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Accepted Papers

Semantic Question Generation a Proposed Methodology and a Case Study for Generating Algorithmic Question Pool

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ABSTRACT

Assessment of student performance is one of the most important tasks in the educational process. Thus, formulating questions and creating tests takes the instructor a lot of time and effort. However, the time spent for learning acquisition and on exam preparation could be utilized in

better ways. With the technical development in representing and linking data, ontologies have been used in academic fields to represent the terms in a field by defining concepts and categories classifies the subject. Also, the emergence of such methods that represent the data and link it logically contributed to the creation of methods and tools for creating questions. These tools can be used in existing learning systems to provide effective solutions to assist the teacher in creating test questions. This research paper proposes a semantic methodology for automating question generation and an application for Algorithms domain. The approach is expected to help educators in practicing using pool of automatically generated questions in specific topics.

KEYWORDS
Ontology-based approach, Automatic question generation, Education, Algorithms, E-learning, assessment.

Cryptocurrency Wallets and Digital Artefacts: a Primer for Law Enforcement AgenciesThe Brain's Basic Functional Circuit The Functional Unit of the BrainCharacter-based Pre-trained Language Model for Arabic Language Understanding

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ABSTRACT
State-of-the-art advancements in Natural Language Processing have significantly improved machine ability to understand natural language. However, as language models progress, they require continuous architectural enhancements and different approaches to text processing. One significant challenge stems from the rich diversity of languages, each characterized by its distinctive grammar resulting in a decreased accuracy of language models for specific languages specially for low resources languages. This limitation is exacerbated by the reliance of existing NLP models on rigid tokenization methods, rendering them susceptible to issues with previously unseen or infrequent words. Additionally, models based on word and subword tokenization are vulnerable to minor typographical errors, whether they occur naturally or result from adversarial misspellings.To address these challenges, this paper presents the utilization of a recently proposed free tokenization method, such as Cannine, to enhance the comprehension of natural language. Specifically, we employ this method to develop an Arabic free tokenization language model. In this research, we will precisely evaluate our model's performance across a range of eight tasks using the Arabic Language Understanding Evaluation (ALUE) benchmark. Furthermore, we will conduct a comparative analysis, pitting our free-tokenization model against existing Arabic language models that rely on sub-word tokenization. By making our pre-training and fine-tuning models accessible to the Arabic NLP community, we aim to facilitate the replication of our experiments and contribute to the advancement of Arabic language processing capabilities.

KEYWORDS
NLP, Free-Tokeniziation, Large Language Model, Arabic Language.

Improving the Capabilities of Large Language Model Based Marketing Analytics Copilots With Semantic Search and Finetuning

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ABSTRACT
Artificial intelligence (AI) is widely deployed to solve problems related to marketing attribution and budget optimization. However, AI models can be quite complex, and it can be difficult to understand model workings and insights without extensive implementation teams. In principle, recently developed large language models (LLMs), like GPT-4, can be deployed to provide marketing insights, reducing the time and effort required to make critical decisions. In practice, there are substantial challenges that need to be overcome to reliably use such models. We focus on domain-specific question-answering, SQL generation needed for data retrieval, and tabular analysis and show how a combination of semantic search, prompt engineering, and fine-tuning can be applied to dramatically improve the ability of LLMs to execute these tasks accurately. We

compare both proprietary models, like GPT-4, and open-source models, like Llama-2-70b, as well as various embedding methods. These models are tested on sample use cases specific to marketing mix modeling and attribution.

KEYWORDS
Generative AI, Large Language Models, Semantic Search, Fine-tuning, Marketing.

Direct Punjabi to English Speech Translation Using Discrete Units

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ABSTRACT
Speech-to-speech translation is yet to reach the same level of coverage as text-to-text translation systems. The current speech technology is highly limited in its coverage of over 7000 languages spoken worldwide, leaving more than half of the population deprived of such technology and shared experiences. With voice-assisted technology (such as social robots and speech-to-text apps) and auditory content (such as podcasts and lectures) on the rise, ensuring that the technology is available for all is more important than ever. Speech translation can play a vital role in mitigating technological disparity and creating a more inclusive society. With a motive to contribute towards speech translation research for low-resource languages, our work presents a direct speech-to-speech translation model for one of the Indic languages called Punjabi to English. Additionally, we explore the performance of using a discrete representation of speech called discrete acoustic units as input to the Transformer-based translation model. The model, abbreviated as Unit to Unit Translation (U2UT), takes a sequence of discrete units of the source language (the language being translated from) and outputs a sequence of discrete units of the target language (the language being translated to). Our results show that the U2UT model performs better than the Speech to Unit Translation (S2UT) model by a 3.69 BLEU score.

