used in the comparison are performance and scalability, data access, data preparation, data exploration and visualization, advanced modeling capabilities, programming language, operating system, interfaces, ease of use, and price/license. The following popular data mining tools are assessed: SAS Enterprise Miner, KNIME, and R for business, Moodle Learning Analytics,

Blackboard Analytics, and Canvas for education, and RapidMiner, IBM Watson Health, and Tableau for healthcare. It also discusses the critical issues and challenges associated with the adoption of data mining tools. Furthermore, it suggests possible solutions to help various industries choose the best data mining tool that covers their respective data mining requirements.

Electronic Clinical Quality Measures of Health Information Technology and Hospital Performance: Evidence of U.S. Hospitals

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ABSTRACT

Electronic clinical quality measures (eCQMs) are an integral part of health information technology (HIT). This study explores the effect of eCQM implementation on hospital performance. The study proposes hospital profitability, efficiency, and quality to measure hospital performance. Based on the literature, this research hypothesizes that implementing eCQMs would positively impact hospital profitability, efficiency, and quality. The sample data are drawn from the 2017 American Hospital Association (AHA) U.S. Hospital Survey datasets (N = 6282), the 2017 AHA U.S. Hospital I.T. Survey dataset (N = 3451), and the 2017 Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) datasets (N = 4345). This paper also analyzes the effect of four control variables in the profitability models – hospital bed size, location, ownership, and teaching status. The study uses multiple regression models to test the hypotheses. Data strongly supports Hypothesis 1 (profitability), moderately supports Hypothesis 2 (efficiency), and does not support Hypothesis 3 (quality). Control variables show mixed results. Both theoretical and practical implications are discussed. Implications and future directions for this research shed light on the potential benefits of implementing eCQMs in hospitals.

Enterprise Architecture in Healthcare Networks: A Systematic Literature Review

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ABSTRACT

Healthcare organizations collaborate, share knowledge, and need to be accountable to each other. Therefore, healthcare organizations manage a dynamic information system landscape. Enterprise Architecture (EA) is a management tool for aligning these landscapes to the primary information needs that healthcare organizations have. EA is of value in some environments, but it seems to be not well suited to the dynamics of healthcare. Despite the publication of several systematic literature reviews on EA in healthcare, a systematic literature study comparing EA applicability at various levels of cooperation (intra, inter, and network collaboration) is lacking. Therefore, we posed the following research question: To what extent is EA researched within healthcare organizations in the context of intra, inter and network collaboration? A systematic literature review was used to select 94 scientific publications for evaluation. These studies make explicit the EA elements at three levels of collaboration in the context of healthcare. The findings show that EA is most frequently studied in relation to a single healthcare organization with a wide range of topics. IT governance and EA implementation are the subjects of the majority of EA network level studies (17 out of 94 studies), followed by building/developing EA, EA acceptance, EA issues and root causes, and EA modeling. Although numerous EA frameworks are discussed in studies at the intra- and interorganizational levels, they are rarely referenced in studies at the network level. Additionally, the EA benefits, success factors, and challenges are comparable at high level, but details differ per level.

These findings demonstrate that EA is researched within the healthcare sector context. The majority of knowledge on EA is focused on a single healthcare organization, but little is known

about EA in a networked healthcare environment. To learn more about how EA might be used in a healthcare network setting, a research agenda has been set up based on the results.

A Framework for Building Cognitive Knowledge Management Systems

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ABSTRACT

Knowledge Management Systems (KMSs) are a critical component of economic development and growth. The accumulation and effective utilization of knowledge capabilities allow firms to create value and improve competitiveness. However, recent technological advances in KMSs have outpaced research in this area, which continues to be siloed and characterized by a lack of cohesive frameworks and a limited focus on cognitive learning. This paper provides a conceptual framework for the development of cognitive KMSs. The proposed framework comprises of strategy, people, processes, learning, and technology that are designed to improve knowledge management and organizational memory.

The Influence of Hybrid Working in the Context of Agile Software Development within the Dutch Financial Sector

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ABSTRACT

The COVID-19 pandemic has accelerated remote working and working at the office. This hybrid working is an indispensable part of today's life even within Agile Software Development (ASD) teams. Before COVID-19 ASD teams were working closely together in an Agile way at the office. The Agile Manifesto describes 12 principles to make agile working successful. These principles are about working closely together, face-to-face contact and continuously responding to changes. To what extent does hybrid working influence these agile principles that have been indispensable in today's software development since its creation in 2001? Based on a quantitative study within 22 Dutch financial institutions and 106 respondents, the relationship between hybrid working and ASD is investigated. The results of this research show that human factors, such as team spirit, feeling responsible and the ability to learn from each other, are the most decisive for the success of ASD. In addition, the research shows that hybrid working creates a distance between the business organization and the IT department. The findings are valuable for Managers, HR professionals and employees working in the field of ASD as emphasizing and fostering Team Spirit, Learning Ability, and a Sense of Responsibility among team members can bolster the Speed of ASD.

Navigating the Ethical and Legal Terrains of AI Tool Deployment: A Comparative Legal Analysis

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ABSTRACT

The pervasive influence of technology has revolutionised numerous sectors across the globe, underscoring the need for a comprehensive evaluation of the tools that technology has engendered. Artificial Intelligence (AI), as a prominent technological tool, has exceeded expectations and proven immensely beneficial to humanity. Consequently, it is imperative to scrutinise the ethical and regulatory frameworks governing its application. This paper employs a doctrinal methodology to analyse the regulatory landscape and ethical guidelines surrounding AI technology in Nigeria and some selected jurisdictions. The findings highlight the necessity of establishing a robust governance system to govern the utilisation of this transformative technology. In light of the analysis, this study proposes several recommendations, including the imposition of stringent requirements for the provision and utilisation of AI tools, as well as the intensification of collaborations with relevant stakeholders.

