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IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

كلية علوم الحاسب وتقنية المعلومات
College of Computer Science and Information Technology

CCSIT



GRADUATION
PROJECT
SHOWCASE 9
2023 - 2024

**College Of Computer Science
And Information Technology**

Graduation Projects Showcase

2023 - 2024

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CS

Computer Science

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AI deep learning model for Germinal Matrix Hemorrhage diagnosis and grading using Cranial ultrasonography images.

Abstract

Germinal matrix and intraventricular hemorrhage (GMH-IVH) is a commonly encountered complication in premature infants and infants with very low birth weight and associated with significant mortality and devastating neurological sequelae. Almost one-half of GMH cases occur silently, therefore, a routine screening with intracranial ultrasound is recommended for all preterm infants born before 32 weeks gestational age. The implementation of an artificial intelligence model, specifically trained for the diagnosis and grading of GMH-IVH, holds substantial potential for enhancing clinical practices in the context of neonatal care. Hence, our objective involves a thorough survey of existing literature, placing particular emphasis on evaluating the artificial intelligence models utilized and the characteristics of the datasets employed. This comprehensive review is driven by the purpose of selecting an optimal methodology for the development of our model that is explicitly tailored to augment diagnostic precision and grading accuracy for GMH-IVH.

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B  **SERAH** BASERAH

Abstract

Baserah' is an innovative smart stick developed to significantly enhance the mobility and safety of visually impaired individuals. This project incorporates advanced Time-of-Flight (ToF) sensor technology for precise obstacle detection. Additionally, 'Baserah' is equipped with a water sensor to detect wet surfaces, enhancing user safety by preventing slips and falls. It also includes GPS and GSM modules, enabling seamless real-time navigation and efficient emergency communication.

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Conferences:
WiDS conference



A Machine Learning model for Emergency Department Triage Classification and Priority-Based Decision-Making

Abstract

Emergency Departments (EDs) are the most critical departments in medical centers, they are commonly the initial point of contact for patients for patients experiencing sudden illness or injury. With the global demand for emergency services, EDs have experienced significant challenges, notably overcrowding, which leads to delayed patient treatment, and those with critical conditions may be neglected or face complications. To address these issues, triage systems like the five-level Emergency Severity Index (ESI) have been implemented to prioritize patient care in EDs. Triage is the initial evaluation where its main objective is to classify patients for medical treatment by assessing their health status and level of urgency through a predetermined sorting procedure. However, ESI still relies heavily on subjective judgments from nurses, which are time-consuming and prone to human error and bias. To improve the efficiency and reliability of patient prioritization, we propose a system based on patients' electronic health records (EHR) in the ED. This system aims to classify patients into three urgency levels, leveraging their EHR data for enhanced prediction. In this study, we introduce a stacking ensemble model that combines LightGBM and CatBoost as base learners, supplemented by Logistic Regression (LR) to mitigate overfitting and reduce variance, thereby improving predictive accuracy. Additionally, our approach incorporates various preprocessing techniques, including Principal Component Analysis (PCA), oversampling, and scaling during exploratory data analysis to further refine the model's performance. Basic machine learning techniques such as Naive Bayes, KNN, and Decision Tree are used for the classification. To sum up the results, our proposed ensemble classifier demonstrated superior performance by achieving an accuracy of 91%, outperforming all other classification algorithms.

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Streamlining Student Housing Registration

Abstract

A proposed solution to the challenges presented by the traditional and manual student housing registration system at IAU and most of the universities in Saudi Arabia. Intended to result in a more streamlined and efficient housing registration system, which will reduce delays, paper waste, and student inconvenience. A web application is proposed to streamline university housing registration procedures, with numerous features to improve the process. The web application's anticipated functions, such as online registration, digital record-keeping, and queue handling. Finally, the need to create such a system and its potential benefits for both students and university management are emphasized.

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Conferences:
WiDS conference



Advancements in Digital Dentistry: AI-Enabled Diagnosis Using X-ray Images

Abstract

Due to the intricacies of oral health diseases, dental diagnosis is a significant difficulty in dentistry. This work intends to solve this issue by utilizing machine learning to improve the accuracy and efficiency of identifying dental disorders, largely using dental X-rays. Our objective is to create a powerful machine learning model that has been rigorously trained on a broad dataset of dental X-ray pictures that include a wide range of dental problems, from cavities to periodontal disease and oral infections. The heart of our research is carefully collecting and curating a large collection of dental X-ray pictures to train and evaluate machine learning algorithms. Our goal is to create a reliable diagnostic instrument that not only gives high precision in diagnosing dental disorders but also excels in efficiency, speeding up the diagnosis process. Beyond this research, we hope to change dental care by demonstrating the potential of machine learning in dentistry. We envisage better patient care through faster and more accurate diagnoses, as well as further research and broader usage of this technology in dental offices, ultimately enhancing the worldwide standard of dental care. This research program intends to usher in a new age in dentistry in which machine learning becomes an intrinsic component of dental healthcare, simplifying and improving diagnosis while also delivering cutting-edge tools for dental practitioners to enhance patient outcomes and develop the discipline.

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Electronic Smart Gadget for Water Consumption Classification Based on Machine Learning Techniques (Naqy)

Abstract

Despite the significant technological advancements in the 21st century, access to clean water remains limited, and water pollution continues to be a widespread issue, leading to millions of deaths caused by waterborne diseases. The conventional methods of assessing water quality are slow and inefficient, requiring the collection of samples that are sent to a lab, followed by a prolonged waiting period for results.

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NoCam: Camera Disabling Application For Android Phones Using Beacons

Abstract

Even though smartphones provide a variety of valuable services, they may also cause their users trouble due to the usage of the Camera in places where it is not permitted. They are considering the several methods available to turn off the Camera. They all require direct action from the user, which may cause people to ignore or even neglect that taking pictures in the area is illegal. This project offers a solution to the issue of taking pictures in areas where it is prohibited. This project's implementation takes advantage of the Internet of Things (IoT) technology by using special transmitters called Bluetooth Low-Energy (BLE) beacons, which let users know when their smartphone has approached an area where using the Camera is forbidden. The smartphone will then interact dynamically with the Beacon. The Camera is automatically turned off when the user enters the range and is returned to the previous settings when the user departs.

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Enshedny

Abstract

Enshedny is an innovative mobile application designed to enhance accessibility for individuals with special needs by providing real-time information about accessible facilities. Utilizing advanced GPS and mapping technologies, Enshedny helps users locate essential amenities such as wheelchair ramps and reserved parking spaces. The application features both light and dark modes to cater to different user preferences and improve readability. Business owners can join the community by adding their establishments that meet accessibility criteria, with submissions reviewed and verified by administrators. Administrators can also generate detailed reports to provide stakeholders with valuable statistical information about the facilities and services offered. Developed using a user-centered design approach, Enshedny supports both iOS and Android platforms, ensuring broad accessibility. Key functionalities include searching for nearby accessible facilities, viewing real-time availability, and contributing reviews. Enshedny aligns with Saudi Vision 2030 by promoting social inclusion and improving the quality of life for people with disabilities, significantly enhancing their independence and mobility. Future enhancements will focus on expanding the database of accessible locations and integrating additional features to further support users in their daily activities.

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HunTumor: Deep Learning Techniques for Brain Tumor Classification

Abstract

Brain tumors can be divided into several classes depending on the tumor location, shape, size, and stage of progression; as a result, tumor classification is an essential task for evaluating the tumor and making a treatment decision according to its category. However, manual diagnosis takes time and tiresome. Therefore, implementing automatic techniques for classification is crucial to accelerate, enhance the tumors diagnosis and save many lives. this project developed an efficient automated approach for classifying brain tumors. it focuses on a 3-class classification problem to differentiate among glioma, meningioma and pituitary tumors, which form three prominent types of brain tumor. The proposed classification system adopts the concept of deep learning and uses a Densely Connected Convolutional Networks or "DenseNet" architecture to extract features from brain MRI images.

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Toyota Cars Image recognition

Abstract

Leveraging advancing ICT, our project combines image recognition and a comprehensive Toyota dataset to identify Toyota cars. The user-friendly website allows instant access to the identification of the car. Overcoming image challenges, we prioritize accuracy using Python, HTML 5, PHP, and ML frameworks (e.g., TensorFlow, PyTorch).

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EasyCommunicate: Eye tracking and Sign language detection system

Abstract

EasyCommunicate system has eye tracking feature, and sign language detection and conversion to text form feature for mute-deaf people, which will be implemented by using deep learning. Additionally, it will assist patients with disabilities in communicating with medical staffs by providing many features with characteristics specifically made for specific types of disabilities that make it easier to communicate with the other parties without the need for an assistant. One notable advantage of the EasyCommunicate system is the writing on keyboard by using eye movements feature, which will benefit people who are both disabled, mute, and deaf. Additionally, the system includes pictures with recorded sounds that will be played when the pictures clicked, featuring commonly used phrases in the hospitals, by simply clicking on these pictures with eye wink, users can effectively convey their needs and concerns. Additionally, medical staff who do not understand sign language can use the system's sign language translation, which will translate the sign language letters to form a word.

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Application of AI Models for Early Brain Stroke Detection: A Case Study in Saudi Arabia

Abstract

Stroke represents a critical global health issue, ranking prominently as a leading cause of mortality and enduring disability worldwide. The imperative for timely and precise diagnosis is acutely felt, directly influencing therapeutic strategies and long-term patient recovery trajectories. Set within the Saudi Arabian healthcare context, this study seeks to capitalize on the transformative potential of Artificial Intelligence (AI) in enhancing stroke diagnostic protocols through the analysis of Computerized Tomography (CT) scans. Leveraging cutting-edge AI methodologies, including Convolutional Neural Networks (CNN) and Support Vector Machines (SVM), our research meticulously evaluates complex CT imaging patterns to expedite and refine the identification and categorization of stroke types. The research navigates the intricacies of AI-assisted CT data interpretation, tackling hurdles from data integrity to algorithmic training complexities, thus bolstering the diagnostic framework's robustness and dependability. Our conclusions shed light on AI's substantial contributions to stroke diagnostics and propose an actionable trajectory for its continued advancement. By bridging neurology and AI research, this study underscores AI's burgeoning role in redefining medical imaging and enhancing patient-centric care.

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HAND BIOMETRIC INFORMATION FOR GENDER CLASSIFICATION

Abstract

The human hand is considered as one of the primary biometric traits that are used to identify a person. As an example, it was implemented by the USA government in the 1996 Games to control and protect physical access to the Olympic Village. This project investigates the possibility of identifying gender information based on different biometric features that will be extracted from hand images using deep learning methods. To evaluate the performance of the proposed method, different experiments will be implemented on a public large dataset of human hand images (dorsal and palmar sides). The experimental results should be compared with a state-of-arts approach on the same data set.

Intelligent Plant Diagnosis System using Image Processing

Supervisor:
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- Mohammed Hesham Al-Gawez
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Abstract

Crop diseases pose a threat to food security, and identifying them quickly can be challenging. However, with the widespread use of smartphones equipped with high-resolution cameras and powerful processors, it has become possible to diagnose plant diseases using image processing techniques through a smartphone. Early detection would assist farmers in protecting their plants and crops from damage, particularly small-scale farmers who rely on their crops as a source of income. Our project aims to provide essential information related to a specific disease, enabling farmers to deal with the disease in a timely manner and take appropriate measures to minimize the resulting damage. We develop a plant advisory system that allows farmers to upload images of plant leaves to obtain information about the plant's health status while providing appropriate treatment measures. The project aim to utilize image processing techniques and machine learning algorithms to build the model

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Hand Gesture Recognition for Computer Use

Abstract

Computer devices has never been more vital throughout history, schools, workplaces, governments, even homes all over the world require at least one device to function, in turn device control and navigation becoming equally important, experts continue to explore more convenient methods of control, as such this report offers its own contribution to the computing industry. Applying Software Engineering and Artificial Intelligence technologies such as deep learning with algorithms such as SIFT and Inspection v4 to detect users hand gestures, extract features, and classify them as actuators to a certain device actions, resulting in a more convenient, unique method of device control, aiming to push the boundaries of accuracy and versality in recognizing diverse hand movements.

