DOKUZ EYLÜL ÜNİVERSİTESİ MÜHENDİSLİK FAKÜLTESİ
BİLGİSAYAR MÜHENDİSLİĞİ BÖLÜMÜ

Bitirme Projeleri Sergisi, 2024

DOKUZ EYLÜL ÜNİVERSİTESİ MÜHENDİSLİK FAKÜLTESİ

BİLGİSAYAR MÜHENDİSLİĞİ BÖLÜMÜ

2023-2024 ÖĞRETİM YILI
BİTİRME PROJELERİ SERGİSİ
ÖZETLER KİTAPÇIĞI

12 Haziran 2024

İZMİR

ÖNSÖZ

Bilgisayar Mühendisliği
Bölüm Başkanlığı

SUNUŞ

Fakültemiz bünyesinde bulunan 12 Bölümümüzden Öğretim faaliyetleri süren 11 Bölümümüzde mezuniyet aşamasına gelmiş mühendis adayı öğrencilerimizin hazırladıkları bitirme projelerinin poster sunumlarının sergilenmesi Fakültemizde geleneksel olarak her Bahar Dönemi sonunda gerçekleştirilmektedir.

Öğrencilerimizi, ülkemiz 12. Kalkınma Planı, Vizyon 2050 hedefleri gibi özellikle ülke öncelikli araştırma konularında, öğrenim aşamasında elde ettikleri bilgi ve becerileri kullanarak sorgulayan, araştıran, veri toplayan ve sonuçları bir proje çerçevesinde sunabilen mühendisler olarak yetiştirmenin gayreti ve mutluluğu içerisindeyiz. Bitirme projeleri hazırlayan öğrencilerimizin yaratıcılığına, yeteneklerinin geliştirilmesine katkıda bulunarak; ülkemizin geleceğini yönlendirecek, uluslararası bilimsel çalışmalarda özgün düşünceler ortaya koyabilecek, Ar-Ge ve innovasyonda etkin, özgüveni gelişmiş bireylerin yetiştirilmesi Fakültemizin ana hedeflerinden biridir.

Bölümlerimizde gerçekleştirilen bitirme projesi sergisi ile öğrencilerimiz projelerini öğrenci, öğretim üyesi ve üniversite dışındaki kurum ve kuruluş temsilcilerine de tanıtma fırsatı bulmakta ve kamu-üniversite-sanayi iş birliği sürecine de katkıda bulunmaktadır.

Bitirme Projesi sergisine katılan öğretim üyelerimize/elemanlarımıza, öğrencilerimize ve tüm kuruluş temsilcilerine katkıları için teşekkür eder, sevgi ve saygılarımı sunarım.

Prof. Dr. Azize AYOL

Dekan V.

Bitirme Projesi Sergisi

Düzenleme Kurulu Adına

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Prediction of Power Outages Due to Weather Conditions

1. *Elif Tevekkül Ekimci*

Advisor: Prof. Dr. Recep Alp KUT

ABSTRACT:

In today's world, an uninterrupted electricity supply is vital for daily life. Power outages not only cause inconvenience but also have widespread impacts on safety, business operations, and essential services. The unpredictability of these outages makes effective planning and response challenging for both service providers and consumers. My project aims to fill this gap by developing a model focused on predicting power outages. Especially in areas prone to severe weather conditions, inadequate preparation and response strategies can exacerbate the impacts of these outages. Accurate prediction of outages will lead to better resource management, reduced impact on residents and businesses, and increased overall resilience of the power supply system. This thesis presents comprehensive studies on the prediction of power outages. By developing models that predict power outages based on weather conditions, and comparing the performances of these models, significant insights were gained.