KEYWORDS
Direct speech-to-speech translation; Natural Language Processing (NLP), Deep Learning, Transformer.

Enhancing Stability and Performance: AI driven Single Optimization of Solid Lipid Microparticles

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ABSTRACT
This study explores the complex behavior of solid lipid microparticle (SLM) formulations. It reveals significant findings on the transient flow behavior of SLMs. A crucial aspect of the investigation was to establish a model that connects fatty amphiphiles and shear stress. This was achieved through start-up flow experiments using a hybrid Artificial Neural Network-AntLion Optimizer (ANN-ALO) algorithm. The pretreatment step established a strong correlation between stress and shear rate. Cetyl alcohol was found to have a significant positive effect on stress levels. Cetyl palmitate, on the other hand, showed a slight negative correlation with stress. The application of ANN-ALO yielded promising results. The coefficient of determination for the tested dataset was exceptionally high, measuring 0.9972. Furthermore, key statistics were assessed, revealing a MAE of 1.75, a MSE of 9.06, and a RMSE of 3.01 for the test dataset. The study involved the concatenation of a global optimization process, where the ALO algorithm was utilized in conjunction with the optimized ANN model to identify the optimal combinations of fatty amphiphiles. The results displayed a range of optimal parameter sets with diverse ratios of fatty alcohols in these formulations, highlighting the flexibility in design and offering multiple options to achieve the desired characteristics. In summary, these modeling and optimization processes contributed to the understanding of the transient flow behavior of SLMs and introduced an effective methodology for its optimization. The findings have practical implications for the development of SLMs, and the proposed approach enables the creation of innovative and effective formulations.

KEYWORDS
Solid lipid microparticles, Rheology, Transient shear flow, Artificial Neural Network-Antlion Optimizer, Modeling, Global optimization.

Recent Developments of Blockchain Enabled Internet of Things for Industrial Applications
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ABSTRACT
This article discusses current improvements in Blockchain technology for the Internet of Things (IoT). Blockchain is an exciting and groundbreaking technology. It is linked to cryptocurrencies and nonfungible tokens (NFTs). Blockchain technology has matured into a management solution for many types of global enterprises. In general, the blockchain can be thought of as a digital distributed database. Blockchain enables all IoT devices to improve security and transparency in their interconnected ecosystems. On the blockchain, sensitive user data such as biometrics, voice recognition, and facial recognition are kept. When data is saved on the blockchain, it becomes unchangeable and only a few people have access to it.

KEYWORDS
Blockchain Technology, Internet of things, Blockchain enabled IOT and Industrial applications.

Effect of Titanium Oxide Nanoparticle Enrichment on the Tribological Properties of Sandbox Bio-lubricant
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ABSTRACT
This study investigated effect of titanium oxide nanoparticle additive on the tribological properties of sandbox bio-lubricant. Titanium oxide nanoparticle-enriched sandbox bio-lubricant was developed by adding varying concentrations of the nanoparticle to the sandbox lubricant. Central composite design of response surface methodology was used to set up experimental parameters in order to minimize the numbers of experiments. The parameters values used for the evaluation were: load (2 N, 5 N, 8 N), speed (150 rpm, 200 rpm, 250 rpm) and nanoparticle concentration (0 wt%, 0.75 wt%, 1.50 wt%). Effects of these values on wear rate, friction coefficient and flash temperature parameter were evaluated. The lowest values of coefficient of friction and wear rate were obtained at a speed of 200 rpm and concentration of 0.75 wt% with 2 N load, while the highest value of flash temperature parameter was obtained with 8 N load at the same speed and concentration. The optimal combinations of parameters for minimum coefficient of friction and wear rate as well as maximum flash temperature were: 8.0N load, 199.4949 rpm speed and 0.7121wt% concentration. The overall results revealed that titanium oxide nanoparticle added to sandbox lubricant improved the tribological properties of the lubricant by increasing the anti-friction and anti-wear capacity of the lubricant. This showed the potential of titanium oxide nanoparticle as additive for bio-lubricant production.