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Analyzing Cybersecurity Risks through Natural Language Processing (NLP)

Abstract

Cybersecurity risks are ever-changing, with abundant information available. Manually sifting through this data to gauge the severity of each threat is time-consuming. In our research, we leverage Natural Language Processing (NLP), a technology facilitating computer understanding of human language. Using NLP, we automatically analyze HackerOne reports as our dataset, extracting crucial information for a clear threat severity report. Our focus is on avoiding the oversight of critical details rather than just optimizing time efficiency. This technology proves valuable for companies and organizations, aiding in a better understanding of online threats and bolstering overall security. It benefits companies by directing their attention to significant issues, rather than minor ones, based on our severity assessment. Additionally, it assists bug hunters by providing clarity on severity, saving them time in determining the appropriate severity level for their submission

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Journals: Mdpi



Fit Talks: Forecasting Fitness Awareness in Saudi Arabia using Fine-Tuned Transformers

Abstract

This study aims to utilize sentiment analysis to assess the awareness of health and fitness among Saudi Arabians. Motivated by the need to address regional health issues, the research focuses on analyzing Saudi content from the X platform (formerly Twitter). Utilizing the X application programming interface (API), we collected and extracted data employing Natural Language Processing (NLP) techniques. Essential preprocessing steps such as normalization, stop word removal, and tokenization were applied to enhance data quality prior to analysis. We fine-tuned two transformer architectures, BERT and GPT, specifically using three BERT-based models (AraBERT, MARBERT, CamelBERT) and GPT-3.5, to identify the sentiment of health-related tweets. The study provides valuable insights into Saudi Arabian attitudes towards fitness and health, popular topics, and genuine expressions, offering actionable information for public health campaigns and initiatives.

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Water Supply Forecast Dataset Proposal

Abstract

Water supply is a critical resource that supports life and economic activities. The availability and quality of water are essential for various purposes, including agriculture, industrial processes, and domestic use. The management of water resources requires accurate forecasting of water supply, which can be achieved through the analysis of historical data. In this project proposal, we aim to develop a water supply forecast dataset that can be used to improve water resource management.

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Enhancing Workplace Safety System: Detecting Fatigue and Alertness Levels through Micro Facial Expression Analysis

Abstract

This project proposes an image processing and machine learning system for real-time detection of fatigue and drowsiness in workplace environments using micro-expression analysis. The goal is to enhance safety by preventing accidents and injuries arising from fatigued states. The system will use optimized algorithms to analyze facial images, identifying visual indicators of fatigue like micro-expressions, eye gaze, and head pose. Curating diverse and representative datasets is key for accurate generalization across demographics and conditions. After evaluating state-of-the-art techniques, optimal facial expression recognition algorithms will be selected. Model optimization and real-time performance will be addressed as key challenges. If successful, the system could significantly improve workplace safety by enabling timely fatigue detection and intervention. The project aims to demonstrate the potential of human-centered AI applications in promoting employee well-being, while considering ethical implications. Ultimately, this endeavors to merge advancements in computer vision and machine learning to build intelligent systems that safeguard human lives.

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Journals: IJCSNS –
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Computer Science and
Network Security

SukarSense: A Clinical Decision Support System (CDSS) for Diabetes Detection and Forecasting using Machine Learning

Abstract

Diabetes is becoming a more widespread issue, especially after the COVID-19 pandemic, due to several reasons such as lifestyle, unhealthy food, etc. Its early detection is crucial, especially in Saudi Arabia. The proposed study addresses that need. In the current study, a Clinical Decision Support System (CDSS) leverages machine learning to improve its ability to identify individuals at risk for diabetes. Providing patients and physicians access to a high-tech crystal ball that can predict their health outcomes is analogous to that. After reading through a ton of research papers, we discovered that, although there is a lot of technology available, the proposed study is unique in that it not only assists physicians but also alerts patients to their potential danger of diabetes. Moreover, we combed through tons of health data, including age, nutrition, and lifestyle, using some amazing machine-learning models with a special focus on the Saudi Arabian dataset. In this regard, we intend to investigate Random Forest and Support Vector Machines in particular, based on the literature review. The fact that our CDSS is more than simply a collection of algorithms is quite fascinating and practical. It is now easy to use for both patients and medical professionals. It connects to telemedicine services as well as Electronic Health Records (EHR). The proposed system includes certain additional features that, when compared to others in the field, such as Dr. Sulaiman Al Habib's, could significantly alter the way diabetic care is provided.

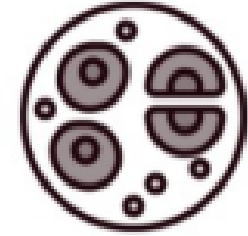
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Conferences:

WiDS conference



Explainable Vision Transformer-based Model for Predicting the Cell Differentiation for Stem Cell-based Therapies

Abstract

The emergence of the regenerative medicine (RM) also known as stem cell therapy has revolutionized the health care. Due to the regenerative ability of the stem, it has been successfully used to treat several diseases such as Alzheimer, Parkinson, cardiac diseases, diabetes, cancer and gastrointestinal etc. Moreover, these stems cell has the potential to develop and regenerate different organs or tissues such as bones, cartilage, muscles etc. Therefore, it can be used to repair or replaced the diseased or damaged part. The stem cell can be developed into other specialized cell, the process is known as stem cell differentiation. Stem cell differentiation status plays a crucial role in regenerative medicine and disease modelling. Tracking and predicting stem cell differentiation is essential for enhancing cell-based therapies and understanding the underlying biological mechanisms involved. During the differentiation process huge number of individual cells are generated, interpreting and tracking the high volume of generated cells are challenging and time consuming. The Vision Transformer (ViT) has demonstrated remarkable success in analyzing visual data by treating images as sequences of patches. Our proposed solution focuses on developing a ViT-based system designed to accurately predict the differentiation status of Neural Stem Cells (NSCs) through morphology-based analysis in both bright field and dark field microscopic images. This model was trained on an extensive dataset of labeled NSC images representing various stages of stem cell differentiation. It surpassed the established benchmarks in brightfield channel image analysis, achieving an overall accuracy of 0.9811 with a loss of 0.0529, precision of 0.9811, and recall of 0.981. To ensure the interpretability of our model's predictions, we incorporated explainability techniques such as Grad-CAM, Attention Maps, and ViT LRP. These methods enhance the model's transparency by illustrating the influential regions and features in the images, which is essential for trustworthy clinical decision-making in stem cell therapy. The system has been integrated into a web application that allows biomedical engineers to upload NSC images and receive immediate predictions. Our research aims to advance regenerative medicine by providing a powerful tool for researchers and biomedical engineers to accurately monitor the stem cell differentiation process.

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AI based Mental Healthcare system (AIMS)

Abstract

In this era of information and communication technology (ICT), tremendous improvements have been witnessed in our daily lives. The impact of these technologies is subjective and negative or positive. For instance, ICT has brought a lot of ease and versatility in our lifestyles, on the other hand, its excessive use brings around issues related to physical and mental health etc. In this study, we are bridging these both aspects by proposing the idea of AI based mental healthcare (AIMS). In this regard, we aim to provide a platform where the patient can register to the system and take consultancy by providing their assessment by means of a chatbot. The chatbot will send the gathered information to the machine learning block. The machine learning model is already trained and predicts whether the patient needs a treatment by classifying him/her based on the assessment. This information is provided to the mental health practitioner (doctor, psychologist, psychiatrist, or therapist) as clinical decision support. Eventually, the practitioner will provide his/her suggestions to the patient via the proposed system. Additionally, the proposed system prioritizes care, support, privacy, and patient autonomy, all while using a friendly chatbot interface. By using technology like natural language processing and machine learning, the system can predict a patient's condition and recommend the right professional for further help, including in-person appointments if necessary. This not only raises awareness about mental health but also makes it easier for patients to start therapy.

Supervisor:
Dr. Deemah Alqahtani
Dr. Sumayh Aljameel

Group Members:

- Deema Abubaker Bashamakh
- Felwa Zeyad Albinali
- Bashayer Adel Almashaan
- Haifa Althonayan
- Atheer Albassam



Automatic Detection of Eczema with Explainable Artificial Intelligence

Abstract

Eczema is a common autoimmune disease that affects the skin, causing the appearance of inflamed, itchy lesions all over the body, particularly in flexural locations. Early and accurate detection of eczema is critical, especially in children, due to the atopic march, which causes them to have a higher likelihood of developing asthma and food allergies growing up. Artificial intelligence can significantly aid in the process of automating detection of many diseases, but its inability to explain its reasoning in a natural language hinders its broad capabilities. Many approaches have been proposed for models with the aim of detecting eczema that have utilized machine learning and deep learning techniques to detect eczema from images of affected areas of skin. However, the past efforts we have found lacked explainability and many of them utilized publicly available datasets. Thus, we will explore the possibility of creating an explainable AI model for eczema detection that is trained using a unique dataset collected from King Fahad Hospital of the University and can explain its findings while outperforming state-of-the-art eczema detection models. While there have been previous works employing various Artificial Intelligence techniques for eczema detection, this is the first-ever contribution in the development of an explainable AI model using a dataset collected in Saudi Arabia.

Supervisor:

Dr. Nida Aslam

Dr. Irfan Ullah Abdurrab

Dr. Norah Alturayeif

Group Members:

- Danah Yousef Aldossary
- Danah Abdullah Alquaamiz
- Raghad Abdullah Althukair
- Lujain Ahmad Alothman
- Roaa Alaa Ainaddin



SmartMPN: Intelligent diagnosis for classification the Ph-Negative Myeloproliferative neoplasm (MPN) using deep learning.

Abstract

Due to the complex and heterogeneous nature of Myeloproliferative Neoplasms (MPNs), particularly the Philadelphia Chromosome (Ph)-negative types such as Essential Thrombocythemia (ET), Polycythemia Vera (PV), and Primary Myelofibrosis (MF), accurate diagnosis and early detection remain challenging yet critical for effective treatment and improved patient outcomes. This research project utilized an open-source dataset provided by Serdang Hospital in Malaysia, which consisted of biopsy images affected by Ph-negative MPN. Our study focuses on developing a cutting-edge automated deep-learning system capable of diagnosing and accurately identifying these rare hematological disorders characterized by the excessive production of blood cells in bone marrow. Based on histopathology images, the deep learning object detection model was effectively utilized to classify Ph-negative Myeloproliferative Neoplasms (MPNs).

Supervisor:
Dr.Amal Alhajri

Group Members:

- Reem Ahmed Bawazeer
- Noura Saad Alahmadi
- Areej Salman Alkhaldi
- Dana Ibraheem Alkhabbaz
- Danah Alghamdi

Journals:

Journal of Computer and Communications.



Spam Review Detection

Abstract

Nowadays most online platforms highly depend on user-generated content. Several reasons that raise the importance of online reviews, they are used to make important organizational decisions, consumers use them to help them decide whether to buy a product, also they formulate the reputation of a company. However, fake reviews have become a prevalent issue with the rise of online platforms and e-commerce. Some people are making efforts to generate fake reviews to raise or fail a product sale, harm the reputation of a competitive company, or any other unacceptable intent that negatively impacts customers and organizations. Artificial Intelligence and Machine Learning techniques have proven to be effective to solve such issue. We aim to develop a machine learning model that effectively detects fake reviews. As part of our study, we will use two datasets, the "Fake Reviews Dataset" and "Amazon Product Reviews". After preprocessing the data and ensuring its cleanliness, it will be used to build and compare supervised, unsupervised, and/or semi-supervised ML models to determine the model that achieves the highest accuracy in predicting the credibility of a review. Moreover, we will use and combine different Machine Learning algorithms to improve the effectiveness of the model. In addition, we want to develop a desktop application with a user-friendly interface to allow the public to utilize the ML model to predict the credibility of a review. When implementing the project, we expect to have a model that effectively predicts spam reviews with high accuracy.

