جامعة الإمام عبدالرحمن بن فيصل
IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

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

CCSIT

GRADUATION
PROJECT
SHOWCASE 8

College of computer science and information technology

Graduation projects showcase

جامعة الإمام عبدالرحمن بن فيصل
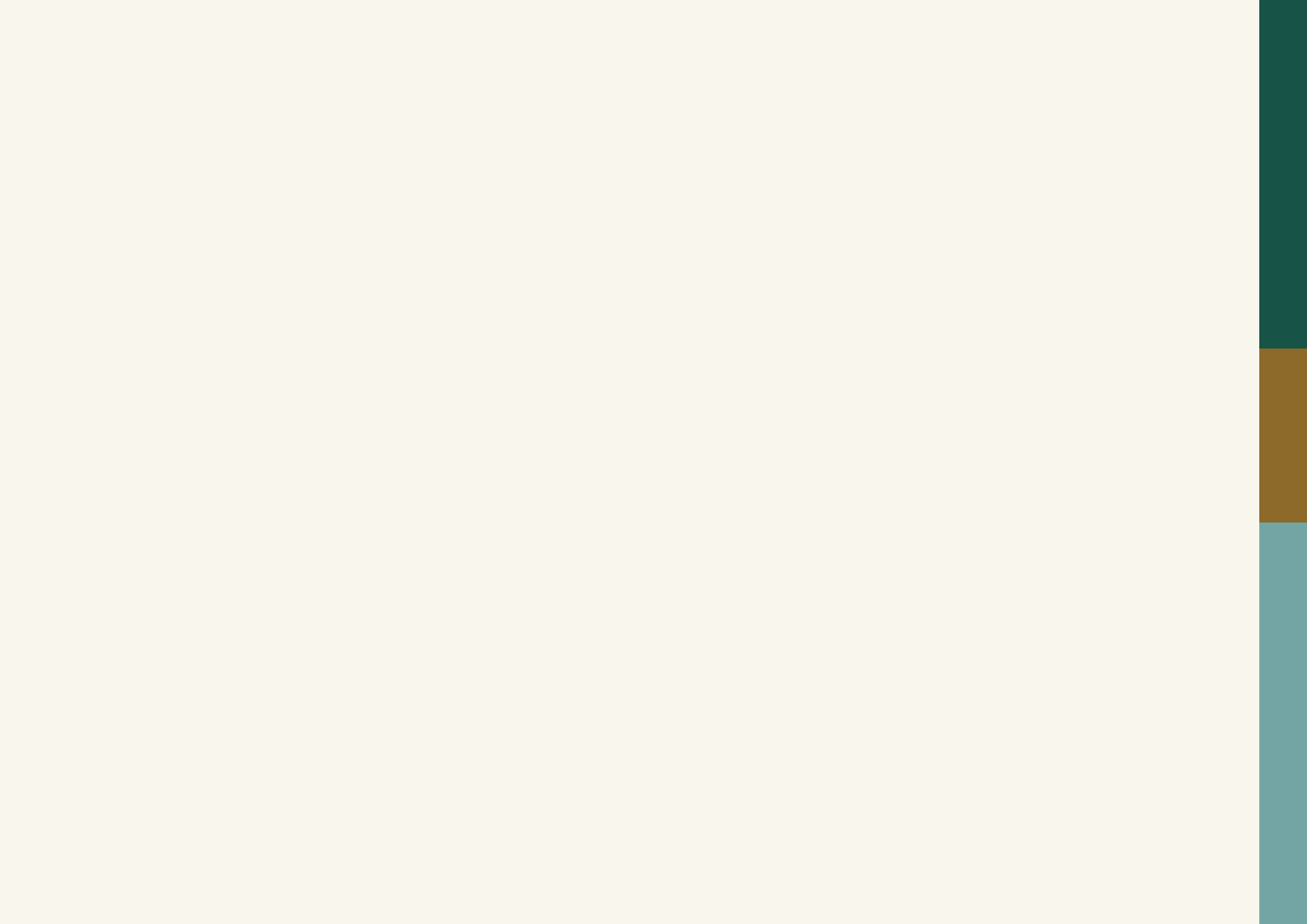IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY

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CS
Computer Science

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Humans are susceptible to a wide range of skin diseases. Many factors contribute to skin disease, including inheritance and the environment. Frequently, people only realize the effect of skin diseases once an advanced stage has already occurred. Over time, these diseases have several dangerous effects on the skin and continue to spread. In order to prevent the spread of these diseases, it is crucial to identify them at their earliest stages. Hence, the detection and treatment of skin diseases at an early stage can improve a patient›s chances of recovery. As a field of medicine, dermatology is particularly difficult when it comes to diagnosis. It can be very challenging to detect and recognize skin diseases. Because of human skin texture and the close visual proximity of different diseases, it is sometimes complicated to detect exactly which type. Sometimes, it is hard to distinguish some skin conditions because they are similar. For an accurate diagnosis, dermatologists may need to gather additional information about the patient, including additional testing and their medical history. The medical field is experiencing rapid growth due to Artificial Intelligence (AI). Different Deep Learning (DL) algorithms can be used to diagnose diseases. The proposed method uses different Convolutional Neural network (CNN) architectures. CNN architectures are trained using a dataset of various skin conditions, such as eczema, psoriasis, and ringworm (tinea). We collected our dataset from a variety of online sources. Based on the results, MobileNet model demonstrated the best performance with an accuracy level of %97.38.

Predictive Artificial Intelligence Technique for Detecting Alzheimer's

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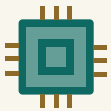
Alzheimer؛s disease (AD) is a brain disorder that destroys the ability to carry out the simplest tasks and leads to symptoms of dementia. However, dementia is the general term that defines poor memory functioning, such as memory loss, difficulty adapting to new information, and losing control of emotions. Studies have shown that AD is the most common cause of dementia, and an early diagnosis of AD provides the opportunity to participate in clinical trials, giving patients a better chance of benefiting from the treatment plan. Therefore, early diagnosis of AD involves assessing neurologists؛ ability to achieve a wider variety of medical accomplishments. In this project, a deep learning (DL)-based model is developed using brain scans, including magnetic resonance imaging (MRI) scans, to detect AD in the elderly with the use of image processing techniques (IMPRO). The dataset in this study is comprised of two main datasets. The first sub-dataset is sourced from an open-source dataset (Kaggle). The second sub-dataset is collected from KFU Hospital by a team of specialists for training and testing the model. The datasets were classified and preprocessed using various DL methods to achieve high accuracy. The proposed model can assist neurologists in diagnosing AD patients. Two separate experiments were conducted using each dataset. Both experiments employed CNN architecture models and VGG19. We achieved an accuracy of %91–%90. This project could improve the Alzheimer؛s diagnosis accuracy and ease the development of effective treatment methods.

Prediction of post-partum sepsis or surgical site infection (SSI) using machine learning

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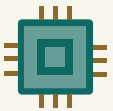
This research project aims to develop and test machine learning (ML) models for predicting the likelihood of postpartum sepsis or surgical site infections (SSI). The goal is to improve patient outcomes and reduce healthcare costs by enabling early detection of SSI and timely interventions. The proposed model was developed using a pre-processed dataset and a random forest feature selection approach to identify the most relevant features for the prediction model. The results show that the machine learning model can accurately distinguish between high and low probability of SSI. Specifically, the extreme gradient boosting classifier produced the best results with an accuracy of %98.4 and a short running time, demonstrating its potential to become a valuable tool for healthcare providers. The proposed model›s accuracy and efficiency make it an excellent candidate for implementation in clinical practice, enabling healthcare professionals to make more informed decisions and improve patient outcomes

Wind Speed Prediction based on Artificial Intelligence Model for the Eastern Region of Saudi Arabia

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With the growth of internet usage amongst people, a new platform has been created that enables practicing bullying. Cyberbullying has increased over the past decade, and it has the same adverse effects as face-to-face bullying like anger, sadness, and fear. With the anonymity people get on the internet, they tend to be more aggressive and express their emotions freely, which can be a reason for the increment in cyberbullying. This study presents the background of cyberbullying and the techniques used to collect and preprocess the datasets used in our future work. Moreover, we reviewed several papers that use different classifiers to detect cyberbullying. The focus of this work is to apply Machine Learning algorithms (ML) in Natural Language Processing (NLP) for Arabic datasets collected from Twitter. Also, discuss the performance measures like accuracy, precision, recall, and F1-score. Therefore, the classifiers were selected based on their results from previous research, which are Support Vector Machine (SVM), Naive Bayes (NB), Random Forest (RF), Logistic regression (LR), Bootstrap aggregating (Bagging), Gradient Boosting (CatBoost), Light Gradient Boosting Machine (LightGBM), Adaptive Boosting (AdaBoost), and eXtreme Gradient Boosting (XGBoost). The best performance resulted from experimenting with the XGBoost with an accuracy equal to 89.56%.