The Role of Institution-Based Trust in Individual's IoT Adoption

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ABSTRACT

The Internet of Things (IoT) enables the connection between humans, physical objects, and cyber objects, resulting in monitoring, automation, and decision-making capabilities. This connection can be complex and lead to uncertainty for individuals before adopting IoT technology. To address this, we conducted research on the role of Institution-based trust in the context of IoT adoption. Our model for IoT adoption is based on existing literature and includes the components of Institution-based trust and its antecedents. Through empirical testing, we confirmed that Institution-based trust positively affects IoT adoption at the individual level. Additionally, we found that User confirmation/disconfirmation and familiarity are the antecedents of Institution-based trust.

SHORT PAPER

Utilizing CO2 Data to Determine Room Occupancy Patterns, Opportunities and Challenges

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ABSTRACT

This short paper explores the potential of using carbon dioxide (CO2) data as a means to establish the occupancy status of a room. The rising concern about indoor air quality, energy efficiency, and occupant comfort has led to the development of innovative techniques to monitor and manage the use of spaces. CO2 sensing presents an intriguing opportunity as elevated levels of CO2 are closely linked to human occupancy. By analyzing and interpreting CO2 levels over time, it becomes possible to infer patterns of room usage and optimize various aspects of building management. This paper discusses the methodology, benefits, and challenges of utilizing CO2 data for establishing room occupancy patterns.

Keywords: Data Management, Sustainability, Data analysis, Internet of Things, CO2 Sensing, Room Occupancy, Indoor Air Quality, Energy Efficiency, Building Management Systems, Machine Learning, Smart Buildings

INTRODUCTION

With the increasing demand for energy-efficient and sustainable buildings, it has become essential to optimize space utilization and comfort for occupants. Traditional methods of determining room occupancy, such as manual headcounts or motion sensors, have limitations and may not provide comprehensive data. In contrast, CO2 sensing offers a promising approach due to the correlation between CO2 levels and the presence of occupants.

Hogeschool Utrecht (HU) wishes to make optimal use of the available spaces in the existing buildings for students and employees. As a public organization it also has a duty to act in a sustainable and financially sustainable way. The HU has insight into the scheduled use of space and also the reserved use of space for teaching rooms. The HU currently has no data-based, structural insight into the actual use of scheduled and reserved teaching rooms. Several initiatives have recently been carried out to provide this insight. This research uses the insights, knowledge and experience obtained there to gain insight into the actual occupancy of HU's scheduled teaching rooms by means of data from HU building management systems.

Last year we started with a number of initial tests to investigate whether we can determine whether or not spaces are in use based on CO2 data. The first results looked useful. That is why we have continued to investigate whether the CO2 data is usable and how we can further improve that usability. In addition, an important point for attention is communication about this to management, since the impact will be great if we assume that education and research books rooms and then leaves them empty. Education and research are experiencing a major shortage of available spaces. So, we're actually planning to say there is no shortage and that's a message that needs to be delivered carefully.

BENEFITS

Utilizing CO2 data for establishing room occupancy patterns offers several benefits. Firstly, it enables a more accurate understanding of space utilization, facilitating optimized scheduling

and allocation of resources. This data can inform decisions related to heating, ventilation, and air conditioning (HVAC) systems, helping to reduce energy consumption and improve indoor air quality. Additionally, it can contribute to enhancing occupant comfort by enabling personalized climate control based on real-time occupancy information.

DESIRED RESULTS

This research aims to realize a product that provides insight into the actual use of teaching rooms in HU buildings. The first minimal viable product (MVP) to be delivered is a building-level report that provides insight into the scheduled and reserved generic teaching rooms versus the actual use of these teaching rooms.

APPROACH

Methodology: The methodology involves deploying CO₂ sensors in rooms and continuously monitoring CO₂ levels over time. The sensors can be integrated with building management systems to collect real-time data. Statistical analysis and machine learning techniques can then be applied to interpret the data and identify occupancy patterns. By comparing the CO₂ levels during periods of known occupancy and vacancy, algorithms can be trained to recognize patterns and estimate occupancy status.

RESULTS

CO₂ sensors can be used in various ways in public areas to monitor air quality and manage the ventilation system more efficiently. Here are some suggestions for the effective use of CO₂ sensors:

Sensor placement: Place the CO₂ sensors in strategic locations in the public space, such as meeting rooms, classrooms, offices, lobbies and common areas. Make sure that the sensors are at a representative height, for example at the head height of those present, because CO₂ accumulates in the upper layers of the room.

Set threshold values: Set threshold values for the CO₂ concentration based on guidelines or standards for good air quality. When the CO₂ concentration exceeds these thresholds, this may indicate insufficient ventilation. Make sure that clear action points have been established for different CO₂ levels, such as adjusting the ventilation rate or alerting maintenance personnel.

Connection to the ventilation system: Integrate the CO₂ sensors with the ventilation system of the public space. Based on the measured CO₂ concentration, the sensors can send signals to the ventilation system to adjust the air supply or exhaust. This provides more efficient ventilation and helps improve air quality.

Real-time monitoring: Provide real-time monitoring of the CO₂ concentration via a dashboard or a central control system. This allows those responsible to monitor the air quality in different rooms and take proactive action when deviations occur.

Awareness and communication: Make the CO₂ concentration and air quality visible to those present in the public space. This can be done by using digital displays that show current CO₂ levels. By creating awareness, people can take measures themselves, such as opening windows or moving to a better ventilated area.

Data Analysis and Optimization: Analyze the collected data over the long term to understand patterns and trends in CO₂ concentration. Identify busy times, peak times and areas with

chronic ventilation problems. This data can be used to further optimize the ventilation system and take measures to improve air quality.