Supervisor:
Dr. Nahid Sultana

Group Members:

- Zeina Moammer Alabido
- Zahra Ali Alharz
- Afnan Turki Alrayyani
- Fatima zaki Almajed
- Norah Khaled Alqablan

Artificial intelligence-based modelling for Water Quality Prediction in Saudi Arabia

Abstract

Digital development is increasingly evolving nowadays, and providing real-life applications will lead to a better life and enhanced standards. Artificial intelligence and machine learning plays a significant role in building smart and innovative systems capable of solving serious and critical problem, that were not solved before, and for our project's idea which is about water quality prediction, artificial intelligence models will assist in providing accurate results describe the quality of water. The project tackles the problem of building a Water Quality Prediction model using a variety of ML and DL models to benefit society by giving solutions that make the operational processes easy, faster computation, and take the optimal solution based on the results of the models However, working with some artificial intelligence algorithm, especially Deep Learning (DL) algorithms, which requires a huge dataset, and this problem one of the gap researches faced by many researches who worked on this idea previously. Consequently, this idea is important, and we choose it to tackle this gap research and try to show better solutions to improve it. Investing in research in the field of AI is crucially important nowadays, and this scientific research leads to improving and enriching the AI research field and discovering new techniques and approaches to automate real-life applications and convert them into enhanced versions that can be used by sectors that demand it.

Supervisor:
Dr. Nasro Min Allah

Group Members:

- Shahad Khalid Alshammary
- Ghada Hamoud Almutairi
- Maryam Ali Alqarrous
- Reema Osamah Radi
- Maha Faraj Alrashidi

Competitions:

Nomniated for best poster in PNU



Unified Blockchain-Based University Student Record System

Abstract

Document verification is a complicated process since each type of document requires different verification methods. For students, academic transcripts are the most essential records provided by their universities. Today's graduates have the ambition to complete their journey, either by pursuing their education or starting their careers. However, the current digital systems and platforms relies on a centralized architecture, risking graduates to lose great opportunities and allowing potential issues of academic fraud as well as extensive time consumption. This would lead to a negative effect on the recruitment process for graduates. With the introduction of blockchain, institutions are able to verify transcripts independently benefiting from the immutability and security of blockchain nature. From comprehensive research we found that all blockchain platforms are partly decentralized leading to serious impact damage such as loss of data integrity and confidentiality beside other limitations regarding the cost, speed, and scalability. In this project, we are developing a solution that is a fully decentralized blockchain-based system providing academic transcripts verification method between the universities, graduated students, and employment institutions, allowing authorized beneficiaries to access the academic transcript independently and overcomes with the limitations that blockchain-based system suffer from.

Supervisor:
Ms. Asrar Abdulrahman
Almogbil

Group Members:

- Mozah Abdulrahman Alismail
- Sara fahad odah
- Batool Ahmed Faran
- Latifah Othman Alessa
- Rana serhan almanaa



Speech Emotion Recognition using Deep Learning

Abstract

With the potential to improve communication systems and human-computer interaction, speech-emotion recognition (SER) has become a central focus of affective computing research. This study aims to build a complete system to recognize emotions from the voice and to compare the performance of two feature extractions, both GTCC and PNCC. The system employs a deep learning model trained on diverse emotions using various datasets, seamlessly integrated into the proposed Chat Vibes Assist system. This system's goal is to employ the concept of SER, which recognizes the customer's emotions from their voices to enhance customer interaction, as users communicate through voice messages, which are inputs to the system. The SER model accurately identifies emotions and returns the results to the employee to further utilize them. Experiments using the Deep Learning algorithm have shown that the GTCC results exceeded the PNCC, with a difference of 1.14%.

CIS

Computer Information System

Supervisor:

Ms. Asiya Abdus Salam

Ms. Albandary Alamer

Group Members:

- Reem Ali Alanazi
- Raneem Waleed Alomair
- Alanoud Ali Khaneen
- Nouf Nasser Alabri
- Rouda Ali Bagraim



Aoun - Baggage Tracking System

Abstract

The continuous advancement of technology has prompted airports to actively seek opportunities for service enhancement. One particular focus area involves the integration of automated help-desks. To effectively tackle challenges related to lost or mishandled baggage, it becomes imperative for airport systems to incorporate an additional feature that facilitates efficient baggage tracking in real-time. By leveraging barcodes integrated into the baggage handling process, our proposed system enables staff members to accurately locate misplaced items with ease. Furthermore, this tracking system seamlessly integrates with self-service kiosk devices, providing passengers with convenient options while minimizing the time spent searching for their belongings. The implementation of such a comprehensive system would result in significant benefits not only for passengers but also for the overall efficiency and effectiveness of the airport operation itself.

Supervisor:
Dr. Saqib Saeed

Group Members:

- Raad S. Alharthi
- Abdullah S. Albogami
- Faisal M. Almadi
- Mohammed S. Alshehri
- Rayyan A. Alyami
- Abdulwahab M. Alanazi

Journals:

Tuijin Jishu/Journal of
Propulsion Technology

Conferences:

National Conference on
Advanced Computer Science
and Information Technology
(NCACSI - 24)



Hadath Platform

Abstract

The "Hadath" platform is a pioneering web-based solution designed to transform event management within university settings, specifically tailored for students and administrators. By integrating key functionalities such as event discovery, registration, real-time notifications, and advanced analytics, "Hadath" significantly improves the ease and efficiency of organizing and participating in campus events. Developed over the academic year 2023-2024, this platform acts as a centralized hub for campus events, leveraging the dynamic and diverse nature of university life to enhance student engagement and administrative operations. Through a systematic development approach, including rigorous requirement analysis, user-centric design, and robust system architecture, "Hadath" ensures a seamless, scalable, and intuitive user experience. Furthermore, extensive testing phases underscore its reliability and performance. By focusing on the educational sector, "Hadath" aims to redefine campus event management, fostering a more vibrant, connected, and productive university community.

Supervisor:
Dr. Yasser A. Bamarouf

Group Members:

- Noorah Nayif Altheeb
- Reema Bader Alzahrani
- Arwa Abdullah Alotaibi
- Ashwaq Hamad Alharbi
- Reem Alaqeel

Journals: Springer

Conferences: CCTS2024



Abstract

Masarat system developed with the primary objective of offering practical solutions to address challenges that students frequently encounter during their academic journey. It allows creating students study guide that work on collecting their data from academic records (GPA, Assignments), to analyze it then presents it as a dashboard where the student's performance will be displayed. It also intends to provide students with a chatbot advisor for answering their academic inquiries. Moreover, the website will introduce options for managing their study plan, academic calendar with notifications, tracking assignment and tasks progress, manage and design their weekly schedule, study environment for increasing their focusing time with soothing sound and tranquil background options.

Supervisor:
Dr. Rachid Mabrouk
Zagrouba

Group Members:

- Abdullah Khalid Alrashidi
- Khaled ahmed almisfer
- Abdulhadl al yaqoop
- mohammed alhassan
- Nouh alfelaiw



PRIOTEC

Abstract

To revolutionize traffic management in urban and suburban areas, the Traffic Signal Priority (TSP) Priority Traffic System Project is an innovative project. Efficiency, safety, sustainability, and technical innovation are the cornerstones of this project. We hope to address the ubiquitous problems of traffic congestion, enhance emergency response times, and advance environmentally friendly transportation options by putting in place a TSP system.

Supervisor:
Dr. Rami Mustafa
Mohammad

Group Members:

- Fatima Waleed Alyousif
- Noor Eyad Alsadah
- Jamilah Farhan Alruwaili
- Sara Nasser Alhowaish
- Amal Almuslim



Cyber Smart Kids

Abstract

Our app teaches internet safety to children aged ten and older through engaging games. They learn to identify fake websites and deal with online risks. The Escape room game provides scenarios to answer, enhancing their learning experience. Feedback is given on correct and incorrect answers. The app educates about email risks and emphasizes attention to prevent hacking. It introduces concepts like junk email and is designed for children who enjoy games.

Supervisor:

Mr. Sardar Zafar Iqbal

Dr. Abdullah Ali Alqahtani

Group Members:

- Abdulaziz Nasser Al-Dossary
- Faraj bin Mukhashen
- Abdulali AL-Marzooq
- Nasser Jawad Aldowail
- Abdulrahman ahmed algazan
- Mishari Raad AL-Suhaim

Journals:

Tuijin Jishu/Journal of Propulsion Technology

Conferences:

National Conference on Advanced Computer Science and Information Technology (NCACSI - 24)



Dlolah AI Help Desk

Abstract

This project aims to familiarize new students and visitors with the college's facilities through an AI robot help desk, providing details about locations such as exam halls and lecturer offices.

Supervisor:
Ms. Maryam Alnasser
Mr. Yousof Almunsour

Group Members:

- Reem Alshehri
- Noura Rashid
- Shahad Albaqami
- Joory Alsarrani
- Dema Alhajri



Almunawara Application

Abstract

Al-Munawara mobile application project aims to establish a user-friendly platform optimized for mobile use, enhancing accessibility and efficiency for Almunawara customers. This comprehensive initiative involves a meticulous analysis of the website's features, the development of a mobile-friendly interface.

Throughout the different phases of the project, emphasis is placed on creating a userfriendly interface aligned with mobile app design guidelines, featuring improved navigation, search capabilities, push alerts, and personalized user profiles. The project's overarching goal is to deliver a fully functional mobile application that offers users a seamless experience. To ensure continuous client satisfaction, the project includes plans for ongoing development and iterative improvements based on client feedback. Leveraging cutting edge technology, the project is committed to enhancing the mobile application's functionality and usability, providing Almunawara customers with an optimal and evolving digital experience.

Supervisor:
Dr. Mohammed Gollapalli

Group Members:

- Nawaf Mousa H. Aljohani
- Hassan Moayad A. Alsenbel
- Ali Sami M. Alsulaibikh
- Mohammed Hameed M. Alabbas
- Mosaed saad A. Alfaris
- Ali Ahmed M. Alturki

Journals: ICCIT

Conferences: ICCIT



IMA -Intelligent Medication Adherence App for Diabetic Patients

Abstract

IMA, the Intelligent Medication Adherence App for Diabetic Patients, redefines health management. It goes beyond simplifying medication adherence with features like reminders and dosage tracking, IMA stands out by embracing holistic well-being and providing self care with features like mood journaling and a supportive user community. IMA also has personalized guidance through outcome prediction, an AI-powered chatbot, a drug interaction checker that helps you avoid any complications with your medications that might have side effects and physical health in depth tracking. Gamification Rewards motivate users to comeback and use the app, resulting in improved medication Adherence and streamlined management. IMA fosters a sense of community and empowers users to take control of their health for a more fulfilling life. These features make IMA a comprehensive health companion.