Nail Scope: A Deep Hybrid Learning Approach for Early Diagnosis of Nail-based Diseases

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In medical domains, the appearance of fingernails can provide clues to underlying systemic diseases or nutritional imbalance; the neglection of such clues could lead to unwanted health complications and less chance for recovery. Therefore, we propose "Nail Scope", a web-based system with intuitive interfaces that will provide users with accurate diagnoses, medical advice, and nail care tips to raise awareness of nail health. Moreover, the prediction model utilizes a Deep Hybrid Learning (DHL) approach to detect nail-based diseases, where a Deep Learning (DL) model is used for feature extraction, and a traditional Machine Learning (ML) classifier is used for classification. The aim is to classify three nail diseases: melanoma, beau's nails, and eczema, in addition to healthy nails. Further, the proposed architecture is compared to the transfer

An Early Prediction of Preeclampsia Using Explainable Artificial Intelligence

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Preeclampsia is a severe medical condition that is considered one of the problems pregnant women can face. It was intended in this research to apply Machine Learning (ML) approaches to tackle this problem because they have tremendous value for many fields and difficulties. Preeclampsia prediction using ML will improve the health sector by using new technologies. Moreover, it can help doctors diagnose and minimize preeclampsia risks for pregnant women. This project aims to develop an Explainable Artificial Intelligence (XAI) model that can predict preeclampsia using a Saudi dataset. A number of ML algorithms are applied to classify the data using medical features such as hypertension level and medical history for the patients. The performance has been tested based on the model performance measures: Area Under Curve (AUC), accuracy, f-score, specificity, precision, Receiver Operating Characteristic (ROC), and sensitivity). In this paper we utilized five classification algorithms, where XGBoost model outperforms other algorithms with accuracy, specificity, recall, f-score, precision, and AUC of 0.992, 1.0, 0.99, 0.99, 0.99, and 0.992 respectively.

V-Route: tracking and locating vehicles using surveillance

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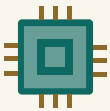
Locating and tracking vehicles without the use of GPS technology or SIM cards seemed to be impossible, but with the help of surveillance cameras and AI models that can be accomplished .In our project, we propose developing a web application that uses pre-recorded footage/ real time footage obtained from surveillance cameras and AI models named V-route to track and locate vehicles. V-route is connected to several surveillance cameras distributed across a city, it allows the users to track a specific vehicle by entering the license plate number and as a result the location of the vehicle, the route taken by the vehicle, the date, time, vehicle color and the speed will be displayed.
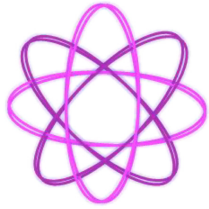
Oblivious transfer applied to quantum image steganography schemes

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Steganography refers to the concept of hiding secret messages within an innocuous cover, allowing only the sender and the receiver to acknowledge the hidden content of the message. A novel approach to steganography has been proposed with the benefits of quantum computing, achieving superior results in all aspects compared to classical representations. In our project, we present a Least Significant Qubit (LSBq) quantum steganography approach applied through two quantum image representations, namely Caraiman's Quantum Image Representation (CQIR), and the Novel Enhanced Quantum Image Representation (NEQR), along with a third advanced variation obtained through combining the two image representations, achieving superior results in terms of imperceptibility, capacity, robustness, and security. Additionally, we propose a post-quantum 1-out-of-2 Oblivious Transfer protocol by applying Multivariate Public-Key Cryptography, using steganographic images as oblivious transfer carriers, which can further increase the quantum steganography scheme's security.

P2P Lending Platform based on Blockchain and ML technology

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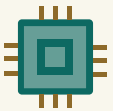
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A loan is an agreement in which the lender gives money or property to a borrower for a specified period, in exchange for the borrower paying back the lender's loan. The loan process is long and requires monitoring by a third party to prove the agreement and manage the process between the lender and borrower and provide security and transparency between the parties. This project employs a lending platform solution based on blockchain technology to assist individuals' lending processes in eliminating third-party interference. This platform also aims to simplify the P2P lending processes and increase borrower-lender confidentiality and security by saving all transactions between lender and borrower in the blockchain. Also, it follows Islamic law by not including interest rates in loans. In addition, the platform predicts the borrower's loan request approval based on his information using ML. Also, all client information will be retrieved from the national unified platform and saved encrypted in the database.

Acetabular Index Calculator App (AICA)

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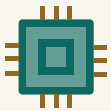
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Developmental dysplasia of the hip (DDH) is a disorder characterized by abnormal hip development that frequently manifests in infancy and early childhood. Preventing DDH from occurring relies on a timely and accurate diagnosis, which requires careful assessment by medical specialists during early X-ray scans. However, this process can be challenging for medical personnel to achieve without proper training. To address this challenge, we propose a computational framework to detect DDH in pelvic X-ray imaging of infants that utilizes a pipelined deep learning-based technique. In the first stage of the pipeline, a binary mask is applied to the original images to be modified and then passed into the keypoint detection model based on the Detectron2 Mask-RCNN implementation to measure the acetabular index angle and assess DDH affliction in the presented case. The main aim of this process is to provide an objective and unified approach to DDH diagnosis. The model achieved an average pixel error of 2.8615 ± 2.39225 and an error range of $2.4015°\pm1.963°$ for the acetabular angle measurement relative to the ground truth annotation. Ultimately, the deep learning model will be integrated into the fully developed mobile application Acetabular Index Calculator Application (AICA) to make it easily accessible for medical specialists to test and evaluate. This will reduce the burden on medical specialists while providing an accurate DDH diagnosis for infants, thereby increasing their chances of successful treatment and recovery.

Modern data science approaches to early diagnosis of dementia

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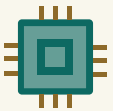
Machine learning technology in the medical field has significantly impacted the early detection of many diseases that were once considered undetectable or predictable. Undoubtedly, Correct and proper diagnosis is the first and most crucial step in treatment, but anticipating diseases can contribute to early treatment. Dementia has been one of the most mysterious diseases since time immemorial to this day, doctors are trying to find solutions to reduce or control it by predicting the risks associated with it.The Sparse logistic regression models have been adopted as machine learning-based classification models. The prediction models must be validated to calculate the absolute risk of dementia scores; existing models must be calibrated, enhanced, and validated in future research to predict dementia risk even for the general population or sub-populations with diverse characteristics. In this project, statistical and machine learning algorithms will be used for the early

Ultra LMS (Learning Management System)

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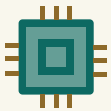
The fingerprint attendance system (Ultra Learning Management System) aims to automate the attendance-taking procedure of any educational institute using biometric technology (fingerprint) in addition to many functions that serve students and teachers to make it more effective. The fingerprint attendance-taking procedure is extremely efficient compared to the traditional name call-out procedures. It saves the time consumed by the traditional method. This project aims a system that is flexible, inexpensive, easy to use, and capable to integrate with the future development of an educational institute. In brief, this system is the most efficient and widely uses solution that keeps the discipline of the students at the highest level and allows the teachers of the students to monitor and follow up on the attendance of their students via the Internet.

Arabic Sentiment Analysis of YouTube Comments Using Machine Learning

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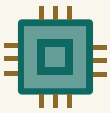
Sentiment analysis is a challenging task for AI technologies, and it is especially difficult in Arabic due to the language's complex morphology and syntax, as well as its rich vocabulary. YouTube videos are an excellent source of user-generated content, which can provide valuable insights into audience sentiment. Thus, we propose a powerful AI tool which enables real-time sentiment analysis on Arabic comments using the YouTube API. It is trained upon a manually collected and expertly labeled dataset and utilizes six advanced classifiers to achieve high accuracy. The model is built in a parallel computing environment, enabling it to analyze a massive amount of comments in a short period of time. It is ideal for content creators, moderators or businesses who require prompt and precise insights into their viewers' sentiments and opinions. Through the tool, businesses can gain valuable insights into how their Arabic audience is responding to their content, enabling them to make data-driven decisions to improve engagement and grow their online community.

Zoodha Auction

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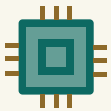
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Mobile application that allows users from anywhere locally, to auction their stuff and have the options like specifying minimum bid for the item, also allows users in Realtime to bid on the products of other users in the application with some bidding limitations to ensure seriousness of the bidders, the auction lifecycle starts from starting the auction till the item amount transformation from the buyer to the seller's account. Other services also included in the application like chatting, comments on auctions, and notifications

QR scanner for taking attendance

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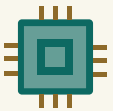
We developed a system to assist in taking students' exam attendance by using the student ID or the QR code contained in the student ID. The system consists of a mobile app that enables the invigilator to take attendance and a web app to register the exam schedule and view the analytics. With our system, we hope to make exam attendees' experiences much faster and more accurate.
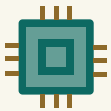
Blockchain enabled Electronic Data Interchange Framework for Smart Healthcare 5.0

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Historically, the healthcare industry relied on paper-based systems to store and manage medical records. These systems, however, are vulnerable to data breaches, loss, and errors. The goal of this research is to create a safe and efficient healthcare system using blockchain technology. This research will make use of a variety of tools and methods, including the Python programming language, the pyQT5 library, and the MySQL database management system. The project will entail the creation of a blockchain-based smart contract for the storage and retrieval of medical records. In addition, a Python application based on pyQT5 will be created to provide users with a user-friendly graphical interface. The system will be integrated with a MySQL database for storing medical records and the DBeaver app for database management. The blockchain-based healthcare system developed will provide a safe and efficient platform for storing and managing medical records. The system will be scalable and user-friendly, with features like appointment scheduling included. The use of blockchain technology will ensure the medical records' integrity and confidentiality, while the user-friendly interface will improve the user experience.