Various machine learning algorithms were employed to create prediction models using real-world data from the field of energy management, and the accuracy of these models was evaluated. Techniques such as data preprocessing, feature engineering, and model optimization were used to better understand the impact of weather conditions on power outages and to improve the accuracy of the prediction models. The main achievements of this thesis include the development of highly accurate machine learning models for predicting power outages based on weather conditions; the comparison of the performance of various machine learning algorithms; the use of data preprocessing and feature engineering techniques; parameter optimization to enhance model accuracy; and the development of a software tool capable of automating all these processes. These achievements will help energy providers and consumers to better prepare for potential power outages and minimize their impacts.

mandriLLM: The Large Language Model Project

1. *Deniz Küçükkara*
2. *Merve Doğan*
3. *Nadirhan Şahin*

Advisor: Prof. Dr. Derya BİRANT

ABSTRACT:

Air pollution is one of the biggest problems that arise with the increasing human population, industrialization and advancement of technology. Nowadays, language models have started to gain an important position. Although they are still in their early stages, their success is progressing very well. Big brands like OpenAI, Meta, and Google are leading these language models. That's why we thought we should focus on local models. At the same time, local models also offer us the advantage of fine-tune. This means that the company has the opportunity to customize and use the model with the data it wants. While doing this, it does not seem possible for the data to be leaked in any way since the model is on its own server. Since Meta llama develops its models in an open source way, we decided to use it as the pretrained model.

The fact that it has the largest team and highest success in open source models made us choose it. Since we wanted to teach Turkishto the model, we started looking for a data set. In the first stage, we used wikipedia data and open source books to teach Turkish well. Afterwards, we started looking for datasets for Q&A and downloaded as many open source datasets as we could from huggingface and started training with them. While doing these trainings, we used a GTX 3080 graphics card and the results were satisfactory. Our current model can speak Turkish fluently and is ready to learn new data. However, in languages like ChatGPT, there are issues that no one can be sure about. These issues are related to data leaks. In fact, we may be sharing all the data we use during the day with GPT. Although this does not pose a risk personally, it may mean the leakage of unwanted data on a company basis.

Developing a Plant Disease Detection Application with Artificial Intelligence for Sustainable Agriculture 4.0

1. *Elif Dilara Akkuş*
2. *Simay Gökçen*
3. *Elif Özker*

Advisor: Prof. Dr. Derya BİRANT

ABSTRACT:

The agricultural sector is one of the most critical sectors for people's nutrition and survival. Today, this sector; It is struggling with many important problems such as climate change, depletion of existing resources and environmental pollution. The concept of sustainability in agriculture, which comes with Agriculture 4.0, one of the most important steps taken to deal with these problems, has been the main motivation of the project. With this motivation, early detection of plant diseases has become the main aim of our project. The project will contribute to the modernization of agriculture, increasing farmer welfare and avoiding economic losses with Agriculture 4.0. The project focused on the apple plant, which is an important agricultural product that contributes significantly to both exports and imports in our country. The project is primarily focused on diagnosing diseases of apple plants using Convolutional Neural Networks (CNN), which is a sub-branch of Deep Learning and is generally involved in analyzing visual information.

The saved model is integrated into a mobile application so that the user can easily use this model. The user uploads a photo of a diseased apple plant leaf to the mobile application, either taken instantly or uploaded from the phone gallery. The system detects the disease and informs the user of the disease outcome and recommended treatment methods. For a healthy model training, the data set went through data processing steps such as data preprocessing, resizing, rescaling and augmentation before being given to the model. To get the best results, the CNN model has been tested with many different layer numbers and different epochs. The best accuracy value achieved in the model is 96.55%, and this result was achieved in the model with 6 layers and 50 epochs. The developed mobile application is designed to be user-friendly, easily understandable and uncomplicated, and can be used easily by people from many segments of society, such as farmers and hobbyists.