KEYWORDS
Sandbox seed oil, titanium oxide nanoparticle , tribology, bio-lubricant, lubrication.

Lottocoin: Increasing Velocity of Crytocurrencies
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ABSTRACT
Since the introduction of Bitcoin, blockchain-based cryptocurrencies have exploded in popularity. Several blockchains have introduced various improvements over Bitcoin's design. However, many of these same blockchains struggle to generate interest from clients, who often want to participate in the more active blockchains. Even more so, those interested in running mining rigs or validators may be reluctant to invest their funds in a blockchain that does not show signs of activity. In this paper, we introduce LottoCoin, where new rewards are randomly generated for

clients who participate in the blockchain. The chance of selection is based on the transaction fees given by the client, thus encouraging greater activity (velocity of money) with greater amounts of coins paid to the miners/validators. By encouraging activity on the blockchain, LottoCoin seeks to generate greater interest for investors providing the infrastructure. Through economic analysis and a simulation using the SpartanGold blockchain framework, we show that the addition of a gambling mechanism can be used to drive adoption of a new blockchain.

Cryptographic Protocols for Electronic Voting System

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ABSTRACT

This paper explores the critical role of cryptographic protocols in strengthening the integrity of electronic voting systems, thereby preserving and reinforcing democratic ideals. It delves into advancements in homomorphic encryption, post-quantum cryptography, and zero-knowledge proofs, which are fundamental to ensuring the security and privacy of online voting systems. The study also investigates robust auditing processes, including using blockchain technology for transparency and risk-limiting audits. Furthermore, it advocates for stricter regulations for private companies involved in electronic voting and emphasizes the importance of user-friendly cryptographic interfaces and educational initiatives. The research integrates human factors research and addresses legal and ethical considerations of online voting cryptographic protocols. The findings underscore the need for a multi-faceted approach to realize secure, reliable, and user-friendly online voting systems.

KEYWORDS

Cryptographic protocol, Security,Online Voting.

Leveraging Nft's for Secured Decentralized Lending "a Defi Solution

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ABSTRACT

In the evolving world of technology and digital assets non fungible tokens (NFTs) have emerged as the latest advancement. These digital assets represent ownership of intangible items. Hold significant value. Unlike cryptocurrencies, like Ethereum or Bitcoin NFTs cannot be exchanged due to their nature. Each NFT has an indivisible value. NFTs not pave the way for financial services but also open up fresh opportunities for creators, buyers and artists.To revolutionize financing in the DeFi space this proposed approach utilizes NFTs generated from digital arts. By eliminating intermediaries this innovative method ensures trust and security in transactions. The idea entails automating borrower lender interactions through contracts while securely storing data using blockchain technology. Borrowers can obtain funding by leveraging assets such as estate, artwork and collectibles that're often illiquid. The key component of this system is contracts that independently execute lending agreements and collateral transfers within predefined parameters. By leveraging the Ethereum blockchain this project aims to provide consumers with access, to a platform offering a wide range of financial services.The demonstration illustrates the process of managing NFT lending and borrowing through contracts providing a secure and trustworthy transaction environment.

KEYWORDS

NFTs , Decentralized lending,Smart contracts ,Decentralized Finance(DeFi), Collateral.

The Mathematics Behind Cryptocurrencies "a Statistical Analysis of Cryptocurrencies

Masoud Eshaghinasrabadi-California State University, Northridge, USA

ABSTRACT

This article undertakes an extensive statistical examination of significant cryptocurrencies, expanding on the groundwork in the previous report, "A Statistical Analysis of Cryptocurrencies." Our study delves into the dynamics of Bitcoin, Ethereum, Tether, Binance, Ripple, Cardano, Solana, and Dogecoin, utilizing trading prices from 2017 to 2022 and considering significant events like the COVID-19 pandemic. Employing correlation analysis, our

investigation aims to unravel the intricate relationships between these leading cryptocurrencies. The findings underscore the necessity of achieving greater independence among candidate distributions to accurately model the return of all popular cryptos, suggesting an enhanced correlation among some. The generalized hyperbolic and generalized t distributions emerged as top-performing models despite limitations in overall fitness that varied across cryptocurrencies, with Tether exhibiting the least favorable fit. Using the fitted models, we forecasted average daily returns from January 1st to February 1st, 2023, demonstrating generally reliable predictive validity. These insights are pivotal in understanding cryptocurrency movements and mitigating the associated trading risks.