Arabic SMS Spam Filtering Using NLP Text Classification Methods

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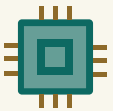
SMS Spam messages are an incredibly common attack vector on laypeople in regard to identity theft, bank fraud, etc. In the Arabic-speaking world, there is very little research regarding stopping this manner of attack, leaving users there very vulnerable. From this motivation we went about to propose a Naïve Bayes classifier with a specific set of preprocessing steps and an Arabic SMS Spam dataset geared towards the most common types of attacks. Results achieved are 96% accuracy, 97% precision, and 90% recall. Matching other classifiers in accuracy while at the same time being a lot faster and more efficient.

"HOPE" Breast Cancer Detection System

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Nowadays,breast cancer is the most frequently life threatening and leading cause of death among women In the past two decades, remarkable progress has been made in breast cancer research that has led to more understanding of the disease, much more efficient and less toxic treatments, and increased public awareness Also, improved scanning has led to early diagnosis at stages where surgical interventions are possible As a result, the survival rate has improved undeniably, especially in young women This document contains the introduction and problem statement in chapter one that explains the aim and objective of developing Hope applications for the early detection of breast cancer While Chapter two shows the Background and review of the literature Also, chapter three shows the software requirement specification needed to complete Hope in the correct format Chapter four includes software design specifications last but not least, chapter five will conclude the report

CIS
Computer Information System
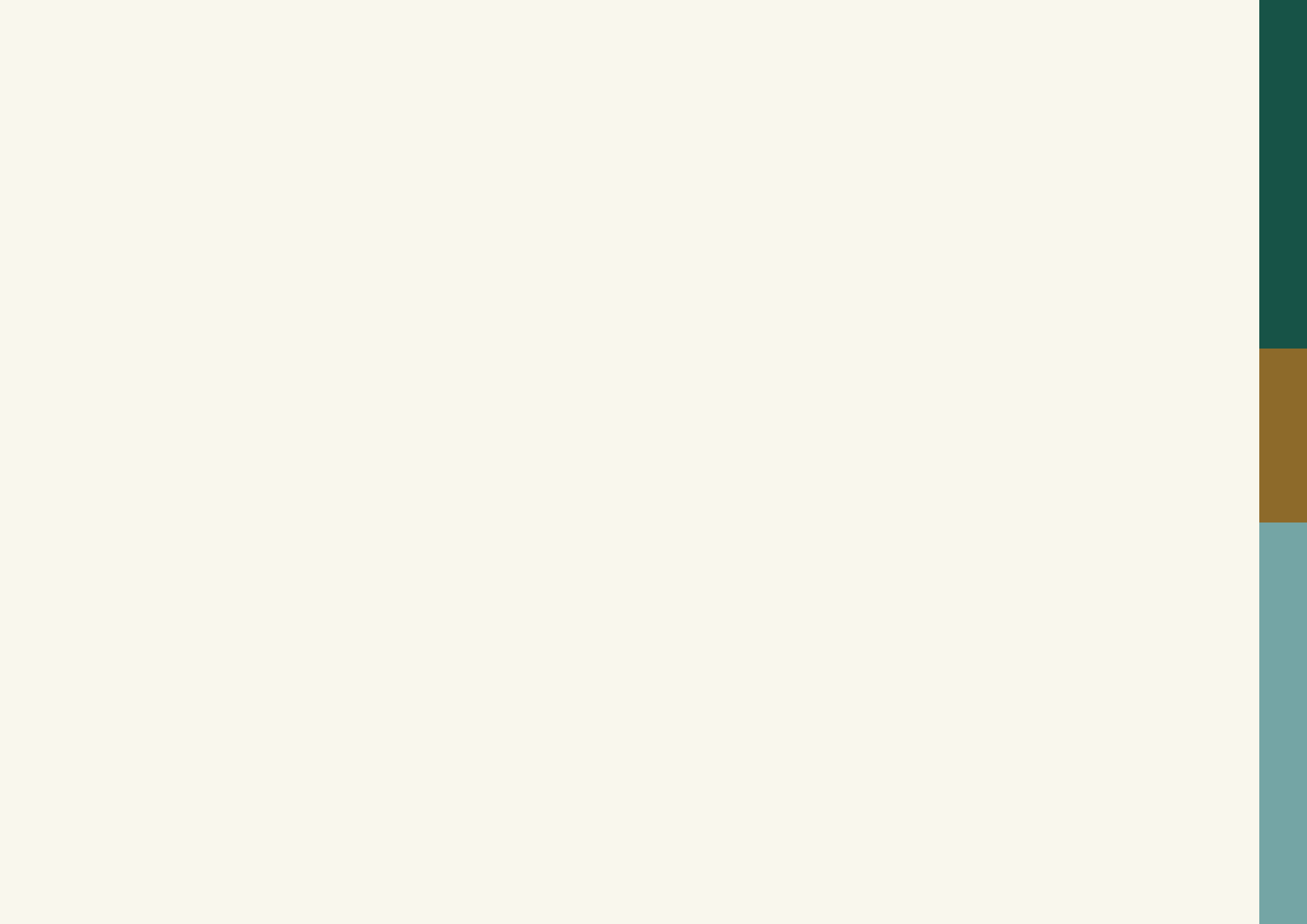
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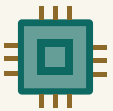
Exam scheduling application to provide a solution for iterative and conflicting scheduling

Smart Parking Space Detction System Using Image-Processing (Parkin)

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The Parkin system is a smart parking solution that can tackle the problem of spending excessive time searching for an available parking spot. It works by utilizing sensors, a computer system, and display panels to efficiently manage parking and minimize traffic congestion, and time wastage. There are different techniques that can be employed to detect vehicles in the parking area, such as image processing, which uses cameras to capture several cars simultaneously. The images are then analyzed using software that compares the variations between successive frames. The parking lot detection is achieved by recognizing the circular green icon in each parking space, and the system can be easily adjusted as needed. The project uses OpenCV software and real-time parking lot images.

Nabigh: Activities-based online educational platform for Autistic children

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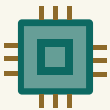
One of the neurological symptoms that affect growth is autism. E-learning is just one of many areas of life where technology is now present. However, there are not many websites that offer educational and entertaining environments for autistic children. This report represents the Nabigh website, a platform that provides autistic children with mathematical activities that support their learning journey while offering various valuable features. Nabigh allows parents and children to interact together since it supports online learning. As a result, it will enable parents to follow their children's educational progress and their child's ability to focus while learning enjoyably and educationally
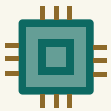
A smart Stick بصيرة

Supervisors

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Nouf Sharaf Almalki
Abrar Hussein Almudhi

To enhance the normal visually impaired stick, we developed the Visually impaired smart stick, which can detect obstacles faced by the visually impaired persons in their environment and help them become more self-reliant and confident. In our project we are developing a hardware and software system, Basira smart stick will be able to detect objects, water, and stairs by using several sensors, in case of any detection, the stick will alert the user through voice or buzzer. Basira application have plenty of features that are beneficial for both the Visually impaired and the Caretakers, caretakers can search and add visually impaired persons, they can chat and be notified whenever an emergency happens.
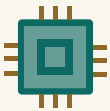
Automatic Grading of Short-Answer Questions

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Abrar Abdulrazaq Alzaher
Omnyah Alqahtani
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The methods of the Automatic Grading of Short-Answer Questions have been constantly advancing with the development of techniques and technology. By automating the grading process of short descriptive answers on a newly developed "SMART GRADER" web application that assists both educators and students in their educational lives, as well as helps educators preserve both their efforts and time by using the newly developed grading method applied in the web application. Within this document consists of an introduction of the "SMART GRADER" web application implementation, Test Plan, Implementation Phase, Test Report, User Manual, and Conclusion. The model was produced as the result of the development of a new technique that was accomplished by the application of previously obtained knowledge. The newly developed strategy employs both the clustering and word similarity methods to provide a consistent and highly accurate classification of student grades. Using the newly created educational website, both educators and students will have a much more convenient educational experience.