Two-Factor Authentication System for Protecting Metadata and Connected Vehicles

1. *Tunahan Yanmaz*

Advisor: Assoc. Prof. Dr. Gökhan DALKILIÇ

ABSTRACT:

In the rapidly evolving and expanding world of technology, there is an undeniable need for innovative solutions that enhance both comfort and security. The aim of our project is to offer users a secure two-factor authentication-based, keyless vehicle access system utilizing QR codes to enhance security. Literature review reveals that keyless entry systems employing two-factor authentication often utilize biometric data (fingerprint, facial recognition, etc.) for identity verification. While such data creates a unique key for the system, it introduces scenarios where user metadata might be at risk. Our approach addresses this concern by enabling keyless entry without using the user's biometric data. Our project serves as an example of a keyless entry system protected by TwoFactor Authentication (2FA) utilizing smartphones. These systems leverage the power and authentication capabilities of smartphones. In our system, the first factor is our smartphone generating unique QR codes, and the second factor is an embedded device equipped with a camera capable of scanning this QR code and fortified with security software.

This system feeds the reliability of two-factor authentication for preventing unauthorized access to vehicles, utilizing a QR code generated uniquely at specific time intervals. In the initial phase, the triggering method of the embedded system, programmed on the Linux operatingsystem using the chosen programming language, is expected to be determined and tested. The subsequent stage involves developing a mobile application for iOS operating systems capable of randomly generating unique QR codes within the project scope. It is deemed appropriate to concurrently program the central security system (CSU) to function on the embedded device during the development of the mobile application. Subsequent stages necessitate ensuring communication and encryption between the concrete mobile application and the program running on the embedded system. Finally, the integrated systems are tested for compliance with ISO/SAE standards, and the completed project is presented.

Sending the Status Logs Collected from the Machine to the Cloud and Analyzing the Collected Data with a PC Application

1. *Fuat Mencik*
2. *Muhammet Ali Yeşilöz*
3. *Sinan Ölker*

Advisor: Assoc. Prof. Dr. Mehmet Hilal ÖZCANHAN

ABSTRACT:

The capabilities and market of mobile technologies have grown rapidly in the last decade. Despite this growth, the rate of mobile technology usage in traditional shopping is quite low. The rapid spread of supermarkets, which are the contexts of traditional shopping, has brought with it increased product options and larger supermarkets. In this study, it has been evaluated that consumers' access to the ideal product and decision time can be optimized. An Android-based application that consumers will use in traditional shopping has been developed. Bluetooth Beacon technology and versatile algorithms were used to optimize the process of accessing the products in the grocery store. The utilization of Bluetooth Beacon technology was employed to map the inside of the grocery store and create a route for preferred products. Augmented Reality technology has been integrated to increase the user experience of consumers in the navigation process.

QR Code technology and Augmented Reality were used together for detailed viewing and filtering of the products on the shelves. In this way, more ideal outputs were obtained from the scanning and filtering processes to be performed by the human eye. It has been ensured that the processes of the consumers in the grocery stores are made more optimal by considering their consumption or economic sensitivities. By using the preferences and route information of the consumers in the shopping process, data that will appeal to the business intelligence units of the grocery stores were obtained.

Digital Twin for Chronic Illness Patients

1. *Mustafa Can Yılmaz*
2. *Gufran Güneş*
3. *Alper Şallı*

Advisor: Assoc. Prof. Dr. Mehmet Hilal ÖZCANHAN

ABSTRACT:

The Digital Twin for Chronic Illness Patients project aims to transform chronic disease management by seamlessly integrating advanced technologies into healthcare. Leveraging IoT devices, the project enables real-time monitoring and rapid response mechanisms to ensure immediate attention to any changes in a patient's health status. By providing patients with regular updates and insights into their health, the project enhances patient engagement and encourages a proactive approach to self-care. A key feature of the project is the integration of diverse data sources, offering a comprehensive view of a patient's health and eliminating data fragmentation across different healthcare providers. The project supports healthcare professionals by providing access to analyzed data, which aids in data-driven decision-making, optimizing treatment plans, and interventions.