Supervisor:
Dr. Gomathi Krishna

Group Members:

- Rose Majdi Al Subait
- Maria Yousef Almutawa
- Lujain Ali Albahrani
- Fatima Al Hajiri
- Dorra Bakeer



Shouf KSA

Abstract

This abstract introduces a vibrant tourism website devoted to Saudi Arabia, a nation with a wide variety of topographies, a rich cultural history, and significant historical relevance. With its distinct fusion of history and contemporary, Saudi Arabia provides a variety of experiences for tourist and a diverse range of sights, from the vibrant city of Riyadh to the historic city of Al-Ula, and from the pristine beaches along the Red Sea coast to the vast sand dunes of the Rub' al Khali desert. Shouf KSA is a website for tourism in the Kingdom of Saudi Arabia. It combines a variety of tourism services in one location to make it easy for visitors to learn about events taking place in the Kingdom, how to purchase tickets, and how to get there. Visitors can pick their own tour guide in addition to learning about the history and tradition of the Kingdom with the aid of the guides. Besides a variety of additional characteristics such as including ability of visitors to explore the various locations and attractions of the nation, and it offers thorough information on historical locations, architectural marvels, cultural events, and nature reserves. Users also have access to travel information, advice, and suggestions, guaranteeing a smooth and rewarding experience. Additionally, the website combines multimedia components including HD photos and interactive maps to fully immerse visitors in Saudi Arabia's richness and beauty. It also offers crucial travel data, where to stay, and how to get around. The website also emphasizes the Kingdom's dedication to sustainability and responsible tourism, placing a strong emphasis on the necessity of maintaining its scenic beauty and rich cultural history for upcoming generations. In conclusion, Shouf KSA website invites visitors from all over the world to embark on a voyage of discovery and exploration. It acts as a portal to the captivating world of Saudi Arabia. It may play a crucial part in exhibiting Saudi Arabia's prosperity to the globe by promoting the nation's distinctive offers and encouraging a feeling of cultural appreciation and environmental.

Supervisor:
Dr.Rami M Mohammad
Dr. Mohammed Alqahtani

Group Members:

- Ali Ibrahim Alwasmi
- Bader Mosleh Alenazi
- Saleh Ali Alshammari
- Mustafa Darweesh
- Abdulrahman Aldulaijan
- Ibrahim Alomar



ScanNAttend

Abstract

Through the seamless integration of facial recognition technology, the ambitious project being undertaken by the University of Imam Abdulrahman bin Faisal is set to usher in a new era of campus administrative effectiveness. This bold initiative is part of a comprehensive plan to modernize access control, attendance tracking, and overall safety in educational institutions. The project aims to develop a comprehensive and robust system to streamline attendance tracking and fortify security protocols across its diverse campus facilities, ensuring a safer and more efficient learning environment. This system will combine cutting-edge facial recognition technology with the existing camera infrastructure. The creation of sophisticated and trustworthy algorithms is essential to the accomplishment of this ground-breaking endeavor. These algorithms are the foundation of the facial recognition system. They carry out the complex task of identifying and validating people based on their distinctive facial patterns. The research and development team at the university is committed to developing algorithms that are not only highly accurate but also swiftly processed. The team comprises machine learning, computer vision, and artificial intelligence specialists. The creation of a secure and legal database infrastructure is equally important. This database will be the haven for registered user data, enabling the system to identify specific users quickly and consistently while upholding strict privacy standards and regulations.

Supervisor:
Mr. Yousof AlMunsour
Dr. Mohammed Gollapllai

Group Members:

- Rahaf Ahmed Almalki
- Kawthar Abdullah Alahmed
- Dana Abdulaziz Alrubayyi
- Zahra Mohammed Al rumaid
- Alaqilah Mahmood Alkhawajah

Journals: IEEE Open
access – in progress



EduVision

Abstract

This project aims to develop a comprehensive web application that effectively manages colleges and universities, automates assessments, and conducts Business Intelligence (BI) analytics on ABET data. The project aims to streamline the management and assessment processes within educational institutions while providing valuable insights through advanced analytics. The scope of the project includes creating a centralized platform for collecting, storing, and analyzing ABET data from multiple departments and faculties.

Supervisor:
Madeeha Saqib
Dr. Saqib Saeed

Group Members:

- Razan Nazeeh Al Nasr
- Mashael Tariq Alahmed
- Sara Thames Alhouzaie
- Maryam Abdulaziz Aldowerji
- Zahra Jaffar Almanayan



Eada Portal

Abstract

EADA, a leading e-waste recycling firm, acknowledges its commitment to operational excellence and environmental sustainability faces challenges due to the limitations of its existing system. Hindered by manual processes, data silos, and a complex interface, the system conflicts with EADA's vision for streamlined efficiency and customer-centricity.

To address these challenges, EADA initiates a strategic digital transformation project: the development of a comprehensive web portal designed to modernize waste management processes. The portal aims to streamline internal workflows and provide customers with a user-friendly and intuitive experience.

We propose a portal that will enhance operational agility by automating time-consuming tasks and improving data visibility. This will result in increased productivity and more informed decision-making. In addition to internal benefits, the portal will elevate customer engagement by offering an easy-to-use interface for effortless e-waste disposal, promoting open communication, and fostering trust through superior customer service.

Supervisor:
Dr. Fatema Sabeen Shaikh

Group Members:

- Renad Alshamrani
- Jood Majed Alswar
- Daliah Bassam
Almuhaiteeb
- Sara Sameer Albaher
- Sadeem AlMesned

Journals: IEEE Open
access – in progress

ProgressPlus

Abstract

Our website equips students with a user-friendly platform for defining their academic goals and conscientiously tracking their progress, also facilitates communication between students and academic advisors, and creating an environment where students can connect, share knowledge, and mutually benefit improving the overall academic experience.

Supervisor:
Dr. Hina Gull

Group Members:

- Roaa Saleh Alghamdi
- Lama Abdullah Alahmari
- Samar Saeed Alqahtani
- Asma Abdulrahman Alharbi
- Salma Sami Nasser

Conferences:
InCACCT-2024



Vet the Pet: Intelligent Health Prediction System and Health Care Application for Furry Friends

Abstract

In today's tech-driven world, mobile applications have revolutionized the way we manage our health. However, a notable gap exists in the domain of pets health apps, as there are few comprehensive options tailored to the healthcare needs of pets. The "Vet the Pet" seeks to bridge this gap by offering a holistic solution for the well-being of our pets.

Our application provides a comprehensive analysis, a cutting-edge focused on enhancing pet care and health management. Exploring its features, user experience, and impact on the pet care industry. "Vet the Pet" features includes predictive disease system that diagnoses potential ringworm from user-uploaded images, enabling proactive measures and timely interventions to identify potential health issues in pets. This predictive capability empowers pet owners to take proactive measures, ensuring timely interventions and safeguarding the health of their pets.

Furthermore, "Vet the Pet" boasts a wide range of services and features, all within the app. Provide the nearest locations for pet's friendly places and clinics, pet owners ability to share their experience by comments and reviews regard pet health, appointments reminders, manage pet's expenses, track the pet's health conditions, scan the QR code for pets' owner information in case if the pet lost, and chatbot. This comprehensive strategy guarantees that pet's welfare and health is regularly observed and preserved.

"Vet the Pet" app exemplifies the power of technological innovation in improving the lives of not only humans but also their pets. In addition, it stands as a pivotal solution in the realm of pet care and health. Through meticulous development and user-centered design, it addresses the diverse needs of pet owners, offering a comprehensive platform for managing their pets' health, and addressing the pressing need for reliable and user-friendly pets' health apps, we will represent a significant step forward in the field of pet's healthcare.

Supervisor:
Ms. Ruba Alsalah

Group Members:

- Maha Mufarrij Alsubaie
- Sara Mohammed Husni
- Batol Fuad Alhussain
- Manar Mohammed Alotaibi
- Maha Khadher Muhalhal

Journals:
IJAER



Malath

Where your inner peace matters

Abstract

The medical field, particularly mental health, has been transformed by technology. The digitalization of cognitive-behavioral therapy (CBT) is one noteworthy advancement. This paper represents Malath application, a cutting-edge app that provides full CBT services, improve the patient's experience, and monitor progress. It's an advancement that's easily accessible and efficient and provides mental health services. It is an innovative app that offers many CBT services. For instance, enable users to monitor their anxiety symptoms, access relaxation techniques, get monthly plans that are specifically tailored to them, and interact with a variety of supportive and educational content. Malath application aims to achieve its objectives. First, allow users to track their anxiety symptoms over time, helping them gain insights into triggers and patterns. Second, offer relaxation exercises, mindful practices, and breathing techniques to help users lessen their anxiety and stress. Third, create an individualized monthly plan tailored to each patient based on their specific diagnosis and condition. Fourth, encourage regular use and engagement with the app, fostering a sense of commitment to anxiety management. Finally, consider users of all age groups and provide content and support that matches their diverse needs. As has been demonstrated, Malath is transforming mental health by digitizing therapy, offering personalized plans, and empowering users of all ages to manage anxiety and stress.

Supervisor:
Dr. Ghadah Alrugaib

Group Members:

- Dhikra Talal Aldakheel
- Fay Khaled Alyemni
- Lamia Abdulrahman Alkhater
- Maysa Almontashari
- Arwa Alrowaili



TapPay: Self-Checkout Mobile Application Using NFC Tags

Abstract

The rapid advancement of technology has upgraded the way we interact with various sectors, including the retail industry. Self-checkout systems present a popular solution for making customer experiences more efficient and operational efficient. NFC technology enables safeguard and convenient communication among nearness devices, making it a perfect candidate for enhancing the self-checkout process. NFC technology provides seamless and contactless payment experience, reduces transaction times, leading to shorter queues and enhanced customer satisfaction. However, one of the primary concerns is ensuring the security of NFC transactions. To ensure that the customer information is secure and prevent unauthorized access, retailers must carry out the implementation of strong encryption and authentication protocols. The integration of NFC technology into self-checkout systems holds great promise for revolutionizing the retail industry. By providing faster, more convenient, and secure payment options, NFC-based self-checkout systems can enhance customer experience. In our project, we aim to create an mobile application that facilitates the checkout and self-payment process for consumers, by using NFC technology. Where the consumer near the mobile to the item he wants to buy, then adds it to the digital shopping cart, then pays in the method he prefers, and then a digital invoice is issued to him for his purchases. All these operations are performed directly through the mobile application.

Med-intern

Supervisor:
Ms.Fatimah alshamarani
Ms.Asiya Abdus Salam

- Group Members:
- Shahad taher alhaddad
 - Roua Ali Bagrain
 - Ghufran jafar Alsayegh
 - Eman Abdulmuin Alfaer
 - Noor almuslim

Abstract

Including medical interns in the healthcare team is essential, but it can be difficult to keep track of their attendance and evaluate their performance. To ensure that interns fulfill their training responsibilities and provide excellent care to patients, it is necessary to have a comprehensive system in place for monitoring their attendance, schedules, and assessments. An ideal solution could be an abstract medical intern learning system. This system would also make it easier for supervisors to effectively oversee interns during their training period

Supervisor:
Dr.Mohammed Alqahtani

Group Members:

- Shareefah alkhudair
- Dana almoqaitib
- Sara alrowaished
- Nourah alqahtani
- Nouf almubayidh

Smart Mirror:NADHEER

Abstract

Our project represents a convergence of innovation and everyday life, reimagining the conventional mirror as an interactive, intelligent, and personalized hub. Our project aims to redefine the way individuals interact with their reflections and the world around them. This project seeks to enhance the user experience by seamlessly integrating essential information and services into the mirror's reflective surface. Through a combination of cutting-edge hardware and sophisticated software, the Smart Mirror offers users realtime access to a wide range of data, including weather forecasts, calendar events, news updates, and health metrics. Moreover, this project aspires to inspire creativity and innovation by highlighting the seamless integration of technologies through careful design.

Supervisor:
Samihah ibrahimi

Group Members:

- Amnah Alzayer
- Ghadeer Alqattan
- Bedoor Alyahya
- Shaha Alswailem
- Zahra Mohammed Alnemer



TrueVoice : audio deepfake fake deteion tool

Abstract

This project focuses on the detection of audio deepfakes using the FakeAVCeleb dataset. By developing an user-friendly, accurate and automated system , it aims to combat misinformation, enhance security, and protect audio content integrity. The project addresses the widespread threat of audio deepfakes and contributes to trust and privacy in the digital landscape.