Regular maintenance and calibration of the CO₂ sensors is also critical to ensure they deliver accurate readings. In addition, it is important to observe local regulations and guidelines regarding ventilation and air quality when implementing CO₂ sensors in public areas.

CHALLENGES

During the research, it happened several times that we did not have real-time access to the data. In addition, it turned out to take a lot of time to make the data available to other systems via an API. The result is that we have not yet been able to realize the desired dashboard.

There are also several challenges on the management and education side. The picture we paint about the vacancy of the spaces is something that education does not want to hear and does not experience as such in practice. Linking consequences to vacancy by, for example, closing buildings meets with a lot of resistance from management. At the same time, we are expected to achieve the climate targets. However, that is not possible if we are not jointly prepared to take a good look at the actual use of the buildings.

CONCLUSIONS

This short paper highlights the potential of utilizing CO₂ data to establish room occupancy patterns. By leveraging the correlation between CO₂ levels and human occupancy, building managers and occupants can benefit from optimized space utilization, improved energy efficiency, and enhanced occupant comfort. Further research and development are necessary to refine the methodology, overcome challenges, and integrate CO₂ sensing into smart building systems. With continued advancements, CO₂-based occupancy detection can become a valuable tool in building management practices, contributing to sustainable and healthy indoor environment.

PANEL DISCUSSIONS

Navigating Artificial Intelligence: From Fundamentals to Ethical Frontiers

ABSTRACT

The panel titled "Navigating Artificial Intelligence: From Fundamentals to Ethical Frontiers" will delve into the multifaceted landscape of artificial intelligence (AI). Beginning with a concise overview of AI, machine learning, and deep learning, the discussion will elucidate their distinctive features and interconnections. The panelists will then explore the pervasive impact of AI across various domains, such as natural language processing, computer vision, cybersecurity, and the dynamic realms of sports and esports. As the AI frontier expands, the conversation will shift towards contemplating future considerations, encompassing advancements, challenges, and potential disruptions. Integral to this exploration is a dedicated exploration of ethical dimensions, probing the responsible development and deployment of AI technologies.

Panel members: Carlos Dye, Carlos Barreras and Andrew Ocampo (University of Nevada, Las Vegas, United States)

ABSTRACT ONLY SUBMISSIONS

Leveraging Student Organizations: Protecting small businesses while building the Foundation for Tomorrow's Cybersecurity Professionals

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ABSTRACT

Small businesses are frequently targeted by cyber criminals who exploit their limited resources to target common vulnerabilities (Segal, 2022). Considering their limited resources, most small businesses cannot afford cybersecurity services and lack necessary knowledge on how to secure their livelihood, this could lead to wariness working with ever-evolving technology.

In addition to the lack of security education among small businesses, the cybersecurity industry itself has a shortage of skilled individuals. There are 700,000 unfilled cybersecurity positions in the United States (Lake, 2022). These unfilled jobs are the result of a lack of experience in candidates and a lack of professionals to train new applicants. Moreover, formal education is not enough, as recent graduates without any prior experience face considerable barriers when entering the cybersecurity industry (ISACA, 2020).

One solution to these problems is leveraging student organizations. Student organizations allow for students to get hands-on experience outside of the classroom and apply practices in a real-world setting. An example of this is UNLV's Free Cyber Clinic. The UNLV Free Cyber Clinic is an academically diverse, student-led organization that provides free cybersecurity assessments and remediation to small businesses in the Las Vegas valley. As students are performing the assessments and remediation, they are able to obtain real-world experience working with industry frameworks, as well as hone other important professional skills such as communication and technical writing. The UNLV Free Cyber Clinic model offers mutual benefits for students, the cybersecurity industry, and local businesses. Wide-span adoption of this model across multiple universities would increase the number of businesses protected and further close the cybersecurity skill gap. This would result in a nationwide boost in cyber defense and a future-ready cyber workforce.

Bias and Prejudice in Machine Learning (ML) and Artificial Intelligence (Ai) Algorithms: An Analysis

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ABSTRACT

As the internet continue to evolve, the importance of learning, understanding, and using machine learning, artificial intelligence, and deep learning, increased tremendously in the business eco-system. In an enterprise system especially the medical field, artificial intelligence research is gaining attention when applying machine learning techniques to healthcare complex problems, by allowing computers make critical predictions from enormous amounts of patient data. The problem evolves when machine learning is used for decision-making, bias could erupt due to the following: unrepresentative datasets, inadequate models, weak algorithm, or human errors etc. All these could result to false negative reports. This research will address a systematic, interdisciplinary analysis of machine learning biases as well as methods to mitigate these biases. The study will conclude by identifying machine learning biases in the workplace and recommend best practices for the enterprise system.

Keywords: Bias, Machine Learning, Artificial Intelligence

Is Chat Generative Pre-Training Transformer (ChatGPT-4) a Killer to Learning

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ABSTRACT

ChatGPT is a family of language models trained on a large amount of data to generate human-like text. They are built on several blocks of nodes of the transformer architecture. They are fine-tuned with supervised, unsupervised and reinforcement learning technologies. They also use various natural language processing tasks such as text generation, language translation and text classification. The pre-training in the title refers to the initial training process of data assembled at the presentation layer. The data for this study will be collected from the Web, Facebook, or internet artifacts etc. This study will evaluate the ability of ChatGPT-4, to perform high-level cognitive tasks and produce text that is indistinguishable from human-generated text. This capacity raises concerns about the potential use of ChatGPT-4 as a tool for academic misconduct in online exams. The study will determine if ChatGPT-4 is capable of exhibiting critical thinking skills and generate highly realistic text with minimal input, making it a potential threat to the integrity of online exams, particularly in tertiary education settings where such exams are becoming more prevalent. This research will further explore the implications of large language models like ChatGPT and recommend strategies for combating the risk of cheating when students use these tools. It is crucial for educators and institutions to be aware of the possibility of ChatGPT-4 being used for cheating and to investigate measures to address it in order to maintain the fairness and validity of online exams for all students.