Utilizing cutting-edge technologies such as cloud computing, mobile applications, and IoT, the project establishes a seamless, efficient, and secure system for managing chronic illnesses. This initiative marks a significant advancement in the healthcare sector. Additionally, by incorporating machine learning algorithms, the project can predict a patient's well-being with an accuracy of 98.6%, thereby assisting doctors in more accurately detecting and managing unwell patients.

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Textile Pattern Design

1. *Deniz Göçer*

Advisor: Assoc. Prof. Dr. Semih UTKU

ABSTRACT:

TaharArmür project aims to revolutionize the field of textile design by providing a comprehensive and user-friendly digital tool for creating, modifying, and visualizing weaving patterns. Traditional methods of pattern design, characterized by manual drafting and labor-intensive calculations, present significant challenges in terms of efficiency, accuracy, and creative flexibility. The TaharArmür application addresses these challenges by digitizing the entire process, offering an intuitive interface, realtime visualization, and advanced calculation tools to support designers in their creative endeavors. Key features of the application include an interactive matrix for pattern creation, color customization, and tools for generating tahar and armür plans, which are crucial for preparing designs for weaving. The application also includes specialized modules for calculating textile properties such as density and weight, ensuring that patterns are optimized for production. By automating these processes, the TaharArmür application reduces the risk of human error, enhances productivity, and allows designers to experiment with new ideas effortlessly.

The development of the TaharArmür application follows an iterative and usercentered approach, incorporating feedback from textile designers to ensure the tool meets their needs and expectations. Comprehensive testing, including unit, integration, and user acceptance tests, ensures the application is robust, reliable, and efficient. Experimental results demonstrate high user satisfaction, significant reductions in design errors, and enhanced creative flexibility. The application performs efficiently even with complex patterns, providing a seamless user experience. The TaharArmür project represents a significant advancement in textile design, combining the rich heritage of traditional weaving techniques with the possibilities offered by modern digital technology. Future work includes expanding the feature set, optimizing performance, integrating advanced technologies such as artificial intelligence and machine learning, and extending the application to mobile and web platforms. These enhancements aim to further support textile designers and ensure the TaharArmür application remains at the forefront of textile design technology, empowering designers to create beautiful, innovative, and high-quality textiles.

DEU Online Android Application

1. *Can Türk Küçük*
2. *Ceyda Yırtıcı*
3. *Emre Bağdadioğlu*

Advisor: Assoc. Prof. Dr. Semih UTKU

ABSTRACT:

The DEU Online Android Application was developed to improve the academic digital experience for students at Dokuz Eylül University. By making digital services accessible through mobile platforms. The application combines the functionalities of the SAKAI educational platform and the DEU Sanal POS system. This mobile application addresses the usability and accessibility challenges faced by students when accessing these systems on mobile devices. The primary objective of the DEU Online Android Application is to provide a seamless and efficient user experience. It offers features such as accessing course materials, handling assignments, viewing grades, receiving announcements, and managing meal credits within the university's cafeteria system.

The application followed design best practices to be user-friendly and compatible with a variety of Android devices. The app is developed with Kotlin programming language and Jetpack Compose UI App Development Toolkit, the application follows the MVVM architecture to construct and maintain a clean and maintainable codebase. The DEU Online Android Application significantly improves the interaction between students and the university's digital services, promoting better academic engagement and operational efficiency.

SOLVIFY QUIZ APP

1. *Simay Ayberik*
2. *Şükrü Berk Öztaş*

Advisor: Assoc. Prof. Dr. Semih UTKU

ABSTRACT:

Nowadays, we see lots of quiz apps through gamified structure. Although we also see that they share so much similarities by themselves. Our project The Solvify Quiz-App stands at the intersection of interactive quiz engagement, social connectivity, and influencer-driven content creation. This mobile application is designed to redefine the traditional quiz experience by providing users with a dynamic and personalized platform that fosters community interaction and knowledge sharing. In response to the limitations of other conventional quiz applications, Solvify gives an innovative solution. Rooted in the motivation to offer users more than just a series of questions, Solvify integrates elements of personalization, social connectivity, and influencer collaboration which we saw generally in social media apps. Drawing inspiration from notable applications in the field, Solvify introduces features that set it apart in the realm of quiz engagement similarities with social media app.