Supervisor:
Mr. Saeed H. AlQahtani

Group Members:

- Kawther Ibrahim Aldabbous
- Shahad Shabab Albuqami
- Lenah Madani
- Zahra Hussain Salil
- Shahad Majed Aldossary



Qarsh: Financial Management Application

Abstract

Financial culture is a way to know how to achieve an individual's wants and needs; despite its importance, the rate of financial awareness and savings is low among individuals in the Kingdom of Saudi Arabia. We used a questionnaire to gauge Saudi society's level of financial management awareness. Three hundred and twenty-eight individuals, ranging in age from twenty to over sixty, took part in the survey. While 23% of them do not save any money at the end of each month, 99% of them think it is essential to save a specific amount each month. Individuals may face difficulty determining their financial priorities and planning and tracking their expenses to achieve their goals. While technology contributes to solving people's problems and helping them improve their quality of life, the Qarsh project came from this standpoint. Qarsh project is a mobile phone application in Arabic that aims to help individuals who want to arrange their priorities, monitor their goals, and track their financial affairs by creating a personal budget, classifying expenses, and reducing unnecessary expenses.

CYS

Cyber Security

Supervisor:
Prof. Sunday Olatunji
(Adam)

Group Members:

- Ahmed Sami Alarfaj
- Hassan Ali Al Saleem
- Abdulaziz Saud Alhuwaishil
- Khalifah Waleed Alzwaimel
- Abdulaziz Abdulrahman Alsudais
- Naeem Mohammed Owaida

Conferences:
CCTS 2024



Momtathel 2.0: Automating Compliance Assessment with Machine Learning

Abstract

In the corporate landscape, compliance with regulations is paramount, exemplified by Saudi Aramco's CyberSecurity Compliance Certificate (CCC). Compliance checks can be complex and costly; many businesses now view them as opportunities to streamline operations. This project advocates using Machine Learning (ML) to extract compliance-related evidence. It seeks to leverage ML to automatically gather and assess relevant data from third-party companies, objectively determining their eligibility for the CCC. This ML approach replaces the manual document reviews. The proposed solution is an enhanced and Integrated version of "Momtathel 1.0", a web application that automates the extraction of compliance evidence for third parties engaged in contractual agreements with Saudi Aramco.

Supervisor:
Dr.Albandari Alsumayt
Dr.Naya Nagy

Group Members:

- Shatha Alsharyofi
- Resal Alahmadi
- Renad Al-Rabie
- Rood alessa
- Noor ashraf alibrahim

Journals:

Two papers:

- 1- papre submitted to IEEE access (Q1)
- 2- paper submitted to sensors (Q1)



DroneDefender: Detect Denial of Service attacks (DoS) over the Internet of Drones (IoD) based on machine learning.

Abstract

To detect and reduce DoS assaults on unmanned aerial vehicles (UAVs), the project intends to build an intrusion detection system (IDS) based on machine learning techniques. Drones are becoming more and more depended on for a variety of functions, which leaves them open to malicious attacks, such as denial-of-service (DoS) attacks that aim to take down drone availability by flooding their networks. The suggested IDS system aims to recognize unusual patterns in network traffic that are suggestive of DoS assaults by using machine learning techniques, enabling prompt detection, mitigation, and reaction. By putting this IDS system into place, important applications inside the Internet of Drones will operate more securely, dependably, and consistently.

Supervisor:
Mr. Sghaier Chaabani

Group Members:

- Yazed Saleh Alghuraibi
- Ammar amin
- Khaled Al-mutairi
- Ahmad Abdullah Alghamdi
- Faisal Abduljalil Bakhurji
- Murtahda Alhussain

Conferences:
NCS 2024



Web-based password manager for student (Vault خزانة)

Abstract

Passwords are one of the most used authentication systems because they are simple to use. However, if the password is tough, it is easy to forget, and if it is simple, it is vulnerable to cyberattacks. The solution is a password manager, which has been developed, but most individuals are afraid to use it. By providing a variety of options, our website will encourage more students to utilize it and diminish their fear of it. The major feature is Arabic master password generation, where the master password can be generated randomly. An example of that is (اض*ي!#!شلاؤئي!@نم). Another option is to use a memorable sentence using an Arabic dataset. An example of that is (قمر شمس نور سماء). If the student wishes to make his own master password that is also an option. The master password can be in Arabic or English utilizing Arabic with unique features such as the Harakat. Vault (خزانة) will function as a normal password manager with Arabic language support. Finally, password managers provide proactive protection against the risks associated with traditional password approaches and assist users in developing trust in them.

Supervisor:
Dr. Abdullah Almuhadib
Dr. Khalid Alissa

Group Members:

- Samar Ali Alqahtani
- Nouf Saeed Alshahrani
- Nouf Ibrahim Alzahrani
- Asma Faleh Alanazi
- Lama Abdullah Alqahtani



CyberBulwark: Advance Anti-Phishing Solution

Abstract

Phishing is one of the most common attacks that can cause significant harm to an organization. Therefore, there is a need to implement an anti-phishing solution aimed at assessing the level of awareness within organizations or individuals regarding phishing attacks. One approach involves using mock phishing emails or messages to evaluate the ability of employees or users to recognize and respond to phishing attempts. This innovative system introduces a proactive mechanism designed to combat the ever-evolving landscape of phishing threats. By leveraging the AI-powered language model ChatGPT, it can generate highly accurate phishing scenarios. Additionally, the system also employs Homoglyph attacks to assess employees' awareness at an advanced level. The primary objective of this research is to identify potential weaknesses within the organization, enabling targeted training to enhance employees' awareness and preparedness. Moreover, this system incorporates a robust reporting infrastructure and a monitoring dashboard to facilitate ongoing assessment and improvement.

Supervisor:
Dr. Saad Alharthi
Mr .Mohammed Sharaf

Group Members:

- Ahmad Dawood
- Mohammed Alhanfoush
- Hamad Aldossary
- Saad Alabdullatif
- Nasser Alyami
- Bilal Bukhari



Service Orchestrator

Abstract

In this project, we will provide a detailed introduction to our service orchestrator, emphasizing its importance in automating industry services. Service orchestrators play a pivotal role in today's fast-evolving technological landscape by seamlessly coordinating various services to enhance operational efficiency. This introduction will establish a solid foundation by exploring the core concepts behind service orchestrators and their transformative impact on industries. Moreover, the project will outline our methodology for implementing the solution, ensuring a well-defined and carefully executed approach. We'll also discuss the design and implementation processes, offering a step-by-step plan. The project will touch upon different strategies. In summary, this project offers a deep dive into service orchestrators, their role in automating industry services, and our systematic approach to ensure its success.

Supervisor:
Dr. Fahd Alhaidari
Mr. Ahmed Al-Barrak,
Mr. Mohammed Bayyat

Group Members:

- Sara Mohammed Alsaber
- Sarah Tawfiq Albassam
- Hessah Abdulmohsen Alnashwan
- Aseel Khaled Alghamdi
- Khadijah Ahmed Alamoudi

Journals:

IEEE-SEM Journal



DeepGuard: An Intrusion Detection Framework for Operational Technology (OT) Utilizing Deep Learning Techniques

Abstract

The increasing attacks targeting Supervisory Control and Data Acquisition (SCADA) systems hold a significant risk to critical infrastructure. This project focuses on developing a robust intrusion detection framework using deep learning techniques to protect the SCADA network. By responding to the pressing need for a comprehensive testing and validation, our approach involves creating a simulated SCADA environment and testing the performance of deep learning models for intrusion detection. The aim of this project is to enhance the security of SCADA systems against evolving intrusion attacks.

Supervisor:
Dr. Saad Alharthi

Group Members:

- Hussain Masood
- Saud Almaghlouth
- Mohammad AL Ibrahim
- Khaled alkroud
- Abdullah Jasem Almuaili
- Faisal aldosrry
- Mohammed Alsakran

Conferences: iccit

Unified National Cloud Cybersecurity Standard (UNCCCS)

Abstract

This "Unified National Cloud Cybersecurity Standard" project aims to integrate and align Saudi Aramco's standards by consolidating existing frameworks and incorporating international best practices. The project objective is to create comprehensive cybersecurity cloud standards, integrating Saudi National Cybersecurity Authority (NCA) standards and extending coverage across various cloud service models. Priority is given to seamless integration with Saudi Aramco's cloud security standards to identify and address gaps. The methodology will include a thorough analysis, comparative study, and formulation of unified standards. The expected outcome is an enhanced cybersecurity measures and organizational alignment with emerging industry standards.

Supervisor:

Dr. Khalid Adnan Alissa

Dr. Abdullah Almuhadib

Dr. Nawaf Alharbi

Group Members:

- Layal Ashraf H Abualsaud
- Sarah Ahmed Alzahrani
- Sarah Fares Al abbas
- Rabab Abdualaziz Alakash
- Shouq Al hammam



THIQQA: Automated Compliance Checking of Essential Cybersecurity Controls (ECC)

Abstract

Compliance with cybersecurity standards is critical for organizations seeking to reduce risks, preserve assets, and improve operational efficiency. However, compliance checking might be difficult because of complicated legal frameworks, lack of resources, and manual procedures. A comprehensive analysis of the literature review has determined that there is currently no viable solution available to automate compliance checking of the Essential Cybersecurity Controls (ECC). To address this gap, this project focuses on developing an automated compliance checking system for ECC called "THIQQA". The proposed solution seeks to improve organization risk management while streamlining operations and lowering expenses with the use of machine learning and natural language processing techniques. Moreover, the project aims to advance the fields of cybersecurity and digital forensics.

Supervisor:
Prof. Nazar Abbas Saqib

Group Members:

- Nassar alshammari
- Abbas Kamal Abualrahi
- Khalid Zaman
- Mohammed Khalil Asiri
- Abdullah Adel Alsaleem
- Abdulmohsen Majrashi



Continuous Authentication using Face Recognition for Enhanced Security

Abstract

As digital security becomes a top priority, traditional methods of authentication like passwords and PINs are no longer enough to safeguard sensitive data and resources. This is because attackers can use various types of attacks, such as credential stuffing, phishing, and password guessing, to bypass these traditional security measures. To address this, the project works to establish a continuous authentication system that uses facial recognition powered by artificial intelligence. The system continually monitors and verifies the user's identity in real-time using facial recognition technology and machine learning algorithms. The system will use a Convolutional Neural Network (CNN) algorithm to automatically acquire intricate facial features, which will enhance pattern recognition reliability regardless of spatial orientation. Various datasets will be used to ensure that the system performs well in different situations. Furthermore, the system's performance will be continuously monitored, and the Convolutional Neural Network (CNN) model will be updated regularly. This advanced system will significantly enhance security and reduce the risk of information leakage. Extensive research has been analyzed to learn from past experiences, and to find a balance between security and usability. Ultimately, the project goal is to enhance security by simplifying the process while minimizing the risk of unauthorized disclosure and modification.

Supervisor:
Dr. Abdulrahman Alharby

Group Members:

- Bushra Saleh Aleid
- Layan Musbah
- Waad Almulhim
- Shahad Alshalawi
- Nuha Bukhari

Conferences:
ICBIT



AuthGuard:Continuous Authintaction Using Keystoke and Mouse Dynamics

Abstract

User authentication is a critical aspect of cyber security, ensuring the verification of a user's identity before granting access to systems. However, traditional static authentication mechanisms based on specific credentials or biometrics have limitations in safeguarding system security. Traditional authentication methods are insufficient in protecting against stolen credentials, session hijacking, and social engineering threats. Therefore, continuous authentication has emerged as a solution to enhance security by verifying a user's identity throughout a session based on behavioral patterns. Moreover, keystroke and mouse dynamics provide unique and difficult-to-replicate behavioral features. By continuously monitoring and analyzing the behavioral patterns, we can distinguish between the real user and the imposter. Therefore, our project aims to develop a continuous user authentication model utilizing keystroke and mouse dynamics, offering a robust defense against unauthorized access.