Keywords: ChatGPT4, Training, Learning, A killer, Education

Application of Machine Learning Models to improve Fraud Detection

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ABSTRACT

Credit Card fraud is a major concern and issue in banking. Hence, fraud detection becomes extraordinarily relevant for financial institutions to better serve their customers and reduce bank losses. In this paper, with the help of RStudio, we have analyzed a large credit card transaction dataset from a European bank, implemented some machine learning algorithms, to better identify and detect credit card fraud. We suggest implementing such machine learning algorithms to enable banks to reduce fraudulent transactions.

Keywords: Supervised Learning, Unsupervised Learning, Financial institutions

Decrypting Success: An Investigation into the Role of Cybersecurity Competitions in Career Advancement

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ABSTRACT

This article presents the findings from a comprehensive survey aimed at understanding the impacts of participation in cybersecurity competitions on career progression within the industry. Leveraging the professional networking site LinkedIn, we identified and surveyed individuals who have participated in such competitions and are currently employed in cybersecurity. Our research focused on determining whether the competitive experience influenced the likelihood of obtaining job interviews, the perceived benefits during the interview process, and the extent to which knowledge gained during the competitions are applied in their current professional roles. Additionally, we sought to identify the types of competitions most commonly engaged in. The findings of our study suggest a strong correlation between competition participation and career advancement in cybersecurity, highlighting the value of these events for skill acquisition, industry recognition, and employment opportunities. Further details and comprehensive analyses are discussed in the article.

Keywords: cybersecurity, competitions, career

Understanding The Role of Context Variables in the Effective Use of Social Computing in Organizations for Knowledge Management Within Groups: An Empirical Study

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ABSTRACT

Social media are online communication and collaboration tools. They have been widely used for intra-organizational knowledge management since around 2005, especially in technology-oriented organizations. This paper specifically focuses on social computing at the group level in organizations and the variables that affect group-level Knowledge Management(KM). In this research, we adopt a qualitative positivist case study-based research approach to confirm the relationships between the use of Social Computing and KM and its effectiveness. We studied three leading IT organizations. Our approach helps us examine the proposed relationships and identify noteworthy interesting aspects pertinent to the hypotheses through the interpretation of the qualitative data. Our empirical tests have found that group-level knowledge management context variables, such as social capital, play an essential role in effectively using social computing for knowledge management at the group level. The finding of our research addresses a gap in the literature on KM in organizations. It can also help organizations better understand the effective use of Social Computing for KM at the group level.

Keywords: Social Computing, Group, Knowledge Management, Case Study

Digital Transformation: A Framework of Digital Constructs and Principles

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ABSTRACT

Today's business world is being transformed by digital technologies characterized by the pervasiveness of social media, the proliferation of mobile devices and apps, the optimization of the data value through analytics, the virtualization of computing resources in the cloud, and the emergence of innovation accelerators such as IoT, AI, robotics, AR/VR, 3D printing, and others. Many of the prime IT trends and changes today fall under digital transformation.

Digital transformation is a relatively new field where a widely accepted and holistic framework is lacking (Kutzner et al., 2018; Gao et. al, 2022; Lassnig et. al, 2022). In the absence of such a framework for guidance, researchers (e.g., Henriette et al., 2015; Kutzner et al., 2018; Nadeem et al., 2018; Hausberg et al., 2019; Verhoef et al., 2019) commonly took an abstract approach through an independent literature review to identify a set of knowledge units or themes that can be used to validate the sensitization and conceptualization of digital transformation. This study conducted an in-depth literature review of selected IS/IT articles, published between 2010 and 2022, which contained "Digital Transformation" in the title or abstract. The study identified 15 digital principles under four digital constructs that can collectively be used to capture the nature, essence and uniqueness of digital transformation.

In summary (constructs in bold and principles italicized), digital transformation is driven by a digital platform that utilizes digital and generative technologies to support a highly heterogeneous mix of social networks, mobile devices, and cloud infrastructures through real-time, anytime and anywhere digital connectivity. Adopting the modern practice of digital software engineering, digital systems in digital transformation employ software-defined infrastructure, implement service-oriented computing, embrace digital user experience, and enforce digital security. Digital transformation brings digital effects in which data is massively digitized, the physical materialization is turning to digital materialization in product design, and business processes and models are being digitalized. As a result, a tremendous amount of digital data is created and stored in the cloud with its value being maximized by data analytics. Successful digital transformation requires effective digital management that is guided by transformational IT leadership, develops digital strategies, executes digital technology convergence, creates digital innovation, and eventually turns an organization into a software-driven enterprise.

The goal of this study is to provide guidance to the understanding and the best practice of digital transformation and a framework for future research.

Keywords: Digital Transformation, Knowledge Constructs, Knowledge Principles

A Framework for Comparative Analysis of Data Mining Tools

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ABSTRACT

This paper presents a comparative analysis of data mining tools and proposes a framework for evaluating these tools. The growing availability of large volumes of data has intensified the need for effective data mining techniques to extract meaningful patterns, insights, and knowledge. However, the absence of a standardized framework for evaluating data mining tools hinders organizations from making informed decisions when selecting the most suitable tool for their specific requirements. The proposed framework encompasses factors such as features, ease of use, scalability, accuracy, performance, and cost. By using the framework, organizations can assess the compatibility of data mining tools versus their requirements and make informed decisions that align with their goals. To demonstrate the practical application of the framework, three data mining tools, namely WEKA, RapidMiner Studio, and IBM SPSS Modeler, will be subjected to a comparative analysis. The analysis will evaluate these tools based on the identified factors, providing insights into their strengths, weaknesses, and suitability for different data mining tasks. The outcome of this research will offer guidance to organizations seeking to adopt data mining tools.