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Maha AlHubail
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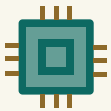
Onsi mobile application which is an educational mobile application that is designed for autistic children from 4 to 12 years old. The idea of the application is to provide various courses that focus on teaching the Arabic alphabet, recognizing emotions and understanding feelings, helping with simple routine daily tasks, and teaching the Quran. Daily tasks include washing up, dressing, brushing teeth, etc. The parent or guardian can schedule the courses according to the child's needs. Moreover, there will be a test section after each course to determine the child's progress. As autistic kids tend to be visual learners. So, in order to provide the right environment for them, we will provide visual aids such as videos, pictures, and audio to demonstrate the lessons. This will help improve children's independence so that they depend less on their parents. The plan is to create a fun educational application that uses animations and visual aids to make the learning process more enjoyable and useful for autistic children. The application will be free since we aim to provide assistance to those who would have an interest in our application. The application will be available in Arabic and on iOS and Android.

Sero سِيرو

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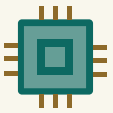
Sero is an application that assists the organizers to provide their events with an online platform to be seen by a large number of customers interested in these events. It also helps customers who have children attend any event without worrying about the possibility of losing them by developing an application for smart watches to track them using the app. Using the system will provide the ability to book, manage, track, search, and view all the events near the customer using an interactive map via the application. The system is only accessible through iOS devices and requires only an internet connection as well as the user's username and password. Then the system will check the entered information against the database to determine the appropriate limitation for the user based on his role. Also, the application directly connects with the database to retrieve the information. Swift UII is used to create the application's interface. As a result, the application will meet the needs to two types of users and provide them with a range of features.
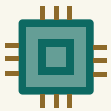
Aabbir Application

Supervisors

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Group Members

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Lojien abbas Alroqaya
Hala Alotaibi
Yasmin uthman Alsomaly
Lujain Aldraiweesh

Some children and people with speech and intellectual disabilities who are unable to utilize speech to communicate with their partners, such as parents, coworkers, or friends, can benefit from augmentative and alternative communication (AAC) technology. However, AAC software is available in the market and is user-friendly, of good quality, and open source but seldom supports Arabic-speaking customers. In this project, we plan to develop a new software model for communication applications based on AAC technology, using Flutter application builder for the front-end and Firebase for the backend.

Kitchen Partners

Supervisors

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Anwar Zaki Almahoozi
Zainab Hussain Alsadah
Ruqayah AlMubaireek
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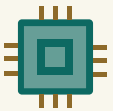
The Minister of Environment, Water and Agriculture Abdulrahman Al Fadley has confirmed that the food wasted is costing the kingdom 40 million riyal per year and its percentage is more than 33%. As technology arises and people getting more into social media that took most of the induvial time in its daily life, thinking of what to eat has become a common issue and it might affect how food is processed until it gets used in a recipe. This paper represents Kitchen Partners application, a platform to aid individuals in choosing what to eat with the ingredients they have so it does not get wasted or rotten, while also

BeWell

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Lamya Albuainain

Anwar Alshehri

Shouq Qassim

With the increasing number of mobile users, applications such as health apps are becoming extremely popular among a broad group of users. As a result of the high demand and growing number of mobile users who have become reliant on their mobile devices for daily tasks, the market now is flooded with thousands upon thousands of health apps. Aside from the growing number of health applications, accidents, such as road traffic accidents, are regarded as the most serious public health concern, resulting in countless fatalities and injuries around the world. As a result, the use of technology simplifies the patient's work by assembling the required medical data in one place. Moreover, there are lots of health apps in the industry with different features and services, but many of them don't contain all the important features all in one place, which is inconvenient for users since they have to download many apps to get the full experience. Accordingly, the focus of our work will be on the development of the health application BeWell, which will include the services that users will use in their daily lives. These services will be demonstrated in various other app reviews regarding the potential that the BeWell app will bring to the table. And, following a thorough examination of the app's features, including the comparison criteria, it was determined that the application will aid in crucial emergency cases, all of which will be included in the chapters of this report.

CCSIT Community

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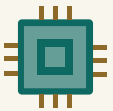
In recent years, technology and mobile applications have quickly developed and integrated into our daily life. Applications that offer essential services are thus constantly needed in a variety of industries and sectors, including healthcare, education, community services, etc. The club management application was created as a result to improve the experience of university students by making everything they need to know or do only a click away. Club members and leaders may complete all of their responsibilities and distribute them using the application. Additionally, it offers features like e-voting, access to examine all certificates, and registration for both club members and students.

Wire Hire

Supervisors
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Sereen Bawazir
Dalal AlHammad

The hiring process at the College of Computer Science and Information Technology(CCSIT) at the Imam Abdulrahman bin Faisal University (IAU) is currently conducted manually, having applications sent via email, ranked as most suited for the role, verifying their credentials, and phrasing out their peer-reviewed journals and validating them, that could lead to loss of data as well as consume time and effort. The system will make use of natural language processing (NPL) and logic learning machines (LLM) that includes GPT-4 module, along with fuzzy strings algorithm, to parse out peer-reviewed journals that are inputted as a one input textbox into categories in the database, then ranking them based on their SJR Quartile, and calculating scores for candidates in order to rank them.

Saeef Application

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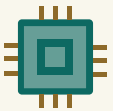
SAEEF is a mobile application that focuses on helping the deaf community. Our project is based on the people who has a deafness problem, it focuses on creating an application that mostly service the deaf adults in the service industry, especially in coffee shops domain. By using AR feature, it allows them to view their items and control of sizing, beside rotating the item in 360 degrees to have the full knowledge about each component that item contain. SAEEF Also will offers and display the ingredients of any item to let the deaf adult reading and visualizing the item to choose their favorites in drinks freely and in full awareness. Moreover, that was the main reason on naming the project SAEEF (ساعف) which means: help and aid. We hope you enjoy our enthusiasm

College Connect

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Abedalfattah feras aburub
Abdulrhman Ibrahim Alkhaldi
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MOHAMMED SALEH A ALGHANEM
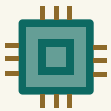
"College connect app is the platform to help all the students of the college with the communication between each other and keeping them connected to what is happening about the college activity all provided on one platform, there are many services provided by the college connect application, such as the post feature, where students can post the content on their account, which is interactive where the other students can discuss about the post, and the post can be the material to help other students for the courses."

Publication: Conference
WRFER World research forum for engineers and researchers

Smart guidence system

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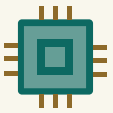
There is no doubt about the number of people with disabilities who face difficulties with their vision, the deaf, hard of hearing and others. These people face many challenges every day as they navigate many different areas to get to where they need to go. A guiding system must be available to assist users with impairments, such as blind people, hard-of-hearing users, and regular users, in finding certain offices and understanding for whom they are intended. The study was developed to assist users in finding their way to any office they want, especially for those with disabilities. The system will provide a solution to a common issue in society and provide a variety of features such as voice and displayed information on the screen. Other than that, this project will save time, effort, and money for organizations by replacing old plates with tablets that offer different functionality and can easily change the information for that specific office without needing to buy new plates.

VIRTUAL NANNY

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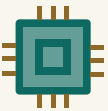
Virtual Nanny is a mobile application that provides parents and guardians with a range of functions to monitor and manage their children's screen time and technology usage. The app has two types of users - parents/guardians, and children - each with different functions and features. Parents and guardians can access a variety of tools to manage their children's activities, including setting screen time limits, blocking applications and monitoring phone activity. The app also features a store section where children can view rewards and points collected, incentivizing them to reduce screen time and engage in other activities. The app is user-friendly and accessible on multiple devices, making it convenient for parents to manage their children's activities anytime and anywhere. Virtual Nanny provides a reliable solution to the growing concerns of parents regarding their children's screen time and technology usage, enabling them to promote healthy habits and responsible use of technology. In conclusion, Virtual Nanny is an effective tool for parents seeking to balance their children's technology use with other activities, and it can help foster healthy relationships with technology for both parents and children.

Task Track

■ Supervisors

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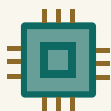
In today's world, achieving smart objectives is crucial. S.M.A.R.T stands for specific, measurable, achievable, relevant, and time-bound, and the Task Tracker system aims to help organizations manage tasks efficiently. The College of Computer Science and Information Technology (CCSIT) at the Imam Abdulrahman Bin Faisal University (IAU) requires a responsive web application that caters to its organizational structure. This paper presents the Task Tracker system designed for CCSIT, customized and tailored to collect and distribute tasks among departments. The system takes advantage of the existing hierarchy in IAU by using the four roles which are: Dean, Vice Dean, Head of Department, and Employee. The dashboard's status menu displays task progress, indicating whether a task is started, not started, or complete. A calendar shows employee task progress, displaying start and due dates and completion percentages. The project's primary aim is to simplify task management, save time, and enhance efficiency within the College of Computer Science and Information Technology at IAU. By providing a user-friendly and responsive platform for task management, tracking, and reporting, the system seeks to facilitate communication between faculty and staff members, creating an organized and productive work environment to help the college achieve its objectives in a streamlined manner.

academic major recommendation system for ccsit students

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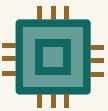
Whether it's because of their academic performance or because they feel confused and   uncertain about their skills and abilities, many students struggle to select the best academic major for them. This can lead to anxiety in some students, who then choose an academic major that doesn't match their skills and abilities and may result in them failing to finish their studies. This project aims to assist CCSIT students in deciding the major that best fits their skills, interests, and abilities. In goal to eliminate the stress and uncertainty related to choosing a major. By analyzing the student's academic progress which include all courses taken in the general years and the student's level of interest of each course, then provide a detailed and tailored report and recommendation of the best major that fits the student skills and align with their academic status and interests. The project has more features like listing each major with some technical certificates that will help the students in having a strong and well-balanced set of skills that increases their employment chances.