The motivation to create Solvify is from a recognition that modern users seek not only to test their knowledge but also to connect with others users and individual influencers in a meaningful way. The application addresses this by enabling users to not only challenge friends in quiz duels and also play with other modes like harmony and challenge and also create and share quizzes tailored to their unique interests. The long-standing motivation also extends to providing a platform where influencers can engage with their audience through captivating quizzes and interactive challenges. The Solvify project's scope is comprehensive, covering both the frontend and backend development using advanced technologies. The Flutter framework, known for its cross-platform capabilities, shapes the visually appealing and responsive user interface. On the backend, ASP.NET handles server-side logic.. Key features include cross-platform compatibility, a responsive user interface, an interactive quiz experience, and real-time communication. In summary, Solvify aspires to be a transformative force in the quiz application landscape, offering users a unique and enriching experience that combines knowledge, community, and entertainment, representing a new standard for the future interactive mobile experiences.

DEU Online iOS Project

1. *Şahin Uz*
2. *Bora Papila*

Advisor: Assoc. Prof. Dr. Semih UTKU

ABSTRACT:

The DEU Online iOS Application was developed to improve the academic digital experience for students at Dokuz Eylül University. By making digital services accessible through mobile platforms. The application combines the functionalities of the SAKAI educational platform and the DEU Sanal POS system. This mobile application addresses the usability and accessibility challenges faced by students when accessing these systems on mobile devices. The primary objective of the DEU Online iOS Application is to provide a seamless and efficient user experience. It offers features such as accessing course materials, handling assignments, viewing grades, receiving announcements, and managing meal credits within the university's cafeteria system. The application followed design best practices to be user-friendly and compatible with a variety of iOS devices. The app is developed with Swift programming language and SwiftUI framework, the application follows the MVVM architecture to construct and maintain a clean and maintainable codebase. The DEU Online iOS Application significantly improves the interaction between students and the university's digital services, promoting better academic engagement and operational efficiency.

Personalized Mine Tracking and Warning System

1. *Enes Salık*
2. *Ahmet Yiğit*

Advisor: Assoc. Prof. Dr. Semih UTKU

ABSTRACT:

In the mining industry, ensuring the safety and health of miners is paramount. This project presents a comprehensive system for real-time monitoring and analysis of miners' biometric and environmental data using advanced IoT technologies. The system integrates wearable devices, environmental sensors, and a robust data management platform to provide continuous health and safety oversight. Wearable devices, such as wristwatches, are utilized to monitor miners' heart rates, while ESP32 microcontrollers collect critical environmental data, including gas exposure levels, from strategically placed sensors. The collected data is transmitted to a centralized backend system for real-time analysis and monitoring. The backend system, developed using the .NET Core framework and a PostgreSQL database, employs REST API architecture and SignalR for real-time communication.

A mobile application, developed alongside the web interface, enables miners to access their health data on-the-go, ensuring they are informed of their well-being at all times. To ensure system reliability and efficiency, comprehensive testing was conducted, covering frontend, backend, database, real-time communication and hardware components. The system adheres to international safety standards, data security protocols, and ensures data integrity and confidentiality. This project demonstrates a significant advancement in mining safety technology, offering a proactive approach to hazard detection and health monitoring, ultimately enhancing the safety and productivity of mining operations.