Keywords: Comparative Analysis, Data Mining Tools, Altair RapidMiner, IBM SPSS Modeler, WEKA

Geographical Effects on the Dissemination of Vaccination Tweets

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ABSTRACT

Purpose - This research draws upon the strength of weak ties theory and prior literature to investigate how both content and context characteristics of a message influence users' content-sharing decisions, and further explore the moderation effect of the geographical attribute (rural versus urban).

Design/methodology/approach - The authors collected the data via the Twitter Application Programming Interface (API), which provides access to public Twitter data. A desktop application in Python was developed to gather available tweets. Econometric analyses were conducted to test the empirical results.

Findings - The study finds that a tweet from authors with more followers, of higher subjectivity, and with more emojis tends to have more retweets of vaccination messages. The results also suggest that the influences of the tweet's characteristics on message dissemination are stronger for higher urbanized regions.

Practical Implications - This study provides practical implications in healthcare, especially the promotion and share of public health messages. It could help policy makers and healthcare managers to better understand the dynamics of the rural and urban disparity in vaccination.

Originality/value - To the best of the authors' knowledge, this is one of the first studies that explore the extent of factors that drive the sharing of vaccination content on Twitter, with a focus on message features. This research also investigates how geographical factors play a role in distributing and sharing vaccination information on social network platforms.

Keywords: Social media, End users, User generated content system, Information seeking behavior, Information sharing, Decision making, Consumer behavior

Unveiling Cognitive Biases and Psychological Vulnerabilities in Phishing Emails: Advancing Detection and Training Interventions for Enhanced Security

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ABSTRACT

Phishing emails continue to pose a significant threat to individuals and organizations, exploiting cognitive biases and psychological vulnerabilities to manipulate recipients into impulsive and thoughtless actions. This research aims to deepen our understanding of these psychological mechanisms and leverage this knowledge to develop effective training programs that enhance individuals' ability to detect and respond to phishing attempts. By improving detection skills and fostering a sense of collective responsibility, we can create a safer online ecosystem. The existing literature emphasizes the pressing need for comprehensive research on cognitive biases and psychological vulnerabilities in the context of phishing attacks. Studies such as Aljofey et al. (2022) have highlighted the role of psychological factors in phishing susceptibility, demonstrating that individuals with higher levels of cognitive reflection and digital literacy exhibit greater resistance to phishing attempts. Similarly, research by Chou et al. (2021) emphasized the impact of cognitive biases, such as confirmation bias and authority bias, on individuals' susceptibility to phishing attacks. These studies provide valuable insights into the underlying mechanisms that make individuals vulnerable to phishing, reinforcing the importance of this research endeavour. The foundation of this study lies in a comprehensive analysis of the characteristics of phishing emails that are either detected or missed by individuals. Experiment 1 will utilize existing data from previous phishing email tests conducted within the University, exploring the relationship between email style and the number of staff members accurately detecting, falling for, or providing login credentials in response to phishing emails. This analysis will inform the development of training programs and support systems aimed at enhancing the cyber security of the University. Experiment 2 will focus on manipulating the cognitive load of users to determine if better allocation of attentional resources, specifically in a "low load" condition, results in increased detection rates. Cognitive load will be manipulated through task difficulty and/or external distractors, providing valuable insights into the impact of cognitive load on phishing email detection and cognitive biases impacting decisions. Building upon the findings from Experiments 1 and 2, Experiment 3 aims to design and evaluate a brief training intervention to improve individuals' ability to accurately identify phishing emails. This intervention will incorporate various techniques, such as focused-attention and open-monitoring training, to determine the most effective training tools for enhancing detection skills.

Ultimately, this research aims to deepen our understanding of cognitive biases and psychological vulnerabilities exploited in phishing emails and develop effective training interventions to enhance individuals' ability to detect and respond to such attacks. By addressing these psychological mechanisms and providing targeted training programs, individuals can become more resilient to phishing attempts, contributing to the creation of a safer online community. This study will have practical implications for organizations, such as UCLan, and the broader cybersecurity landscape, enabling the implementation of evidence-based strategies to mitigate the risks of data breaches and cyber-attacks.

Keywords: cybersecurity, cyberpsychology, phishing

Exploring the Role of Generative Artificial Intelligence (AI) in Modern Marketing Strategies and Tactics: A Guide for Business Professionals

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ABSTRACT

Generative Artificial Intelligence (AI) has revolutionized various industries, including marketing where AI techniques are used to enhance daily workflows to drive innovative strategies and tactics. This research aims to comprehensively explore the integration of Generative AI in the realm of marketing and provide valuable insights to guide business professionals in adopting and optimizing its use including ethical considerations. In addition, the research will provide insights to the academic community to prepare students for the realities of marketing practice in the modern world. To address the research questions, respondents will be screened to be marketing professionals in decision-making capacities using an availability sample from the American Marketing Association. A descriptive research design will be used for this research. The data collection tool will be administered to respondents as an online survey delivered via email addresses through the Qualtrics XM platform. The expected outcome of this research is to add to the evidence on how Generative AI is changing the way practitioners execute their daily workflows with implications for academic pedagogy.