BrewFix Mobile Application for cafe maintenance and coffee machine services

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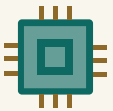
The coffee shop industry in Saudi Arabia is growing and people around the world are drinking more coffee. Coffee shops use machines to make their drinks, but these machines need maintenance to stay productive. If a machine breaks down, it can cause problems for the coffee shop. "BrewFix" is an app that offers maintenance services for coffee machines and has different packages for café owners to choose from. The app also has a "Train staff" service to help new employees learn. This document explains how the app works.

CYS

Cyber security

Ransomware detection based on machine learning

RANSOMWISE

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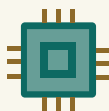
Ransomware attacks have increased recently and have been impacting critical infrastructure and corporations all around the world. Fundamentally, ransomware encrypts crucial files on the targeted machine using advanced encryption methods and then demands money to decrypt the files. Therefore, according to the detection of ransomware, it is crucial to develop effective ransomware detection methods. The goal of this project is to develop a robust machine-learning model that can identify unseen samples in order to detect ransomware using machine-learning techniques with high accuracy and a low false positive rate. In this project, we built three datasets which include memory features, API features, and a mixed dataset containing both memory and API features, by using our robust Cuckoo sandbox, furthermore, we evaluated them using five machine learning models. As a result, we utilized the API dataset since it achieves the best result using the Random Forest model with 99.57% accuracy and 0.0094 false positive rate with 80 features on the RansomWise tool. In addition, the RansomWise tool will generate a YARA rule when it detects a ransomware file. Based on our results, we can conclude that the API call features are a powerful indicator to detect ransomware. Nevertheless, we recommend utilizing API in ransomware detection. Finally, we tested our tool using several new samples to verify the work, and it achieved a promising result. As a future work, we will publish our prototype to be used publicly and can be accessed anywhere.
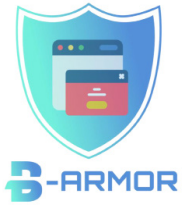
B-Armor: Real-Time ""Browser-in-the-Browser"" Attacks Detection

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Today's phishing attacks develop continuously, till they reached the newly discovered attack at mid of March 2022 named Browser-in-the-Browse. It is designed in a way that is hard to detect, and it deceives the user. This type of phishing attack is mainly used to steal user's credentials using a single sign-on that appears within a pop-up webpage, where its URL looks correct and safe to the victim. Moreover, content page URLs display correct addresses when users hover the mouse over the webpage content links. After the literature reviews, it was found that no solution has been discovered for this type of attack till now. This project proposes the "B-Armor" the first solution, the real-time plug-in that can detect Browser-in-the-Browser attacks. The proposed solution relies on four significant indicators, and it calculates the final security percentage of the web-page to provide the proper alert to the user.

SurgeFier: Zero Trust Adaptive Access Policy Engine

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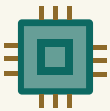
Recently, Zero Trust Architecture has received increasing attention in the aftermath of the Covid-19 pandemic. Due to remote work becoming the new norm, the connection to an organization's network has become no longer secure. Working remotely has led to a rise in the number of cyber-attacks, which increases the need for an improved mechanism of authentication and verification. Zero Trust Architecture can address such problems. Hence, many companies have started the process of implementing Zero Trust to prevent a vast number of cyber threats. Various Zero Trust architecture models that were proposed in previous research have been reviewed. Evident limitations in the execution of Zero Trust Architecture resulted in substantial gaps in knowledge. Therefore, a gap analysis has been conducted of the attributes used in previously proposed methods to authenticate and verify users by the policy engine. Thus, the proposed method in this paper aims to enhance the components required for authentication and authorization by utilizing context-based access control decisions and dynamically determining risk scores. The project goals were attained by configuring a Policy Engine that calculated the risk score for user's based on various user's attributes and granted dynamic access to resources based on the calculated risk and the vitality of the resource.

INEX-IDS: Design and implement intrusion detection system for secure communications protocol for connected and autonomous vehicles

■ Supervisors

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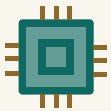
Autonomous vehicles are expected to play a pivotal role in advancing Cooperative Intelligent Transportation Systems, contributing to the optimization of road behavior, reducing accidents, and improving traffic management. However, concerns regarding the security of such vehicles persist. To address this issue, this project has explained autonomous vehicles' internal and external communications and proposed a solution by implementing an intrusion detection system that provides a specific response when detection happens. This study aims to enhance the security in the communication of driverless vehicles, provide high-accuracy detection, and increase safety when used on public roads. Based on the literature review, an Internal and External Hybrid Intrusion Detection System is provided as a solution that merges inter and intra-communication intrusion detection systems into a hybrid system that monitors assets, network connectivity, and operational variables using two different detection approaches and techniques to detect the anomaly and misuse behavior and response with a warning message, alert, and log to any abnormal and unknown activities.

Momtathel: Extract Compliance-Related Evidence Using Machine Learning

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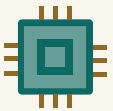
Compliance with standards is a non-negotiable aspect of business operations, but assessing compliance-related evidence can be a complex and time-consuming task. This project aims to address this challenge by providing an automated approach for extracting compliance-related evidence using machine learning. Machine learning algorithms can read and evaluate documents, automatically extracting evidence and checking if the expected evidence value is met. The proposed solution, a web application called "Momtathel," will automate the extraction of compliance evidence for third parties engaged in contractual agreements with Saudi Aramco. By automating the compliance assessment process, third parties can save costs and time. We achieved high accuracy in compliance assessment by creating our datasets using real evidence provided by Saudi Aramco and using Support Vector Machine, Logistic Regression, XGBoost, and Voting models. These machine learning techniques have streamlined the compliance assessment process, making it more efficient and accurate.

Intelligent Email-based Incident Response Automation System

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Dr. Fahd Alhaidari

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Renad Mohammad AlGhamdi

In this modern world, all enterprises seek the best ways to accomplish their work in the shortest amount of time with the highest accuracy possible. Automating the decision-making process on the approved guidelines and tools has become vital, considering everything from threat prevention to security infrastructure design to incident detection and response techniques and tools. Whether an organization's Incident Response (IR) team works independently or as a separate department, they have primary responsibilities, identifying, deploying, configuring, and managing their security infrastructure and addressing support tickets. Handling the incident reported through emails is usually carried out by the first responder team within the IR. Using machine learning and automation, the project is designed to automate and enhance incident response processes and manage the IR to respond faster and more effectively to threats, breaches, and cyberattacks. In addition to speed, the system will reduce the effort required to promptly handle incidents and will save time. The system was implemented using ML Model to classify Outlook incident reported emails beside a website designed to monitor and handle incidents. The system has been developed to deal with three types of cyber incidents. According to these three incidents, the system was tested and showed a good result.
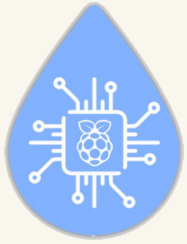
IoTears: Framework for DDoS Attack Detection in IoT-Based Network Using Machine Learning Models

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IoT can be found in home security and alarm systems, smart fridges, and more. Malicious actors often attempt to find new ways to exploit any resources, and IoT devices are a perfect candidate for such exploitations due to their limitations. It is commonly exploited in attacks such as Distributed Denial of Service (DDoS) by forming botnets of IoT devices. This project chose Machine Learning (ML) as it is a promising solution for DDoS detection. The main goal of the project is to propose a framework to detect DDoS attacks in IoT-based networks. The framework encompasses the creation of a lightweight, open-source dataset called IoTears. The dataset consists of 349,056 records in total and has been through preprocessing steps as discussed further in this report. Correlation Analysis was utilized as the feature selection approach for this project, which combined correlation and Random Forest Classifier (RFC) Importance. The result of this integration was the selection of the top ten features. Five models have been trained and tested using IoTears dataset and evaluated using different performance analysis metrics yielding an accuracy rate of 61.908% with Naïve Bayes, 99.779% with XGBoost, 99.570% with Ada Boost, 99.681% with Bagging, and finally 99.756% with LGBM. Among all models, XGBoost achieved the highest accuracy rate along with exhibiting reasonable training time and the lowest false positive rate. Therefore, this project proposes XGBoost as the best ML model to be employed in our framework.