Supervisor:
Dr. Abdulrahman Alharby

Group Members:

- Rana Aboulsamh
- Maryam Albugaey
- Sarah Alsubaie
- Fatimah Abujaid
- Dana Alghamdi



SCABUS: A Hybrid ML-Powered Anomaly Detection Tool for the SCADA Modbus Protocol using Network Traffic Files

Abstract

Nuclear reactor shut-downs, pipeline explosions, and power outages; the main source of these catastrophic scenarios are the results of an insecure SCADA system. Supervisory Control and Data Acquisition (SCADA) systems stand at the heart of industrial infrastructure and in recent times, there have been growing concerns surrounding the security of these essential systems as the cybersecurity landscape continues to evolve.

Our project is on enhancing the security of these essential systems, with a special emphasis on the Modbus protocol, an old yet pivotal communication standard within this domain. Modbus serves as a central, standard network used across SCADA systems; however, it lacks strong security measures such as encryption and authentication, thus making it an optimal target for our efforts. By harnessing the power of machine learning, we are developing a tool capable of real time monitoring and anomaly detection within this protocol using network traffic files. This contribution not only supplements the security of these critical systems but also paves the way for introducing secure automation through machine learning in the realm of Operational Technology (OT).

Supervisor:
Dr. Amal Alahmadi

Group Members:

- Lama Almesned
- Maram Alnaim
- Shaima AlBaker
- Alana Faiz Aldawod
- Reema Aljumaia

Journals:
IEEE Access

Conferences:
WiDS conference



EyeML: Money Laundering Detection Using Machine Learning

Abstract

Money laundering has been around for many years, and it has become even easier and increasingly common in recent years with the use of the internet, also known as Cyber laundering. Money laundering is a serious financial crime that attempts to conceal the original source of money that was generated from criminal activities and makes them appear as if they came from a legitimate source. Thus, the reduction of public faith in institutions and a raising of doubts about the legitimacy of governments, financial institutions among the general population is a focal problem. Machine learning (ML) emerges as a promising tool, utilizing it we can examine massive datasets of financial transactions in order to identify suspicious behaviors, and offer the ability to analyze and identify patterns of money laundering activity that are difficult for human analysts to find. In this project, we proposed an Anti-money laundering tool that utilizes various machine learning algorithms and two different datasets specifically to detect cases of money laundering and notice any suspicious behavior. The conducted experiments have generated a range of results, and the deployed model achieved a 100% accuracy result. With this project, we attempt to overcome the barriers that have been previously observed.

Supervisor:
Dr. Fahd Alhaidari

Group Members:

- Hana Alghulayqah
- Mariam Alomari
- Sharifa Alsadah
- Razan Alogaiel
- Noura Aldahmash



RanSphere: Ransomware and DGA Detection via Network Traffic Analysis Using Machine Learning and Markov Models

Abstract

Guarding data against malware is now more crucial than ever. Ransomware is a type of malware that represents a real threat to organizations and individuals, since it encrypts data or even blocks access to the whole system rendering it unavailable to authorized users. Most proposed solutions consider host-based detection, which requires the system to be infected first due to its reliance on local artifacts, leading to a late response. Conversely, network-based methods have the ability to detect ransomware in an early stage, as most ransomware strains tend to communicate with a command-and-control server before beginning the encryption process. In response to this emerging threat, we have dedicated our effort to propose a solution that overcomes this problem. An extensive literature review was conducted to analyze all the aspects and reach an optimal solution. Therefore, in this project we have developed a real-time ransomware detection system called RanSphere, which integrates both machine learning and analytical techniques to identify abnormal behavior with an accuracy reaching 99.98% and 98.02%, respectively. To validate the efficiency of our solution, we conducted a real-world experiment by running the attack, thereby assessing the accuracy and reliability of our detection system.

Supervisor:
Ms. Reem A. Alassaf

Group Members:

- Shahad Ibrahim AlGhareeb
- Fay Abdullah Alshammari
- Nouf mohammed Alghamdi
- Raghad Abdulrahman Alamoudi
- Nawir Hassan Aldossary



CTI-CogniX: AI-Powered Summarization and Correlation Model for Cyber Threat Intelligence Reports

Abstract

Cyber Threat Intelligence (CTI) reports play a critical role in informing organizations about the latest cyber threats. However, the vast quantity and diversity of these reports can be a significant challenge for Cybersecurity specialists, who are tasked with reading and summarizing them in a short timely manner. This paper proposes a model to find the correlation between CTI reports using Artificial Intelligence (AI) and Natural Language Processing (NLP) based on specific indicators, actors, and languages. The model leverages a transformer-based language model to automate the process of generating extractive summaries from PDFs, and HTML sources. Newly summarized reports will be interconnected with similar reports to generate a more holistic summary. Moreover, it is further assessed by the standardly used metrics like ROUGE, Validation Loss, Perplexity, BLEU-4, and WER, human experts also play a crucial role in the evaluation process. After training and evaluating five models, our results showed that the facebook-opt-350M model demonstrates exceptional performance and proves to be the most effective model to be deployed on CTI-CogniX system. The proposed model demonstrates the potential of NLP to be used to automate the process of cybersecurity report summarization to help cybersecurity specialists work effectively.

Supervisor:
Prof. Nazar Abbas Saqib

Group Members:

- Jana Mohammed AlQahtani
- Zaharh Ali Almuraihel
- Reema Zaki Almustafa
- Farah Amer Alruwaili
- Fatemah Abdulkhaliq Alsaihati



OFF-The-Hook A Tool to Detect Zero-Font and Traditional Phishing Attacks in Real-Time.

Abstract

Phishing attacks continue to be a major security threat, with cybercriminals constantly evolving their techniques to bypass traditional defenses. One emerging tactic is zero-font phishing, where attackers make use of characters that have no font size, which means that specific HTML attributes are designed to be hidden. Existing email filters are able to notice these characters even if users are not, therefore filters cannot tag them as phishing emails. To address this challenge, we present a comprehensive tool that can detect both zero-font and traditional phishing attacks. The developed tool implements a multi-layered approach, utilizing four key security checks in combination with an advanced Machine Learning model trained on a well-known dataset of phishing and legitimate emails to provide an additional level of protection. By integrating these complementary security checks, our tool achieves a high accuracy rate in identifying both zero-font and traditional phishing attacks. The significance of the study lies in proactively identifying and preventing phishing attempts, ultimately safeguarding privacy and security in the continuously evolving digital landscape.

Supervisor:
Ms. Maryam Aldossary

Group Members:

- Arwa Mubarak Alrakah
- Fatema Abdulrahman Al jarri
- Layan Saad Al Ali
- Rawan Ibrahim Al Shayib
- Sara Najeeb Alshaieb

Competitions:

SheCodes – Best poster competition

Conferences:

Women in data science conference



ForceField: AI-Powered Advanced Persistent Threat Detection System

Abstract

When it comes to national disputes, cyber warfare is a pillar angle that puts national security at risk. These types of wars apply numerous attacks to ensure dominance and the upper hand on the targeted nations. One of the most commonly nation-supported attacks is Advanced Persistent Threats (APTs). They are a widely spread threat consisting of a collection of malware that is difficult to identify. Moreover, APTs can stem harm to system data without being detected due to their stealthy persistence for a long time. With that being said, this research aims to present an intelligent framework for effectively detecting APTs. The study analyzes and compares existing approaches with the desire to highlight their limitations to improve such drawbacks in the presented framework. Furthermore, the study emphasizes the need for a detective approach showing intelligence, resilience, flexibility, updated datasets, and early detection in its methodology. The presented system, ForceField, incorporates these essential elements, employing behavioral analysis to reach a high accuracy detection rate. Therefore, this project proposes an early, real-time detection system based on a machine-learning model that can identify APT phases.

Supervisor:
Ms. Maryam Aldossary
Dr. Amal Alahmadi

Group Members:

- Amani Awidh Alyami
- Ghada Saeed Alghamdi
- Zahra Abdullah Al Sulili
- Maryam Almanasif
- Juri Mohammad Alaqeel

Journals:

IEEE-SEM Journal

Conferences:

WiDS conference



Flying Cop: UAV-based Criminals Identification System with Secured Environment

Abstract

A safe and secure society is one of Saudi Arabia's 2030 Vision goals, which creates a significant need for improved law enforcement technologies. When many people are around or a major event is taking place, the ability of law enforcement organizations to recognize and catch offenders can be enhanced with the use of facial recognition technology applied to drones. These drones can navigate through crowds and take pictures over long distances while guaranteeing accurate person identification. In addition, they can compare the detected faces against known criminals' datasets and provide authorities with real-time notifications. Based on this, we proposed a drone-based facial recognition system that is based on deep learning. The proposed system contains a secure Web application portal and a notification system to notify the intended authorities.

AI

Artificial Intelligence

Supervisor:
Dr. Mohammed Imran

Group Members:

- Rawan Khalid Alharbi
- Rahaf Zamil AL-Shammari
- Azzah Saeed Alghamdi
- Deena Saad Alqahtani
- Zahraa Nader Alqatari
- Razan Ahmed Alomari

Bunnah A Real-Time Coffee Beans Defect Detection System using Computer Vision

Abstract

Coffee is one of the world's most popular beverages, and its quality is critical for customer satisfaction and market value. Saudi Arabia is investing in this field as it contains a huge number of consumers and producers. The Jazan region is known for its coffee-growing area, and it has several farmers who rely on traditional farming techniques, which are labor-intensive, time-consuming, and prone to human error. To address this issue with the help of artificial intelligence, this paper presents real-time coffee bean defect detection. The proposed system leverages the capabilities of computer vision algorithms to automate the defect inspection process. In this study, four types of coffee beans (normal, burnt, immature, and broken) were captured using an advanced camera which was then annotated and exported using different label formats. Moreover, the system utilized four deep learning models: Faster R-CNN, YOLOv5, YOLOv8, and YOLOv9. After training on a comprehensive dataset of annotated coffee beans, the results successfully showed the experiments of detecting coffee bean defects, with the highest mAP50 achieved at 99.1% and 99.5% by Yolov5 and Yolov8 respectively. Ultimately, a connected webcam was employed to facilitate the real-time detection of coffee beans, allowing for the inference of results and the optimization of the coffee inspection process. Finally, this project contributes to economic goals in Vision 2030 for the Kingdom of Saudi Arabia as it aims to increase the production of coffee beans

Supervisor:
Mr. Mohammed Salih
Dr. Atta-ur-Rahman

Group Members:

- Yahya Abdullah Alhabboub
- Basel Yousef Altaha
- Hussein Ahmad Alkatout
- Khalid Ahmed Alzahrani
- Hassan Mohammed Baragbah

Journals:
MDPI



OCULAR AI

Transfer Learning Approach to Retinal Eye Diseases Prediction

Abstract

The project idea is to develop a transfer learning model using machine learning and deep learning techniques to predict various retinal diseases by analyzing images from the Retinal Fundus MultiDisease Image Dataset (RFMiD). This model will leverage advanced algorithms such as Convolutional Neural Networks (CNN) and Transformer architectures to enhance the early detection and diagnosis of retinal disorders like Diabetic Retinopathy, Media Haze, Optic Disc Cupping, Tessellation Disease, and Drusen. The ultimate goal is to aid in healthcare by providing a tool for the early identification of conditions that can lead to vision impairment or blindness.