Keywords: generative artificial intelligence, marketing strategy, marketing workflows

ChatGPT in Research: A Bibliometric Analysis

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ABSTRACT

ChatGPT, developed by OpenAI, is a cutting-edge language model with an exceptional ability to understand, generate, and engage in human-like text-based conversations (Abdullah, et al., 2022; Chui, et al., 2022; Deshmukh, 2023; Haleem, 2022; OpenAI, n.d.; Ray, 2023; Shelkande, 2023; Wu et al., 2023). When it was launched on November 30, 2022, ChatGPT sparked a sensation that spread across the fields of technology, communication, and artificial intelligence. Its appearance marked an important turning point in the development of AI-driven language models, capturing the interest of individuals, businesses, and researchers everywhere. As users eagerly started to investigate the immense potential it held for reshaping human-computer interactions, the anticipation surrounding ChatGPT's release was met with awe and fascination, thus pushing the boundaries of creative expression. (Alshater, 2022; Aydın & Karaarslan, 2022; Gao et al., 2022; George & George, 2023; Gilson et al., 2022; Jeblick, et al., 2022; Kalla & Smith, 2023; Roose, 2022; Zhang et al., 2022). Since then, numerous groups, including technology enthusiasts, linguists, ethicists, entrepreneurs, and academics from various fields, have shown significant interest in ChatGPT. As each group attempted to understand the implications and opportunities that this cutting-edge AI language model brought to the table, its arrival sparked a flurry of discussions, debates, and investigations. While researchers and ethicists engaged in critical examinations of its potential impacts and challenges, such as biases, ethical considerations, and societal impacts, developers, educators and entrepreneurs were inspired to incorporate it into a variety of applications by the seamless and contextually coherent conversations it can generate (Abdullah et al., 2022; Hariri, 2023; Li, 2023; Krügel, 2023; Liebrez et al., 2023; McGee, 2023; Rahimi & Abadi, 2023; Susnjak, 2022; Vidhya et al., 2023; Wilson & Billam, 2023; Zhang et al., 2023).

In a very short period of time, ChatGPT has become a very hot research topic across a variety of academic disciplines, such as medical writing and scientific writing (Biswas, 2023; Alkaissi & McFarlane, 2023), library services (Lund & Wang, 2023; Mali & Deshmukh, 2023), general education (Baidoo-Anu & Owusu Ansah, 2023; Tlili et al., 2023; Zhai, 2022), medical education and research (Arif et al., 2023; Eysenbach, 2023; Khan et al., 2023; Kung et al., 2023), healthcare (Casella et al., 2023; Garg et al., 2023), scholarly publishing (Curtis, 2023; Homolak, 2023; Tsigaris & da Silva). Some researchers are looking at ChatGPT's opportunities, challenges and possibilities (Aljanabi, 2023; Deng & Lin, 2022; Donmez, 2023; Kasneci et al., 2023; Paul et al., 2023; Santhosh, 2023; Van Dis et al., 2023; Whalen & Mouza, 2023; Xames & Shefa, 2023).

Besides the above research on various aspects of ChatGPT, there have been a few research activities specifically focusing on the literature reviews of the published papers. Li et al. (2023) carried out a systematic review of the existing publications on the use of ChatGPT in healthcare, outlining the "status quo" of ChatGPT in medical applications, for healthcare professionals, NLP scientists as well as general readers. Using the PRIMSA guidelines, Lo (2023) provided a rapid literature review of the impact of ChatGPT on education, aiming to a better understanding of ChatGPT in terms of 1) its capabilities across subject domains, 2) how it can be used in education, and 3) potential issues raised by researchers during the first three months of its release from December 2022 to February 2023. Raman et al. (2023) examined the early publication of ChatGPT research using the Altmetric Attention Score (AAS), a composite attention score created by Digital Science. Six early trends in both ChatGPT research and the early attention to this research were revealed by their findings from the analysis of the entire corpus of publications as well as the top publications according to the highest AAS scores. Sallam (2023) retrieved and analyzed 60 English papers from PubMed/MEDLINE and Google Scholar that examined ChatGPT in the context of health care education, research, or practice, aiming to highlight the potential limitations of ChatGPT. Zamfiroiu et al. (2023) analyze the research papers that were published in the three months after the launch of ChatGPT on November 30, 2022. They analyze the papers indexed by Google Scholar, Scopus and Web of Science, focusing on the scenarios of using ChatGPT and how to interact with it in education, science and research. They also offer some recommendations for future research that can be conducted with the aid of ChatGPT.

Among many academic studies on various aspects of ChatGPT, there are a few done to investigate the published literature in ChatGPT using bibliometric analysis. Gabashvili (2023) presented a systematic review of literature reviews and a bibliometric analysis of primary literature on ChatGPT, trying to evaluate the existing reviews and literature related to ChatGPT's applications and its potential impact on different fields. Khosravi et al. (2023) conducted a bibliometric analysis of the scientific literature of chatbots and ChatGPT to explore the structure, conceptual evolution, and trends in this field by analyzing data from both Scopus and WOS databases. They identified three key areas of interest in chatbots and ChatGPT publications: 1) digital technologies and mental health, 2) conversational agent design and evaluation, and 3) artificial intelligence and related technologies. There are other research activities using bibliometric analysis to study the published literature of ChatGPT in various areas, such as: the impact of ChatGPT in healthcare (Alessandri-Bonetti et al., 2023), the thematic landscape of GPT (Cano et al., 2023), the trustworthiness of ChatGPT (Farhat et al., 2023), the academic uses of ChatGPT in the first 6 months (Haverkamp, 2022), the use of ChatGPT in OBGYN (Levin et al., 2023), ChatGPT application in education (Pradana et al., 2023), the collision of ChatGPT and traditional medicine (Tan et al., 2023).

Despite the above academic studies on various areas of ChatGPT with bibliometric analysis, little has been done to investigate the published literature of ChatGPT in research using bibliometric analysis. So far, no paper has been found with the application of bibliometric analysis to the studies on ChatGPT in research. The lack of this type of bibliometric analysis calls for researchers to pay more attention to explore the emerging research trends with a bibliometric approach to ChatGPT in research.