SecAuth: A Novel User Authentication Model Based on QR codes and OTP methods

Supervisors

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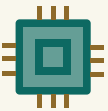
The advancement of science and technology has brought numerous conveniences to people's daily lives. Bank transfers, online shopping, and ticket ordering, all of which can be done from home comfortably. However, recent years have seen several difficulties with the use of the available authentication techniques, and in the future, these available techniques might not be suitable for our lifestyles. Phishing and keyloggers attacks may still infiltrate the authentication methods. Indeed, several methods of authentication are constantly being enhanced including the usage of Quick Response (QR) codes and One-Time Passwords (OTP). However, there is a need to consider more solutions that address a variety of attacks and at the same time preserve the performance and the usability of systems. In this project, we propose a novel approach to utilize QR and OTP with other cryptography techniques to provide a strong user authentication method considering the performance and usability of the proposed system. Therefore, we adopt digital certificates for authentication against MITM attacks, Elliptic-Curve Cryptography (ECC) as lightweight cryptography for confident communication, user-friendly mask techniques to maintain usability, and valid substitution methods against keyloggers and other password attacks. The proposed system implemented and evaluated by different testing procedures and rational methods to prove its accuracy, validity and novelty.

UniThreat: Cyber Threat Intelligence Platform

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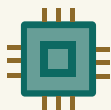
UniThreat is an open-source cyber threat intelligence platform that provides real-time monitoring and detection of data breaches in universities and other specific domains. By using sophisticated artificial intelligence web scraping techniques to collect and analyze data from various sources, including emails and websites, UniThreat offers a comprehensive and intuitive threat intelligence solution. The platform complements existing security systems and prioritizes data privacy and security by using advanced encryption methods.

MalScanner - File Behavior Analysis using Machine Learning

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Nawaf Alsukaibi
Abdulaziz Alhassan

MalScanner is a tool that aims to provide a simple, effective, and user-friendly method of scanning files for malicious behavior. Furthermore, MalScanner scans a file and extracts features to be used in machine learning assisted static malware analysis and inspects the file's behavior dynamically. This tool also implements a blockchain database to store analysis results. The solution will be presented to the user in a straightforward manner via web application.

A hybrid smart technique for mitigating AP evil twin attacks using machine learning and statistical models

Supervisors

Dr. Fahad Alhaidari

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The evil twin wireless attack is a particularly dangerous and a successful method of compromising the security of important systems such as intrusion detection and prevention systems (IDS/IPS) and firewalls. This type of attack has become increasingly common in recent years, and its ease of execution in public spaces like airports, malls, and corporate offices makes it more concerning. In response to this growing threat, we have taken on the challenge of developing a solution that can effectively defend against evil twin attacks. Our proposed solution leverages the power of machine learning and statistical techniques to detect evil twi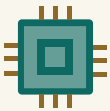n attacks with the highest possible accuracy. We used a combination of statistical analysis and a machine learning model that has been trained on a private and generalized dataset known as AFSD. Moreover, we generated additional samples from actual experiments to ensure that our model is well-equipped to handle the diverse and evolving nature of evil twin attacks. Our approach of mitigating evil twin attacks involved a two-phase process. First, training the selected machine learning model and use it as a first layer of detection, after which a statistical engine is used to analyze data from potential evil twin access points. If an evil twin attack is confirmed, a decision is made to trigger a denial-of-service (DOS) attack to take down the evil twin access point. We have conducted several experiments to evaluate the proposed solution and all the results showed the effectiveness of the solution in mitigating the attack in real-world environments.

Awareshield tool for GRC cybersecurity awareness measuring

Supervisors

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Emad Abdulaziz AlThukair
Hassan Mohammed Alamri
Khalid Fawaz Almuzid
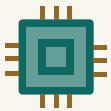
AwareShield, a web-based tool that monitors employee cybersecurity awareness. Cyber threats are rampant nowadays, making it crucial for organizations to prioritize their cybersecurity protocols. AwareShield offers phishing emails, quizzes, and exams to keep employees aware of cybersecurity threats. Our research shows that regular assessments can enhance cybersecurity awareness, and AwareShield provides a comprehensive solution. It customizes and sends phishing emails, quizzes, and exams that mimic real-world cyber-attacks to assess employee response. AwareShield tracks performance and generates reports to identify knowledge gaps for targeted training. Our tool is highly customizable and user-friendly for all employees. Overall, AwareShield is a highly effective tool for monitoring employee cybersecurity awareness and reducing the risk of cyber-attacks.

Laboratory Access implementing QR code Authentication using OTP

Supervisors

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Faisal Mohammed Alotaibi
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Mohsen Hisham Bamardouf
Yousef Abdulmohsen Aljuwaid
Husain Alqalaf
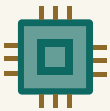
In this project, we have proposed a new technique to control the access of these laboratories. Our idea is to use an encrypted QR code with AES encryption with an TOTP authentication that will be connected to LAN network to guarantee that each student enter can only use a single PC.

Network traffic analysis

Supervisors

Prof. Nazar

Group Members

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Ahmad Salem Alfuzea
Musallem Abdullah Almahri
Abdulaziz Waheeb Alboraei
Khalifa Shaheen Khalifa Albuainain

The "Network Traffic Analysis Tool (NTAT)" is a packet sniffing tool used for capturing packets transmitted over network with detailed analysis for each packet. The tool has two main features which are Traffic Classification and Covert Channels Detection to inspect packets searching for hidden data to detect data leakage and maintain security.

AI
Artificial Intelligence

Preemptive Diagnosis of Cervical Cancer, Multiple Sclerosis, and Schizophrenia Using Computational Intelligence Techniques

Supervisors

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co-supervisor

Dr. Rim Zaghdoud

Group Members

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Lujain Mohammed Alnajrani
Salam Adel Alshammasi
Nawal Mohammed Khalid Alsheikh
Meshael Abdulrahman Almusairii
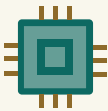
Chronic diseases' consequences extend to affect not only individuals, but also societies and economies. Moreover, since chronic diseases are one of the main causes of death globally and are so prevalent in Saudi Arabia, it is critical to use all available technologies to detect them early. Machine Learning (ML) is one of the growing approaches used in the health industry to effectively diagnose various diseases. Despite prior attempts to diagnose chronic diseases, their work has primarily focused on patients who have already exhibited symptoms. The literature study also showed that the most recent p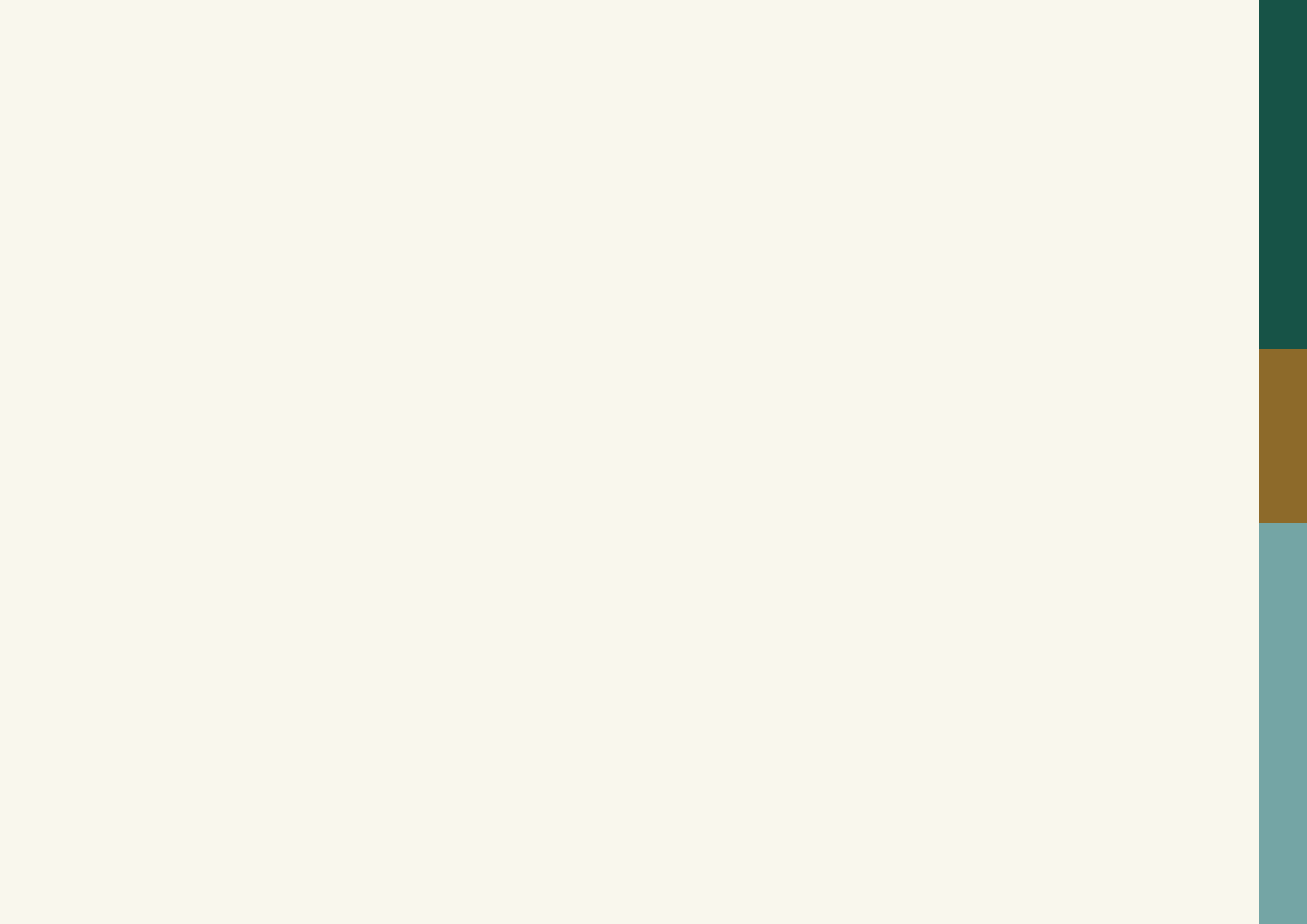apers utilized Computed Tomography (CT) scan pictures using deep learning techniques to detect illnesses, which is inadequate for utilization in community hospitals with restricted imaging resources. As a result, the goal of this project is to use ML approaches to detect Cervical Cancer, Multiple Sclerosis, and Schizophrenia before symptoms appear using clinical data only. The clinical data used in this project is obtained from online and Saudi Arabian hospitals data since the data are typically available and easily evaluated from any medical facility. After examining the targeted disorders, promising outcomes were achieved. Extreme Gradient Boosting (XGBoost) and Adaptive Boosting (AdaBoost) classifiers both had an accuracy rate of 99.79% when used to detect the presence of Cervical Cancer using an online dataset. The King Fahad Specialty Hospital (KFSH) in Dammam, Saudi Arabia provided the Multiple Sclerosis dataset that was used to train the Extra Trees (ET) model, which had a 94.74% accuracy rate. Additionally, to diagnose Schizophrenia, a K-Nearest Neighbors (KNN) model was trained using data provided from the Al-Amal Complex for Mental Health Hospital in Dammam, Saudi Arabia, and it attained an accuracy of 99.38%. Accordingly, this project aims to maximize supportive care for individuals' health and lower the risks of the identified chronic diseases in Saudi Arabia.