KEYWORDS
Cryptocurrency Dynamics, StatisticalExamination, GroundworkExpansion, CorrelationAnalysis, CandidateDistributions, Independence Modeling, Generalized Hyperbolic Distribution, Generalized t Distribution., Predictive Validity, Trading Risks, Bitcoin, Ethereum, Tether, Binance, Ripple, Cardano, Solana, Dogecoin, Trading Prices, COVID-19 Impa.

On the Construction of Perfect Keyword Secure Peks Scheme
Indranil Ghosh Ray

ABSTRACT
With the growing popularity of cloud computing, searchable encryption has become centre of attraction to enhance privacy and usability of the shared data. First searchable encryption scheme under the public key setting was proposed by Bonah et al. which is known as PEKS. In the PEKS scheme, one can easily link between cipher text and the trapdoor. In Information Sciences 2017 paper, Huang et al. proposed a public key SE scheme. In this scheme, encryption of a document or keyword requires the secret key of the data sender. The data sender generates ciphertexts, and upload them onto the cloud server. The data receiver generates trapdoors depending upon the public key of the sender and its own secret key. Thus, the PEKS scheme of Huang et al. circumvents the above attack by linking the ciphertext and the trapdoor to the key of the sender. However no work is available in the literature to stop attacks against linking user key and cipher text and server key and cipher text. In this paper we address these issues. We formalize the two new security notions, namely UKI-security and SKI-security. We have shown that our scheme is secure under these newly introduced security notions.

Exploration of Teaching Methods and Means for Commercial Bank Management
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ABSTRACT
Commercial Bank Management is one of the core courses for finance majors in universities. In order to achieve good teaching results, many teachers have made useful explorations in teaching methods and means. This article starts from the background of curriculum teaching reform, combines the characteristics of different teaching contents, and explores the specific application of case teaching method, chart teaching method and common teaching means in the teaching process of this course.

KEYWORDS
Teaching reform, commercial bank management, case teaching, chart teaching

AI Scribes: Boosting Physician Efficiency in Clinical Documentation
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ABSTRACT
The increasing demand on healthcare systems has amplified the burden on physicians and other healthcare practitioners, with a huge portion of time dedicated to documenting patient encounters. Prolonged charting periods not only contribute to decreased physician productivity but also

emerge as a prominent factor in physician burnout. This study investigates the potential of Artificial Intelli gence (AI) to mitigate this challenge, focusing on AI-powered medical scribing as a solution to alleviate the burden o f traditional charting methods in documentation of patient encounters and improve overall physician productivity. This research contributes to the ongoing discourse on the role of AI in healthcare and seeks to inform healthcare practitioners, administrators, and policymakers about the potential benefits of integrating AI-powered medical scribing to improve physician efficiency and mitigate the impact of extensive charting on overall productivity and well-being.

KEYWORDS
Physician Productivity, Artificial Intelligence (AI) scribes, Electronic Health Records, Charting, Physician Burnout.

Exploring the Opportunities of Health Resources and Services Availability Monitoring System (Herams) for Interoperability of Health Information Systems and Health System Development in the Emergency and Development Contexts

Hashimi Mohammad Badar, Al-khshbi Arafat Hussein, Brechard Raphael, Petragallo Samuel, Fuhrer Caroline

ABSTRACT
Health Resources and Services Availability Monitoring System (HeRAMS) is a system that maintains up-to-date master health facility list, assigns and maintains unique ID for each health facility, offers APIs for integration with other information systems, provides information on functionality and accessibility of health facility, and provides information on availability of essential health services and impediments for partial or not availability [2][4]. This paper explores the potentials and opportunities that come with HeRAMS for interoperability of health information systems and health system development in emergency and development settings. This study also proposes a conceptual framework for enhancing the integration and interoperability of HeRAMS with other health information systems and an approach for integration of external systems together by leveraging HeRAMS as a mediator. The paper concludes with a recommendation of the next steps to be taken.