Patient Healthcare Tracking System

1. *Mehmet Tunahan Kanpolat*
2. *Oğuz Kaan Şanlı*

Advisor: Assoc. Prof. Dr. Semih UTKU

ABSTRACT:

In this project, a comprehensive healthcare management system has been developed to help patients record their health data. This system enables patients to measure their daily health data with the assistance of a smartwatch and ensures they take their medications on time using a special medication box provided to them. Additionally, family members can remotely monitor the patients' health status through their mobile phones, providing a sense of security and support to the patients. Each patient is assigned to a doctor, and the patient-doctor relationship is managed through a web-based doctor panel. The project also includes an administrative panel responsible for overall project control and data security. With this concept, the aim is to encourage patients to diligently record their health data and adhere to their medication regimen. The data is collected through a dedicated Android application, which helps patients remember their medication schedules. The application is user-friendly, designed to facilitate patients' daily lives and monitor their health status. Moreover, doctors and administrators have access to this data, enabling them to provide timely medical interventions. This enhances communication between patients and healthcare providers, ultimately leading to improved health outcomes.

The key achievements in this thesis include the availability of the healthcare management system for patients, the user-friendliness of the Android-based application, effective management of the patient-doctor relationship through the doctor panel, and the development of a software tool to facilitate more effective data analysis. This project has the potential to significantly enhance patients' health outcomes and quality of life, representing a crucial step towards making healthcare services more accessible and effective.

Disease Prediction with Human Microbiota

1. *Bora Kocapınar*
2. *Bahadır Emin Temel*

Advisor: Assoc. Prof. Dr. Zerrin IŞIK

ABSTRACT:

This project employs extensive human microbiota data, particularly focusing on the taxonomic distribution within the gut, collected from Gmrepo. It pioneers a sophisticated approach to leveraging machine learning algorithms to predict diseases, thereby augmenting early diagnosis and facilitating personalized treatment plans. The project successfully develops an interactive web platform capable of detailed health data analysis to predict the risk of six different diseases. This platform is crucial for the proactive management of health, aiding both individuals and healthcare professionals in identifying potential health risks early. It utilizes state-ofthe-art machine learning models, including XGBoost, Random Forest, and KNN, to analyze microbial abundance data, which has proven to be a reliable indicator of various diseases.

Moreover, the project emphasizes the practical application of its research by providing a detailed account of the design, implementation, and testing of the disease prediction models. It offers a comprehensive overview of the user-friendly web application developed for this purpose, which includes features such as data uploading, model training, and detailed result presentation. This project exemplifies the integration of scientific research and technological innovation, presenting a scalable and effective solution for the health sector. Its success in applying machine learning techniques to complex biological data sets a new standard in the field, promising significant implications for future research and practical applications in disease prediction and health management.

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Blockchain and Machine Learning Based Event Tracking Application

1. *Cihan Özata*
2. *Gökay Dinç*
3. *Mehmet Baran Selçuk*

Advisor: Assoc. Prof. Dr. Kökten Ulaş BİRANT

ABSTRACT:

This project explores the development of an advanced Organization Tracking Application that leverages blockchain technology and machine learning to transform the event management landscape. In an era where digital solutions are paramount, there is an increasing demand for secure, personalized, and interactive applications that enhance both user and organizer experiences. The primary objective of this project is to integrate cutting-edge technologies to address existing challenges in data security, personalization, dynamic pricing, and user engagement within the context of event management. The project begins with an extensive review of current literature on blockchain, machine learning, and event management systems, identifying gaps and opportunities for innovation.

A prototype application is developed, featuring secure user authentication via blockchain, personalized event recommendations, dynamic ticket pricing using machine learning algorithms, and interactive features such as comments and ratings. The application's usability and effectiveness are assessed through user testing, focusing on metrics such as user satisfaction, engagement levels, and the accuracy of recommendations and pricing adjustments. The results of this project aim to provide significant insights into the practical benefits and implementation challenges of integrating blockchain and machine learning into event management applications. Additionally, the study examines the potential impact on user trust, engagement, and overall experience, offering a robust foundation for future developments in this domain. This research contributes to the academic and practical discourse on the application of advanced technologies in event management, providing valuable implications for industries seeking to enhance their event management systems. By addressing key issues such as data security and personalization, the innovative approach presented in v this project has the potential to significantly improve the efficiency, accuracy, and user satisfaction in the organization and participation of events.