Supervisor:
Dr.Dina Alabbad
Dr. May Aldossary

Group Members:

- Rund Abdullatif Alsaleh
- Wajd Mohammed Alharbi
- Joud Salah Alhuzami
- Hind Abdulmonem Alzahrani
- Madhawi Safar Dhafeer



Tayaqqan | Deepfake Arabic Audio Detection

Abstract

In the rapidly evolving digital era, deepfake technology, particularly in the realm of synthetic audio, has emerged as a formidable tool with the potential to deceive individuals. Utilizing various artificial intelligence techniques, deepfake technology creates highly convincing visuals, audio clips, and more. The emergence of such technology is accompanied by substantial risks, including impersonation of notable figures and promoting social engineering attacks. Despite the various detection models built to detect fake audio clips, there exists a notable gap in Arabic audio detection models. Recognizing the urgent need for effective countermeasures in the Arab community, this study proposes a Deepfake Arabic Audio Detection Model to distinguish between real and fake audio clips. The study leverages a closed-source dataset of Arabic audio clips, curated by researchers at KAUST Academy, to explore the efficacy of machine learning models in audio classification. Employing distinct methodologies ranging from simple machine learning algorithms to complex deep learning approaches—Naive Bayes, Support Vector Machine, Random Forest, and Extreme Gradient Boosting all trained on Mel-Frequency Cepstrum Coefficients, along with Convolutional Neural Networks and Visual Geometry Group-16 network (VGG-16) trained on Mel Spectrograms—the study seeks to identify the most effective approach for deepfake audio detection. Among these, the model trained using SVM outperformed, achieving 98.32% accuracy, 98.22% precision, 98.41% recall, 98.32% F-score, and 98.32% AUC. As a suggestion for future work, further fine-tune the model on datasets featuring up-to-date advanced deepfake techniques and experimenting with other features to boost both effectiveness and applicability.

Supervisor:
Dr. Mustafa Youldash
Dr. Atta-ur-Rahman

Group Members:

- Sultan Mohammed AlBayyat
- Ammar Yasser Alomran
- Ahmed Salah Almousa
- Mohsen Yousif Alshatti
- Rayyan Ahmed Almousa

Journals:

Journal of Computer and Communications



Deep Learning Approaches: Broadening Horizons in Melanoma and Non-Melanoma Skin Cancer Detection and Diagnosis (MelanAI)

Abstract

Melanoma and non-melanoma skin cancers are two of the most frequent skin malignancies in the modern period. In this project, we intend to create a model that will be capable of accurately detecting skin cancer utilizing convolutional neural networks and deep learning methods. According to the literature review, deep learning techniques were used to treat a single form of skin cancer and had an average success rate of 95% to 97%. Making the model capable of distinguishing between three categories is our aim, and we'll work to hopefully achieve even greater success rates. When the model is complete, it will be able to identify illnesses in patients extremely early and support early infection treatment. Although we may utilize local datasets if we can, the dataset to be used in training and assessing the model's performance will be a public dataset from Kaggle. By reducing the time, it takes to diagnose a patient with one of the diseases indicated above and freeing up vital time for doctors to attend to other crucial issues, we strive to help people in the medical field. Additionally, we anticipate that this model will support radiologists' diagnostic choices. By early identifying patients, preventing the spread of skin infections, and saving many lives in the process, creating a model employing cutting-edge deep learning techniques would undoubtedly aid in the battle against these illnesses. We want to improve or attain a comparable conclusion in this study from other studies that were done in this field and produced positive findings.

Supervisor:
Prof. S.O. Olatunji
(Aadam)

Group Members:

- Maryam Mohammed Alakkas
- Zainab Osamah Albugeaey
- Hneen Sultan Alshelaly
- Shahd Abdulaziz Aleissa
- Thuraya Tariq Alzubaidi

Competitions

Best 3rd Poster – WiDS @
KFUPM

Journals:

2 Journals (Elsavvier)

Conferences:

1- WiDS @ PSU

2- International Conference
of Business and Technology
at Bahrain



Preemptive Diagnosis of Hypertension, Colorectal Cancer, and Skin Cancer Using Computational Intelligence Techniques

Abstract

Chronic diseases have consequences that extend beyond the individual, affecting societies and economies. Early diagnosis of chronic diseases is crucial, they are one among the leading causes of death worldwide. This is particularly true in Saudi Arabia, where such diseases are prevalent. To address this, many health sectors have started to leverage machine learning (ML) to identify a range of diseases accurately. Historically, most studies focused on patients who had already exhibited symptoms. Recent experiments, based on literature analysis, have used Computed Tomography (CT) scan images combined with deep learning for diagnoses. However, these methods are not yet suitable for community hospitals with limited imaging capabilities. Therefore, there's an imperative to employ advanced technologies in treating chronic diseases, ultimately improving the quality of life for the population. This research specifically aims to use machine learning techniques to diagnose skin cancer, colorectal cancer, and hypertension in Saudi Arabia before symptoms appear, based on clinical data, which is readily available in any medical facilities including local clinics. Such an approach could enhance supportive treatments and reduce risks linked to late discovery. Clinical data for this study will be sourced from selected Saudi hospitals. If local data is unavailable, we will rely on online datasets from previous research.

Supervisor:
Prof. Sunday Olusanya
Olatunji (Aadam)

Group Members:

- Hussein Saleh Mohsen
- Sari Ghanim Al Gahtani
- Khalid Mari Al Dhafeeri
- Abdullah Mohammed Al Talaq
- Abdulmalik Khalid Fagi
- Bassem Saeed Al Sherhi

Conferences:

4th ICCIT CONFERENCE



Preemptive Diagnosis of Stroke, Pancreatic Cancer, and Polycystic Ovary Syndrome (PCOS) Using Computational Intelligence Techniques

Abstract

This project uses machine learning to pre-diagnose stroke, pancreatic cancer, and PCOS in Saudi Arabia, leveraging computational intelligence techniques . The plan includes objectives, scope, schedule, and aligns with Saudi Vision 2030 for healthcare transformation.

Supervisor:
Dr. Mustafa Youldash
Dr. Atta-ur-Rahman

Group Members:

- Manar Mohammad Alsayed
- Abrar Abduaziz Sebiany
- Joury Maher Alzayat
- Ghaida Alshammari
- Mona Saad Alqahtani
- Noor Abdullah Aljishi

Competitions:

- WiDS at KFUPM
- NCCC at IAU
- She Codes 2024 at PNU

Journals:

- MDPI Machine Learning and Knowledge Extraction
- MPDI Big Data and Cognitive Computing

Conferences:

- WiDS at KFUPM
- NCCC at IAU
- She Codes 2024 at PNU



Diagnosis of Diabetic Retinopathy Using Computational Intelligence Techniques

Abstract

Diabetes is one of the chronic diseases that are spreading rapidly as the population grows, putting the health of individuals at high risk. That is mainly because of the busy lifestyle, unhealthy eating habits, and unawareness of the disease. The disease affects the human body in various ways. One of the significant consequences of diabetes is diabetic retinopathy (DR), which can result in severely reduced vision or even blindness if left untreated. Hence, the situation demands an efficient early detection and diagnosis system. As Saudi Arabia's Vision 2030 emphasizes the significance of digital transformation in the healthcare sector, it becomes essential to supply healthcare professionals with effective DR diagnosis tools. Not only will this provide excellent patient care, but it will also result in cost savings and boost the kingdom's economic growth since the traditional process of diabetic retinopathy diagnosis could be time-consuming and costly. Artificial intelligence (AI) has played an unparalleled role in every aspect of human life, especially healthcare. This study uses AI technology, specifically deep learning, to accomplish two main tasks: binary classification to determine whether the patient has DR or not, and multi-class classification to determine the DR stage in a timely and accurate manner. The proposed model utilizes six pre-trained convolutional neural networks (CNNs), EfficientNetB3, EfficientNetV2B1, RegNetX008, RegNetX080, RegNetY006, and RegNetY008. This study utilized publicly available datasets, APTOS, and a private Saudi dataset from Alsaif Medical Center. In the first experiment, all models were trained and evaluated using fundus images from the APTOS dataset. The initial results show that the RegNetX080 model achieved a 98.6% accuracy in binary classification, while EfficientNetB3 achieved an 85.1% accuracy in multi-classification. In the second experiment, all models were trained and tested using the APTOS dataset, with the Saudi dataset used for model validation. The results of the second experiment were as follows: EfficientNetB3 achieved a 98.2% accuracy in binary classification, and EfficientNetV2B1 achieved an 84.4% accuracy in multi-classification. This technology shows great promise in the early detection of DR.

Supervisor:
Dr. Mohammed Imran
Basheer Ahmed
Dr. Mustafa Youldash

Group Members:

- Rashid Sami Albinali
- Majid Al-Raimi
- Mahmoud Noor
- Alwaleed Al-Qurashi
- Mashari Aljiban
- Abdulrahman Aljuhani



Abstract

XRAI is a groundbreaking digital platform that transforms lung health diagnostics by enabling users to upload lung X-ray images for analysis by sophisticated models, which not only diagnose potential conditions but also offer an interactive chat feature powered by language learning models (LLMs), providing personalized guidance and enhancing both the accuracy and accessibility of medical diagnostics.

Supervisor:
Dr. Nawaf Alharbi
Prof. S.O. Olatunji (Aadam)

Group Members:

- Reham Hassan Alzahrani
- Reema Ibrahim Albrahim
- Wadha Munahi Alotaibi
- Wahbia Ahmed Saleh
- Haya Abdullah Aldossary

Competitions:

Women in Data Science
Conference (Poster).

Journals:

MDPI AI journal

Conferences:

Women in Data Science
Conference.

Fetal Hypoxia Detection Using Machine Learning Techniques

Abstract

Fetal hypoxia is a condition where the fetus receives insufficient oxygen supply during late pregnancy or labor. Early detection and treatment are critical due to their potential to lead to serious complications, including brain damage and fetal death. Using ML techniques applied to a local dataset from King Fahad University Hospital in Saudi Arabia, various models, including RF, SVM, DT, ANN, TabNet, AdaBoost, Bagging Ensemble, Stacking Ensemble, and Voting Ensemble, were employed. Among these, the RF model emerged as the top performer, achieving an accuracy of 96.77%. However, the DT and Bagging Ensemble models also demonstrated strong predictive capabilities, both reaching an accuracy of 95.16%. The dataset includes physiological and clinical parameters such as fetal heart baseline value, accelerations, decelerations, and maternal uterine contractions. Feature engineering and selection were crucial for effective model training. ensuring relevant features were identified to enhance prediction accuracy. While RF, SVM, and the other ensemble techniques showed competitive performance, DT and Bagging Ensemble outperformed them, with Bagging Ensemble's approach proving particularly effective in reducing overfitting and improving generalizability. For a public dataset, the best result obtained is SVM with 99.26% accuracy and stacking with 99.25% accuracy. The results suggest that machine learning models offer promising tools for early detection of fetal hypoxia during labor. As well as contributing to the development of robust classification models for fetal health monitoring and leveraging local hospital data to address critical aspects of the country's population.

Supervisor:
Eng. Mohammad Khan
Dr. Atta-ur-Rahman

Group Members:

- Ahmed Mohammed Alawad
- Yazan Mohammed Alqahtani
- Fares Adham Almutairi
- Al-Saqar Nasser Al-Soqair
- Abdulaziz sultan Alshammary
- Mohammed Abdullah Safhi

Journals: MDPI



Arabic Sign Language Gestures Detection System

Abstract

Communication stands as a cornerstone of human existence, a vital conduit that enables us to connect, exchange ideas, and foster mutual understanding. However, let us consider those individuals who are unable to communicate through spoken words—those who are deaf and rely on sign language. The proposed endeavor takes the form of the Arabic Alphabet Sign Language (ArASL) Gestures Detection System, primarily designed to serve Arabic-speaking communities. We were able to gather a high-quality dataset of hand gestures in ArASL by either manually taking pictures or by finding good, correct, and clean images of the desired sign language. To convert these images into some sort of intelligence the proposed project will use several deep neural network (DNN) techniques including YOLO and convolutional NN (CNN's). The proposed project will develop an application that will be easy to use for both deaf and normal people. Thanks to its user interface that will make it easy and convenient to take advantage of all its functionality and the power of DL models housed in it. Through this project, we envision a more inclusive and connected future for all.