KEYWORDS
HeRAMS, Interoperability, digital health, health information management, systems integration.

AI Powered Echocardiography

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ABSTRACT
The purpose of this paper is to highlight the current technological developments in diagnostic cardiovascular care. Echocardiography, a widely known imaging tool is used to extract insights about a patients' cardiac anatomy and perform necessary treatments or procedures based on their diagnoses. AI models are fed with huge amounts of raw cardiac data and use deep learning algorithms to identify images with remarkable speed and accuracy. AI applications in computer vision offer key benefits in the healthcare industry. Companies such as Siemens are the key players – the commercialization of new AI technology has enabled healthcare organizations to streamline workflows, reduce errors, and lower costs. Potentially, there will be no reproducibility issues thereby redirecting clinical efforts towards patient treatment planning and research to prevent uptrends of heart disease.

KEYWORDS
Echocardiography, Convolutional Neural Networks, Artificial Intelligence, Medical Imaging, Patient monitoring, Clinical Analysis.

Contextualizingsyntactic Interoperability Data Standardsfor Health Information Exchange Enhancing Data Use and Utilization in Uganda's Public Healthcare System

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ABSTRACT
In Uganda, the deficiency in syntactic interoperability standards for Health Information Exchange (HIE) hampers the exchange of healthcare information, limiting equitable access to quality health data and services. Addressing this gap, we adopted a three-phase study approach using HIV and TB programs as case studies. Key informant interviews with electronic health information experts revealed challenges like limited standardization guidelines, insufficient capacity, and data safety concerns. A framework supporting syntactic interoperability data standards was developed, gaining 94% approval from participants. The framework encompassed all stakeholders involved in data standards development according to 68% of respondents. Additionally, 88% agreed that the framework facilitated the development of clear, well-defined, and precise standards systematically. The derived syntactic interoperability data standards, while endorsed by 96% of respondents, must consider changing selection criteria over time. Implementing these standards promises improved service delivery, enhanced quality, equity, outcomes, and safety of patients in Uganda, crucial objectives given the substantial burden of infectious and non-communicable diseases.

KEYWORDS
Data use, eHealth, Electronic Health Records, Syntactic Interoperability standards, Hospitals.

Design and Thermomechanical Modeling of the Blade of an Air-cooled Gas Turbine

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ABSTRACT
The proposed study constitutes a contribution to the establishment of a methodology and a model making it possible to identify the thermomechanical behavior of an air-cooled blade sector. To analyze this problem and highlight the causes of a failure observed on a turbine, we first carried out the 3D design of blade models with a four-digit series NASA profile. Then, we identified the actual operating parameters of the machine. The actual operating parameters of the machine. The thermomechanical behavior of the blade sector, stressed by the thermal loading under operating conditions, is analyzed using a finite element calculation code. This study constitutes a fairly important contribution to the modeling of the blade for the finite element analysis of the influence of the thermomechanical effect. It makes it possible to determine the stresses and deformations in the gas turbine blade. The maximum values of the Von Mises stresses were determined in order to assess the behavior of the material. Comparing the Von Mises stresses of both static and thermomechanical studies also allowed us to see the maximum and minimum deformation. The results are very encouraging from the design study of an aluminum blade, and the modeling in thermomechanical terms, the simulation protocol gives logical and coherent answers.

KEYWORDS
gas turbine, blade, thermomechanics, stress, displacement & Strain.

THE COVID SHOCK, THE RISE OF DEFI, AND BITCOIN'S INCREASING MARKET RISK

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ABSTRACT
This paper aims to determine whether Bitcoin's market risk increased in response to the COVID-19 shock. Our analysis employs familiar asset pricing models used by investment managers. Our main result is that Bitcoin's market risk increased after the lockdown in March 2020. Wavelet analysis that captures both time and scale changes is introduced, and risk estimates that allow for both time and scale changes are provided, consistent with our main finding. From the standpoint

of traditional investments, we find that the market risk of a Bitcoin investment after March 2020 is similar to that of a risky tech stock.

KEYWORDS
Blockchain, Bitcoin, DeFi, Ethereum, Wrapped Bitcoin, CAPM, Fama/French