AI Supported Engineering Learning and Interview Platform

1. *Furkan Özdemir*
2. *Emre Özkaya*

Advisor: Assoc. Prof. Dr. Kökten Ulaş BİRANT

ABSTRACT:

This project aims to create a comprehensive web application to support skill development and job search in engineering. Emphasizing competition and skill development, the app encourages users to participate in coding challenges, foster growth, and positively contribute to education with AI. Designed to appeal to users of all levels (basic, intermediate, advanced and entry), the application provides opportunities to develop software skills through practical exercises featuring a variety of programming models and technologies aligned with real-world scenarios. The content covers programming models, database management, and web/mobile application technologies, focusing on structures that support software developers' business processes. Users can solve UML diagrams, algorithms and test questions based on different scenarios. The platform facilitates the implementation of software processes, improves problem-solving skills and increases experience in the software field. Users can track their performance, interact with others, and access a wide range of engineering skills.

Technical background includes React.js, Sass, HTML, CSS, JavaScript and OpenAI integration in front-end development. Backend technologies, including Node.js, Express.js, MongoDB, Gmail integrations and other configuration libraries, offer users the opportunity to practice with artificial intelligence-supported tools and gain interview experience. In parallel, this thesis introduces PURE, a comprehensive platform designed for coding and skills assessments in software development. Similar to HackerRank, PURE serves as a dynamic ecosystem where both companies and individuals participate in coding challenges. The platform facilitates efficient coding skill assessments for companies, allowing them to effectively evaluate potential v candidates. Individuals can sign up independently, access a pool of coding questions, and improve their proficiency through practice. PURE's technology stack includes React for the frontend, JavaScript and SCSS for styling, and Express.js as the backend framework. MongoDB acts as a database that provides efficient data storage and access. ACE IDE enriches the coding environment, and OpenAI integration enhances the platform's capabilities, providing intelligent assistance and innovative solutions. PURE's key goals include streamlining hiring processes for companies, providing a user-friendly interface for candidates, and fostering a constantly learning community. Companies can track applicants' progress, evaluate coding skills, and make informed hiring decisions. PURE aims to revolutionize coding assessments and skills development through the combination of cutting-edge technologies. This thesis explores the design, development and implementation of PURE; It reveals its functionality, features and transformative impact on recruitment processes and individual skill development in the field of software development.

Extend the Integration of Digital Account Management (DAM) Services from Interactive Brokers into InbestMe Platform

1.   *Emircan Tepe*

Advisor: Assoc. Prof. Dr. Kökten Ulaş BİRANT

ABSTRACT:

This senior project focuses on integrating the inbestMe portal with Interactive Brokers' Digital Account Management (DAM) Tools to automate user account management and document updates. Currently, the document update process at inbestMe is manual, time-consuming, and prone to delays that can temporarily restrict user operations. By leveraging the DAM FB API, the project aims to streamline this process, ensuring updates are handled automatically and efficiently. The project's primary goal is to enhance user experience by reducing downtime associated with document updates and minimizing the administrative burden on the inbestMe team. This integration not only promises improved operational efficiency but also sets a new standard for user convenience in the FinTech industry. The project involves understanding and implementing the API provided by Interactive Brokers, integrating it into the existing inbestMe infrastructure, and ensuring data security and compliance with relevant regulations.

This project contributes to the broader FinTech landscape by demonstrating how API integrations can solve practical industry problems and enhance service delivery. It offers a case study in the effective use of digital tools to automate critical business processes, ultimately contributing to the ongoing evolution of financial services. The successful completion of this project is expected to provide a reliable and scalable solution for document management in the inbestMe platform, setting a precedent for future developments in the sector.