Since the research on ChatGPT has become more and more popular and important not only in the United States, but also all over the world, in order to have a better understanding of the research on ChatGPT in research, this paper proposes a bibliometric analysis on the paper

publication and journal performance, focusing on the overall status and emerging trends, as well as the impact on future research directions for ChatGPT in research. Using the bibliometric data retrieved from the peer-reviewed publications in the database Web of Science (WOS), this paper aims to answer the following research questions:

- 1. What are the most productive countries in terms of publications related to ChatGPT in research?*
- 2. What are the most productive institutions in terms of publications related to ChatGPT in research?*
- 3. What are the most productive researchers in terms of publications related to ChatGPT in research?*
- 4. What are the most popular research areas in terms of publications related to ChatGPT in research?*
- 5. What are the most popular research journals for researchers to publish their papers on ChatGPT in research?*
- 6. What are the authorship and collaborative research patterns of ChatGPT in research?*
- 7. Which research papers are highly influential with respect to citation and usage count on ChatGPT in research?*
- 8. What are the emerging trends of future directions for studies on ChatGPT in research?*

The significance of this paper is three-fold: First, it would provide answers to the research questions that reveal the present status and emerging trends of ChatGPT in research through a bibliometric analysis. Second, it would provide a better understanding of what has already been researched and what is being researched for ChatGPT research. Third, it would provide future research directions for ChatGPT in research, as well as assessments of ChatGPT in research.

Keywords: ChatGPT, bibliometric analysis, paper publication, journal performance, Web of Science (WOS)

Raw Network Traffic Analysis and Anomaly Detection with PCA

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ABSTRACT

Problem and Motivation

In the field of intrusion detection, many studies traditionally rely on signature-based methods or supervised machine learning. These methods have limitations. Overseeing the numerous attack signatures in an Intrusion Detection System (IDS) can be overwhelming for administrators. For the IDS to identify threats, it necessitates an in-depth analysis of millions of packets. This process is not only time-consuming but also unsuitable for real-time threat detection. Supervised machine learning faces a core challenge wherein the quantity of malicious data packets is significantly smaller than that of benign data packets. This disparity makes it hard to train the model for accurate attack detection adequately. Given these challenges, we employ Principal Component Analysis (PCA), an unsupervised machine learning, to discern regular traffic, treating malicious traffic as an outlier or anomaly within the standard network flow.

Concerning the dataset required for the analysis, it would be most advantageous to obtain real network traffic data, containing network intrusions, to reveal the patterns of attacks and the anomalies in the network. Nonetheless, acquiring this type of data is problematic because of the dataset's sensitive nature. It might include specific organizational details, client information, and personal data of employees. Thus, we utilize a network traffic dataset obtained from a cybersecurity event, specifically the National Cyber Defense Competition (NCCDC) ("National Collegiate Cyber Defense Competition," n.d.). This contest tasks college teams to maintain a simulated company's operations while facing constant cyber threats. All teams had identical network structures and the same initial configurations. The network data captures interactions among customers, the student team (representing employees), and other staff members, simulating an authentic business environment.

Related Literature

PCA has been employed for anomaly detection in US backbone networks (Lakhina, Crovella, & Diot, 2004, 2005; Ringberg, Soule, Research, Rexford, & Diot, 2007) and for feature extraction in the KDD Cup 1999 dataset, which simulates intrusions in a military setting (Patil, Biradar, Ravi, Biradar, & Ghosh, 2022). The NCCDC dataset, though less explored academically, has seen some utilization. Boger et al. applied k-means on the NCCDC 2014 dataset to distinguish between regular and abnormal traffic but did not categorize specific attack traffic (Boger et al., 2016). Bachupally et al. stored the 2014 dataset in Hadoop's HDFS and used Hive queries to categorize packets, identifying only DoS attacks (Bachupally, Yuan, & Roy, 2016). Mireles et al. developed a framework to extract attack narratives from the 2015 dataset. They used SNORT to retrieve attack signatures and then conducted a manual, rule-based analysis on each signature (Mireles, Cho, & Xu, 2017). No identified research utilizes the NCCDC 2016 dataset.

Methodology

We obtained the NCCDC 2016 dataset, totaling 1.8 TB, from the IMPACT website (IMPACT, n.d.). It comprises 931 pcap files, each 2 GB, containing between 1.5 and 16.5 million packets. Using Wireshark's tshark tool and Python's Scapy packages, we filtered packets specifically containing the chosen team's IP address as either the source or destination.

Then, we chose target servers and services for monitoring and selected packet attributes, including Packet Index, UTC time, Ethernet Type, IP details, and Protocol specifics. These attributes were chosen based on potential attack signatures used for rule-based classification. For instance, the IP fragmentation flag was included due to its relevance in DOS attacks like the IP fragmentation attack. Similarly, TCP flags and ICMP types were selected because of their association with well-known DOS attacks, such as SYN-flooding and ICMP-flooding.

In order to execute Principal Component Analysis (PCA), it is imperative to modify the data types as required. Packets have fields represented as numbers, but they are mainly categorical variables. For instance, port numbers 25 and 80 correspond to SMTP and HTTP applications. Given the vast range of port numbers and possible IP addresses, creating dummy variables for all is impractical. We concentrated on specific server services targeted by attackers, resulting in 12 server-port pairs. Monitoring both incoming and outgoing packets gives 24 features. With the inclusion of TCP flags and ICMP packets, this totals 136 features. Instead of treating each packet as individual data, we count the 'True' categorical variables per second and minute.