Supervisor:
Mrs. Mehwash Farooqui
Dr. Mohammed Imran
Basheer Ahmed

Group Members:

- Weam Anwar Alsadah
- Zainab Mohammed Alsadah
- Abeer Ahmed Alsaeed
- Rabab Mohammed Alhabib
- Fatimah Hassan Almansour
- Shahad Basel Almomen

Conferences:

1- The 6th International Conference on Blockchain Computing and Applications BCCA 2024

2- The 4th International Conference on Computing and Information Technology ICCIT



Vision Secure : A Real-Time Computer Vision Approach for Enhancing Safety and Security in Saudi Universities Environment

Abstract

As the security landscape changes, personal and community safety must be given top priority to achieve Saudi Vision 2030's ambitious objectives for a secure society. This initiative aims to enhance universities' safety and security by implementing computer vision technology in two primary areas, which are the universities' main gates, and their parking lots. The proposed framework consists of many models, each of which was incorporated into the prototype interface to completely depict the system's overall structure, and then linked to the university's existing camera infrastructure. First, the sticker detection model used YOLOv8 to identify a university entry permission sticker, and it achieved a f1-score of 82%. Second, the seatbelt detection model used YOLOv8 to determine if the driver was wearing a seatbelt, and it achieved a f1-score of 87%. Also, the license plate detection model achieved a f1-score of 99%, and characters recognition achieved a f1-score of 96% using YOLOv8 and dictionary mapping to accurately detect and recognize plate characters. Finally, the ROI technique and YOLOv8 were used to count occupied and unoccupied parking lots, resulting in a f1-score of 93%. The paper is interested in providing real-time detection and intervention in the face of potential threats.

Supervisor:
Dr. Sumayah Aljameel
Dr. Deemah Alqahtani

Group Members:

- Shahad Aljafaari
- Dlayel Aluahideb
- Fatema Alamoodi
- Zainab Alsafwani
- Danah Algarni

Competitions

Second place in posters competitions in WiDS at KFUPM,
Second place in NCCC2024 at IAU posters competitions

Journals:

- 1- MDPI Machine Learning and Knowledge Extraction
- 2- MPDI Big Data and Cognitive Computing

Conferences:

- 1- WiDS at KFUPM
- 2- The 6th National Computing Colleges Conference NCCC 2024 at IAU

Ebana إِبَانَة
للسانِ طلق، وقولِ بيّن

Ebana: Stuttering Disfluency Correction Using Artificial Intelligence (AI)

Abstract

Stuttering is a speech disorder where a person has difficulties expressing their thoughts in the form of words or sentences. Although stuttering has been widely acknowledged and is currently undergoing research, there is no ultimate cure for it. Thus, researchers are always looking for ways to ease the lives of people who stutter (PWS). With Ebana, the idea of a stuttering correction system is introduced. Ebana allows PWS to share their stuttered voice virtually as both stutter-free text and voice. The dataset used in this project is an Arabic speech dataset recorded and collected by team members in collaboration with King Fahd Hospital of the University (KFHU) and publicly accessible online platforms. Moreover, the proposed methodology is based on utilizing the Automatic Speech Recognition (ASR) system NeuralSpace, as well as implementing the Large Language Model (LLM) Gemini. Additionally, the process utilizes the voice cloning technology Elevenlabs. As the process of building Ebana includes multiple stages, each stage is evaluated subjectively and objectively on its own. The average overall subjective evaluation yielded a Mean Opinion Score (MOS) value of 86.1%, while the objective evaluation of the ASR showed a word error rate (WER) value of 33.11%. Furthermore, the LLM was also evaluated using WER, resulting in a value of 12.74%, and the voice cloning technology was evaluated using Mel Cepstral Distortion (MCD), resulting in a value of 19.32. Ebana is a user-friendly application that enables PWS to express themselves easily without the fear of being misinterpreted or misunderstood.

Supervisor:
Dr. May Issa Aldossary
Dr. Dina Abdullah Alabbad

Group Members:

- Reem Alshami
- Renad Alnuaim
- Maimonah Altaweel
- Haya Alzahim

Competitions

1 – Future technologies competition, organized by Ministry of Communications and Information Technology.

2 – Women in Data Science Conference.

3 – The 6th National Computing Colleges Conference NCCC 2024.

Journals & Conferences:

1 – Women in Data Science Conference.

2 – The 6th National Computing Colleges Conference NCCC 2024.

3- ACM Computing Surveys

4- Machine Learning and Knowledge Extraction – MDPI journal



SIGNAL IT | Signal It: Stroke Detection Based on Bio-Signals

Abstract

Strokes continue to be a major reason for disability and mortality around the globe, necessitating the development of effective tools for early detection and intervention. In recent years, there has been a growing interest in utilizing bio-signals, generated by the human body, as potential detectors of stroke occurrence. Various types of bio-signals, including Electroencephalography (EEG), are employed in stroke detection studies. The use of bio-signals as a tool for stroke detection holds promise as a non-invasive, cost-effective, accurate, and transportable approach, making it accessible in diverse healthcare settings. This project aims to help elderly patients and patients with disabilities since their stroke symptoms may be subtle, and to help the paramedics to make a quick decision if the patient should go to a hospital with a stroke department or any nearby medical center. As a result, the patients will be treated within the initial hours which is very crucial to strokes. Previous related studies did not mention the difference between Machine Learning (ML) and Deep Learning (DL) in processing EEG signals to detect strokes. Therefore, the "Signal It" project will focus on the utilization of both ML and DL techniques with EEG data to explore the distinctions in their approaches, and to combine ML and DL models using ensemble techniques and assess the impact of each method on the performance and accuracy of stroke detection. Four experimental setups were devised, each exploring different feature engineering methods. These setups included utilizing all features, employing features selected by Decision Tree (DT) with various thresholds, as well as Principal Component Analysis (PCA) and Independent Component Analysis (ICA) for feature reduction. Empirical findings demonstrate that the ensemble model, comprising Bernoulli Naive Bayes (Bernoulli NB), Adaboost, XGBoost, DT, k-Nearest Neighbor (KNN), Random Forest (RF), and Gaussian Naive Bayes (Gaussian NB) with ICA technique achieved perfect performance scoring 100% in accuracy, precision, recall, and F1-score.

Supervisor:
Mrs. Mehwash Farooqui
Dr. atta-ur-rahman

Group Members:

- Cadi alshammari
- Latifa mohammed alsuliman
- Fatimh Abdullatif AlBaik
- Razan Ayman Sharaf
- Zainab Omar Alsaif

Journals:

- 1- MDPI
- 2- IIETA

Conferences:

4th ICCIT CONFERENCE



VISION-COR: A Comprehensive Approach to Automated Corrosion Detection in Visual Inspections

Abstract

The frequency of corrosion-related concerns is becoming a rising concern in many industries. Corrosion causes significant economic losses and threatens the safety of structures and equipment all over the world. Since corrosion continues to be a significant cause of operating disruptions and maintenance expenses, resolving this issue has become increasingly important. Detecting corrosion helps achieve the broad objectives of minimizing industrial risks and maximizing resource utilization. However, it is noteworthy that most studies in this field have encountered challenges due to limited and less diverse datasets. The scarcity of comprehensive data has often hindered the development of robust corrosion detection systems. To address this limitation, this project aims to create an enhanced corrosion-detecting system using deep learning and computer vision techniques. By leveraging data-driven insights and employing advanced deep-learning approaches, the system seeks to overcome the constraints posed by inadequate datasets. In doing so, it aims to provide a more accurate and comprehensive solution for identifying corrosion tendencies and managing associated hazards in diverse industrial settings.

Supervisor:
Mr. Mohammad Aftab Alam
Khan
Dr. Sunday O. Olatunji (Aadam)

Group Members:

- Razan Khalid Alshammari
- Fai Saleh Alanazi
- Rahaf Mofareh Yaan Allah
- Fatimah Abbas Alkhatim
- Shahad Khalid Alghamdi

Journals:

1 – Computers in Biology and
Medicine (Elsevier journal)

Conferences:

1- WiDS @ PSU
2 – International Conference
of Business and Innovative
Technology (ICBIT) 2024 at
Bahrain



Preemptive Diagnosis of Epileptic Seizure, Osteoporosis, and Sickle Cell Anemia Using Computational Intelligence Techniques

Abstract

The ramifications of chronic illnesses go beyond affecting individuals and impacting societies and economies. Given that chronic diseases are a leading global cause of death and are highly prevalent in Saudi Arabia, it becomes imperative to leverage all available technologies for early detection. In the healthcare industry, Machine Learning (ML) is an emerging method that can effectively diagnose various diseases, including chronic conditions. Previous efforts at diagnosing chronic diseases have mainly concentrated on patients who are already displaying symptoms. Additionally, recent research has demonstrated a reliance on deep learning techniques with Computed Tomography (CT) scan images for disease detection, which presents limitations when applied in community hospitals with limited imaging resources. As a result, the goal of the project is to use ML approaches to detect Epileptic Seizure, Osteoporosis, and Sickle Cell Anemia before symptoms appear using clinical data only. The clinical data used in this project is obtained from online data since the data is typically available. Furthermore, the chosen approach for this study draws inspiration from analogous research endeavors conducted previously. Leveraging the insights from prior studies, our methodology integrates a diverse array of advanced machine learning algorithms, including Random Forest, Support Vector Machines (SVM), K-Nearest Neighbors (KNN), Gradient Boosting (GBoost), and Extreme Gradient Boosting (XGBoost). Through meticulous implementation and iterative refinement of these sophisticated techniques, our aim is to significantly enhance the accuracy and effectiveness of chronic disease detection. By harnessing the strengths of these models, we strive to fortify the predictive capabilities necessary for robust and early identification of the chosen chronic diseases, thereby facilitating proactive and targeted intervention strategies.

Supervisor:
Dr. Mustafa Youldash

Group Members:

- Fatima Algharash
- Aseel Alqahtani
- Sara Altaleb
- Azzahra Alkhuridah
- Razan Alzahrani

Competitions:

- 1- Women In Data Science Conference (WiDS)
- 2- The 6th National Computing College (NCCC24)
- 3- She codes 2024 @ Princess Nora University

Conferences:

- 1- Women In Data Science Conference (WiDS)
- 2- The 6th National Computing College (NCCC24)
- 3- She codes 2024 @ Princess Nora University



MSolutions: Multiple Sclerosis Subgroup Classification and 3D Lesion Segmentation

Abstract

Multiple sclerosis (MS) is a chronic, inflammatory condition affecting the central nervous system. It occurs when the immune system mistakenly attacks the protective covering of nerve fibers, disrupting communication between the brain and the body. Diagnosing MS can be very challenging, even for experts. AI intervention has the potential to benefit individuals with MS worldwide. Thus, We present a toolkit that can differentiate between types of MS, identify the presence of MS lesions in MRI scans, and segment them. This tool aims to support MS specialists with timely and accurate diagnosis. Furthermore, we have contributed to MS research within the Arab regions by incorporating Arab datasets, including those from Saudi Arabia and Iraq. This initiative aligns with the objectives of the Saudi Arabia 2030 vision, particularly in improving the Kingdom's health sector through technological solutions.