Deep Learning-based Seismic Facies Classification through Integration of MobileNetV2 and U-Net Architectures

Supervisors

Dr. Dina Alabbad

co-supervisor

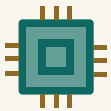Dr. Irfan Ullah Abdur rab

Group Members

Fatimah Nabeel Alomair
Halah Fahad Alabdulkarim
Manar Khalid Alahmari
Munira Abdullatif Alhumaidan
Dana Abdullah Aldossary

The integration of Artificial Intelligence and Geophysics fields has played a significant role in increasing the understanding of the earth's properties, as well as reducing the pressure on geoscientists by saving time, effort, and cost devoted to studying and exploring geographical areas. In the oil and gas industry, seismic data plays a vital role as it enables geoscientists to identify the position and dimensions of subterranean oil and gas deposits. Through the interpretation of these sound waves, geoscientists can generate comprehensive images of the underground geology, encompassing details such as the depth, configuration, and properties of the rock strata. It is crucial to choose the best label for a seismic facies image as it can indicate significant information about the subsurface structure and facilitate the discovery of prospective hydrocarbon reservoirs. It has been essential to utilize and activate Artificial Intelligence technologies in the field of Geophysics since those procedures and methods solve countless problems, one of which is seismic facies classification. By utilizing Computer Vision and Deep Learning techniques to produce the labels, the geoscientists can recognize the appropriate areas for drilling and exporting the oil and gas as well as establishing the optimal mining technique for this task. In this work, we implemented a seismic facies classification system based on U-Net and MobileNetV2 models to classify the best label for each image. Artificial Intelligence techniques used to develop the system by operating a public dataset of seismic facies images recommended by Saudi Aramco geoscientists, as this dataset simulates the images Saudi Aramco works with. The provided model will be then utilized by Saudi Aramco to benchmark the obtained results of the current research with their own dataset. The employed dataset in this project is of size 450 seismic images with two different width (701x255) and (401x255) to train and test the combined model. The final accuracy score reached 97.96% for generating and predicting the seismic images labels consisting different shapes and colors for each label.

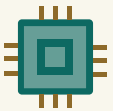# Car Accident Reporting (CAR) System Using Deep Learning

■ Supervisors

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Ms. Amal Alhajri

co-supervisor

Ms. Rahaf Alshamrani

■ Group Members

Huda Nasser Alnasser
Khawla Ahmad Al-Matar
Rahaf Salem Al-Qahtani
Sara saleh al hatela
Shoog Abdulraouf Alrassan

Every day, car accidents result in a significant number of fatalities and injuries, some of which are due to delayed medical care and subsequent mishaps. The development of a car accident detection system, which will shorten the period between when an accident happens and when first emergency responders are alerted to the accident scene, is a successful strategy for minimizing traf fic fatalities. Newer strategies make use of the automatic accident detection and notification system built into new cars. Although these methods are effective, they are costly, require complicated maintenance, and are not found in all vehicles. This paper proposes a Car Accident Reporting (CAR) System that employs transfer learning of the VGG16 model to automatically detect car accidents in images captured by roadside cameras or other surveillance systems. As a result of the system, car accidents are detected with an accuracy of 94%, and precision of 92.97%, which can potentially re duce emergency service response times. Furthermore, the system could be useful for traffic man agement and accident prevention.

Birthweight Range Classification of Infants Using Machine Learning

■ Supervisors

Dr.Dina Alabbad

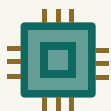### co-supervisor

Dr. Noor Felemban

■ Group Members

Shahad Yahya Ajibi
Noura Khalid Saad Alsaqer
Raghad Bandar Alotaibi
Rahaf Awad Al-Qahtani

Pregnant women around the world require special care to give birth without health complications. The uncertainty surrounding the fetus's birth situation, including its weight range, can lead to significant risks for both mother and baby, as there is a standard birth weight range. If the fetus exceeds or falls below this range, it can result in considerable health problems. Although ultrasound imaging is commonly used to predict fetal weight, it is not always accurate, and there is no supporting system available to predict the weight range in Saudi Arabia. Therefore, it is essential to leverage available technologies to build a system that can serve as a second opinion for doctors and health professionals. Machine Learning (ML) offers significant advantages to numerous fields and has a great ability to address various issues. As such, this project aims to use ML techniques to predict the birth weight range of infants. To achieve this goal, utilizing two different datasets: one from a Saudi Arabia hospital (King Fahd University Hospital (KFHU)) and another publicly available dataset through the Institute of Electrical and Electronics Engineers (IEEE). KFUH's best result was obtained with the Extra Trees model, achieving an accuracy, precision, recall, and F1-score of 98%, with a specificity of 99%. On the other hand, the IEEE dataset attained an accuracy, precision, recall, and F1-score of 96%, respectively, with a specificity of 98%, using the Random Forest model.

Preemptive Diagnosis of Hepatitis C, Coronary Heart Disease, and Depression Using Competitional Intelligence Techniques

■ Supervisors
Mrs. Mehwash Farooqui

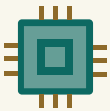## co-supervisor
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■ Group Members
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Munirah Youseef Alsaeed
Fay Abdulrahman Al-Shammari
Maria Ali Al-Ghamdi
Fatimah Mohammed Al-Qassab

Chronic diseases are becoming more common as time goes on. They have been found to be the primary cause of death worldwide, including the Kingdom of Saudi Arabia. A preemptive diagnosis of chronic disease will facilitate a significant contribution to improving the quality of life and taking a burden from the health sector. One of the primary aims of the 2030 vision is to improve the health sector by applying the latest technologies. Therefore, the broad adoption of electronic health records in Saudi Arabia hospitals has managed to accumulate data. This data can be employed along with Machine Learning (ML) techniques to develop a more accurate preemptive diagnosis system. Based on the literature, various attempts were made to diagnose chronic disease for people with symptoms. However, this project aims to preemptively diagnose individuals in the Saudi community.