Finally, PCA is implemented on the dataset comprising 136 features (columns) to generate plots featuring axes representing the chosen primary components, such as PC1 and PC2. Subsequently, a comparison is drawn between the plots prior to and after the start of the competition.

Risk and Contribution

We verified the potential of our methodology for intrusion detection with unsupervised machine learning. We chose the underexplored NCCDC2016 dataset, preprocessed its vast raw network traffic data, and applied PCA. We learned the feasibility of detecting sudden spikes in access to specific services on the target server. Unlike typical anomaly detection research that uses SNMP or NetFlow IP flows, we used raw network traffic to generate the flows, allowing packet-level inspection when anomalies are identified in the traffic. However, our approach using the NCCDC datasets has some limitations. We cannot access the target systems' log files, preventing verification of intrusions and damages on the servers. Additionally, we cannot detect Port-scans because we focus only on 12 specific server ports.

This research lays the groundwork for an unsupervised learning-based intrusion detection system, focusing on extracting patterns and insights from raw network traffic on core routers.

Keywords: raw network traffic, anomaly detection, principal component analysis, NCCDC

Surviving and Thriving in the Hybrid Cloud: a Review of the Current Cloud Computing Landscape

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ABSTRACT

Background and Purpose

Academic and industry institutions have migrated essential services to public cloud providers (Microsoft, AWS, Google, etc.) with mixed results. Some industry leaders attempted to replace their on-premises data centers with public cloud services, which is not recommended (Potel, 2023) without understanding how these services perform in the public cloud, along with a cost analysis. Even with some organizations retracting from the “Cloud First” approach, public cloud services market revenue is growing ~ 20% year-over-year since 2020 and topped 1/2 trillion dollars in 2022 (IDC Worldwide Semiannual Public Cloud Services Tracker, 2H 2022). Cloud technologists believe hybrid cloud; (the combination of public and private clouds) is a better path toward operational efficiency, better security, faster applications development, improved business insights, and better resiliency (Raynovich, 2023). This research will explore and assess the ever-changing landscape of the services offered by public cloud providers and investigate the emerging trends and the evolving relationship between public and private cloud services.

Problem Statement and Research Questions

Adopting cloud computing requires a sound Information Technology (IT) strategy (Tripathi, 2022). This strategy should be informed by a detailed understanding of which services thrive in the public cloud space and what services should remain in the private cloud. The primary research question will focus on revealing the guidance that can be derived to assist organizations in navigating these problematic terrains and ensure that your IT strategy considers the required elements for the decision process to place your services into the appropriate environment for success.

- Consideration 1; Security. The responsibility of patching Operating Systems can be moved to the public cloud provider by leveraging Platform as a Service (PaaS) with web and container services.*
- Consideration 2: Network. Understanding the constraints and strengths of your current connections to the Internet, where your clients connect, and the dependent services in your private cloud are imperative to success.*
- Consideration 3: the skill strength of your current IT department. Understanding the current administration skills of your IT support staff and development capabilities should direct to whom the management tasks are assigned to maintain environments.*

- *Consideration 4: Continuous Delivery Pipeline. Evaluating your current development, security, and operations (DevSecOps) release processes and potentially migrating to an Agile/Scrum methodology should be highly considered.*

A secondary research question will investigate IT decision-makers' concerns and/or hesitations when considering migrating critical services to public cloud providers and the factors that prevented them from migrating certain private cloud services.

Methodology

To address the research questions, respondents will be screened to be IT professionals in decision-making capacities. A descriptive research design will be used for this research. The data collection tool will be administered to respondents as an online survey delivered via email addresses through the Qualtrics XM platform. The survey will explore the primary and secondary research questions to capture the current landscape. Statistical significance will be tested.

Expected Outcomes

This research will discover the elements to take into consideration when placing services in public or private cloud environments. This paper will explore what services will thrive in the public versus the private space and the considerations that should be evaluated when planning service migrations.

Keywords: cloud computing, public cloud providers, private cloud, hybrid cloud, devsecops, Platform as a Service (PaaS), Continuous Delivery Pipeline

Consumer click action predictions using real time search data

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ABSTRACT

Predicting consumer's click actions among the list of products in real time has been instrumental in targeting and personalized recommendations. Traditional methods have relied on access to historical consumer-level data, a resource becoming scarce due to burgeoning privacy regulations. In this research, we introduce a Bayesian dynamic approach to predict consumer clicks by harnessing their search filtering choices such as adjustments on price ranges to refine search results. This innovative method allows us to understand consumer preferences even with limited data and predict consumer's click actions. This methodology holds the potential to bolster a company's capability to provide timely recommendations while adhering to the constraints of privacy regulations. We develop a Bayesian model to capture live-streamed information to assess individual-level price-quality tradeoffs in a fluid setting. Through a utility model tailored for price-quality tradeoffs, our model provides a closed-form solution, which brings a transparent insight into how various factors converge to influence consumer choices. We validate the model's efficacy through simulations and actual data from a prominent travel agency, deploying the Markov chain Monte Carlo technique. Both simulated and real-world applications of this novel method underscore its superior predictive prowess, suggesting that businesses can adeptly discern consumer inclinations by analyzing their real-time online actions.

Keywords: real time prediction, consumer preference, recommendations, big data, data privacy, Bayesian statistics

POSTER PRESENTATION

Implementing a digital red cross within humanitarian network

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ABSTRACT

As hospitals become more reliant on technology for their everyday processes, this in turn has led to an increased globalized threat of cyber attacks such as ransomware. In an effort to deter some-what-ethical black hat hackers, the International Committee of the Red Cross (ICRC) wants to devise a digital equivalent of its widely known red cross/crescent. The proposal suggests a digital emblem would aid in enabling hackers to better identify and avoid attacks on anything brandishing such a symbol.