Marine Debris Detection and Waste Prediction System Using Deep Learning and Computer Vision Techniques

Oseen

Supervisors

Dr. Noor Felemban

co-supervisor

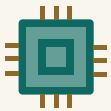Dr. Mustafa Youldash

Group Members

Seba Ghassan Alqarawi
Afnan Marwan Mhran
Joud Saleh Al-Jaloud
Danah Adel Almudaifer
Fayrouz Fayez Al-Haidar

The protection of the marine environment is undeniably one of the most pressing issues facing our world today. Human waste is a threat to preserving the earth's waters, as it affects marine ecosystems and leads to the extinction of a number of underwater creatures. Many activists have raised awareness about ocean pollution to help reduce it, and a number of campaigns have been conducted to clean beaches and seashores. But one can never anticipate the amount of waste that is swallowed into the seas and oceans; unless specialized teams dive into it to do the calculations and clean it manually. This procedure is very expensive and time-consuming. With the contribution of technology, this process can be facilitated using Artificial Intelligence (AI) and Internet of Things (IoT) techniques. Our proposed project, Oseen, aims to automate a part of the process of cleaning the ocean. This project's goal is to provide users with the amount of waste at a certain location by creating a system that integrates an underwater camera and detects waste using computer vision algorithms. In addition, a prediction system was implemented to forecast whether there is waste at a given location using machine learning techniques. Thus, assisting in the management of underwater cleaning campaigns. In this work, we address this problem with use of local data. Hence, several experiments were conducted using different Deep Learning and Machine Learning algorithms and pre-trained models for detecting underwater debris and predicting its existence and were trained on a dataset acquired from The Red Sea Research Centre in Saudi Arabia. Whereas the highest performance achieved for the detection model was using YOLOv5 in which it produced an mAP of 72.8%. As for the prediction model, Random Forest outperformed other classifiers with an accuracy of 100%. This project is expected to contribute to the United Nations goal of "life underwater" and Saudi Arabia's 2030 vision of protecting marine diversity using AI technology.
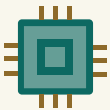
Preemptive Diagnosis of Liver Cirrhosis, Chronic Obstructive Pulmonary, and Parkinson's Disease Using Computational Intelligence Techniques

Supervisors

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Group Members

Abdulaziz Saeed Alzahrani
Abdulaziz Saud Alsubaie
Ibrahim Abdullah Alnafea
Abdullah Sameer Alamri
Osamah Waleed Aldahlan

Chronic diseases significantly impact individuals, societies, and economies globally. Early detection of chronic diseases is crucial, given that they are one of the leading causes of death worldwide and are prevalent in Saudi Arabia. Machine Learning (ML) is an emerging approach in the healthcare industry that can effectively diagnose various diseases, including chronic illnesses. However, previous attempts have primarily focused on symptomatic patients and utilized imaging techniques not always accessible in community hospitals. Therefore, this study aimed to detect Liver Cirrhosis, Chronic Obstructive Pulmonary Disease (COPD), and Parkinson's Disease before symptoms appear using clinical data only. The study used clinical data from online and Saudi Arabian hospitals, which are typically available and can be quickly evaluated from any medical facility. Various ML algorithms, including Light Gradient Boosting Machine (LGBM), Adaptive Boosting (AdaBoost), Extreme Gradient Boosting (XGBoost), and K-Nearest Neighbors (KNN) classifiers, were employed to achieve promising outcomes. For instance, the LGBM model had an accuracy rate of 97% in detecting Parkinson's Disease, while the XGBoost model had a 98.98% accuracy rate in detecting Liver Cirrhosis. Additionally, the KNN model attained an accuracy of 96.82% in diagnosing COPD. The project aims to improve supportive care for individuals' health and reduce the risks of chronic diseases in Saudi Arabia by leveraging ML on clinical data to detect chronic diseases before symptoms appear. The study's outcomes highlight the potential of ML in the early detection of chronic diseases, which can improve health outcomes and reduce the burden of chronic diseases on individuals, societies, and economies. The results of this study could aid in developing effective preventative measures and early detection strategies for chronic diseases in Saudi Arabia, ultimately leading to better health outcomes and reduced healthcare costs
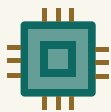
Pneumonia Detection from Chest X-Rays

■ Supervisors

Dr. Mustafa Youldash

■ Group Members

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jasser Mohammed alghamdi
abdulaziz adel aloumi
nouri Ahmed alsayed
osama mansour alyami

JANOS, an x-ray image detection and classification system that uses artificial intelligence and computer vision to give an accurate diagnosis and analysis from a given X-ray image. The project aims to explore the applicability of artificial intelligence systems in the medical field and aid doctors in diagnosing different diseases that normally require reliability on the human eye. As a development phase we will first implement a deep learning model that detects and classifies pneumonia only, but JANOS as whole is supporting multiple models that detect and analyze different diseases and conditions.

A Machine Learning Model to Predict the Ideal College for Preparatory Year Students

Supervisors

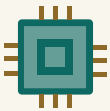Mohammad Aftab A. Khan

co-supervisor

Dr. Atta-ur-Rahman

Group Members

ahmad jabali
Abdulrahman abdullah aljallal
Mohammad Khalid Aljebali
Hussam Aboud Ziad

The main idea of this research is to investigate a machine learning (ML) approach to help students select the ideal college for them after the preparatory year, based on the inputs provided from the preparatory year only, such as courses grade, etc. The output of the system is a Six-Class Classification of recommended colleges. We divided the 2264 records of students between 2018 and 2021 with 20 feature data using a 10-fold Cross-Validation then passed it to a Voting Classifier with Extra Trees Classifier achieving the highest accuracy with 95%. Moreover, we built a web app with two functionalities: a Single-Prediction (for the students) and a multi-Prediction (for the Administrator). The admin can upload the data as Comma-separated values (CSV), or as a Microsoft Excel spreadsheet (XLSX) file, and then the file is passed to a function that appends a prediction to each record, then pass it again to the admin as a Downloadable file. As for the student, it is a simple form having the required inputs to enter and predict their ideal college. In addition to a backend Admin control web app for authentication and authorization.

Multiple sclerosis's edss detection

MYMS
Be Heather
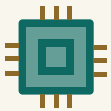
Supervisors

Dr. Mustafa Youldash

Group Members

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Saifallah Tarek Gebreel
Nawaf Alqurashi
Abdulhadi Alamoudi
Turki Almutib

Multiple sclerosis (MS) can harm the brain and spinal cord. Numerous symptoms, such as issues with balance, arm or leg mobility, and vision, may result from this. It is a lifelong disorder that can occasionally lead to extreme disability. If MS is not identified and treated at an early stage, it can cause significant impairment. The goal of this project is to create a system with two objectives: the first is to track Expanded Disability Status Scale (EDSS) progress. The second is to develop a machine learning model as a diagnosis tool for MS in Saudi Arabia utilizing straightforward clinical data. Support Vector Machines (SVM), K-Nearest Neighbor (KNN), XGBoots, and Extra Tree were utilized as classifiers among other machine learning techniques. Gridsearch CV and feature selection methods were used to enhance classifier performance. XGBoots was the top-performing classifier, employing 21 attributes to achieve accuracy of 97%. With better disease management and better patient outcomes, this experiment shows the potential of machine learning in the early detection of MS. Early intervention and patient support for MS patients may be significantly impacted by additional study and the application of machine learning techniques in the field of MS

A Deep Learning Framework for Diagnosis of Pneumonia, COVID-19, and Tuberculosis.

PulmoVision

Supervisors

Mohammed Salih Ahmed

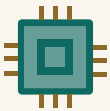### co-supervisor

Dr. Atta-ur-rahaman

Group Members

FARIS ALGHAMDI
Ali Hosam AlJumah
Zuhair Hussain AlIbrahim
Hammam Asim Hakami
Saleh Ali AlDakheel

Pneumonia, COVID-19, and Tuberculosis are some of the most fatal and common lung diseases in the current era. Several approaches have been proposed in the literature for the individual diseases' diagnosis, since each require a different feature set altogether, but a few studies were conducted for a joint diagnosis approach. A patient being diagnosed with one disease as a negative may be suffering from the other diseases and vice versa. However, since the said diseases are related to the lungs, there might be a likelihood of more than one disease in the same patient. In this study a deep learning model has been proposed that will be able to detect the mentioned diseases from the chest x-ray images of patients. The datasets used in training and validating the performance of the model are public datasets from Kaggle. The proposed model obtained a 98.72% accuracy for all classes in general and obtained a recall score of 99.66% for pneumonia, 99.35% for no-findings, 98.10% for tuberculosis, and 96.27% for covid-19, respectively. Furthermore, the model has been tested using unseen data from the same database and has been proven quite accurate in contrast to the state-of-the-art studies in literature.

Early detection and prevention of brain stroke using machine learning algorithms
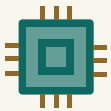
Supervisors

Dr Mohammed Imran

Group Members

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MOHAMMED YASSER ALMUBARAK
Mohammed AlBasheer
Abdulwahab Ahmed alaqel
Ahmed almaskeen

Strokes in general are sudden and come when the patient least expects especially brain strokes which are mostly fatal to those 55 years old and above, and if one would survive it can cause serious paralysis or lack of strength. Therefore, such complicated issue is challenging for only health care sector so other fields like computer science can offer a hand. Based on literature reviews outcomes, we haven't found many papers using middle east samples, although they're high risk. For example, middle east countries alike Qatar come close to rank one highest on strokes worldwide. in this paper we take into consideration medical risk factors and applies machine learning and deep learning algorithms like decision tree, multiple layer perceptron, k nearest neighbor, gaussian naïve bayes, logistic regression, support vector machine, and random forest classification in order to build an ensemble stacking. With ensemble stacking prediction we have achieved the accuracy of 88%.

Designed by

Noof Aldossary