Turkish Trademark Similarity Inspection Project

1. *Hatice Çelik*
2. *Merve Öztürk*

Advisor: Assoc. Prof. Dr. Kökten Ulaş BİRANT

ABSTRACT:

In this project, a sophisticated similarity search system is developed for images and text utilizing Qdrant, a vector database optimized for high-dimensional data. Feature vectors are extracted from images using a pre-trained MobileNetV2 model and stored in Qdrant, enabling efficient similarity searches to identify and retrieve images based on their visual features. For text similarity, two approaches are implemented: semantic similarity using the SentenceTransformer model to generate embeddings capturing the semantic meaning of words, and character n-gram similarity using CountVectorizer to create vectors based on character composition. Both types of vectors are stored in Qdrant collections, facilitating comprehensive searches for similar words based on either semantic content or character structure. The main achievements of this project include the development of a robust system for storing and querying high-dimensional vectors, efficient indexing and retrieval of similar items, and the integration of advanced machine learning models for feature extraction and embedding generation. This work demonstrates the effectiveness of combining state-of-the-art vector representations with a powerful vector database to solve complex similarity search problems in both image and text domains.

A Tool for Social Media Users' Personality Type Analysis Using Myers-Briggs Type Indicator and Machine Learning

1. *Safa Çevik*

Advisor: Assoc. Prof. Dr. Kökten Ulaş BİRANT

ABSTRACT:

In the digital age, social media has become an integral part of daily life, shaping how individuals express themselves and interact with the world. Understanding the psychological aspects of social media users is essential for tailoring personalized experiences and content delivery. This thesis introduces a comprehensive tool for analyzing the personality types of social media users, employing the renowned Myers-Briggs Type Indicator (MBTI) and advanced machine learning techniques. The proposed tool leverages the MBTI, a widely accepted psychological framework, to categorize individuals into 16 distinct personality types based on preferences in perception and decision-making. By incorporating machine learning algorithms, the tool aims to enhance the accuracy and efficiency of personality type predictions by learning patterns from vast datasets of social media activities. The thesis involves the use of a publicly available dataset from Kaggle to extract relevant features from social media content, including text and user interactions. These features serve as input to the machine learning model, enabling the system to discern intricate personality traits and tendencies exhibited by users across various online platforms.

The anticipated outcome of this research is a versatile and user-friendly tool that not only enhances self-awareness but also provides valuable insights for content creators, advertisers, and social media platforms seeking to personalize user experiences. By merging psychological frameworks with cutting-edge machine learning, this thesis contributes to the intersection of computer engineering and psychology, paving the way for a more personalized and engaging digital landscape.

Clinical Psychology Diagnostics Application

1. *Muzaffer Sevili*

Advisor: Assoc. Prof. Dr. Kökten Ulaş BİRANT

ABSTRACT:

Obsessive-compulsive disorder (OCD) is a prevalent and debilitating mental health condition characterized by intrusive thoughts and repetitive behaviors, significantly impairing daily functioning. Traditional therapeutic approaches, such as cognitivebehavioral therapy (CBT), have shown effectiveness but are often limited by accessibility and high costs. This study aims to address these challenges by developing and evaluating a mobile application designed to assess and modify cognitive biases in individuals with OCD. The mobile application leverages tasks to measure and alter interpretation bias and attentional bias, two cognitive processes critical in the persistence of OCD symptoms. Utilizing Swift for iOS, the application provides a user-friendly interface, real-time data synchronization with Firebase, and secure data storage. The intervention includes cognitive bias tasks, mindfulness exercises, and real-time feedback, facilitating continuous user engagement and personalized therapeutic support. Participants, recruited through clinical psychologists, used the application over a specified period, with pre- and post-intervention assessments measuring changes in cognitive biases and OCD symptoms.

The study demonstrated high user engagement, significant reductions in cognitive biases, and notable improvements in OCD symptoms, supporting the application's effectiveness. Comparative analysis with traditional CBT highlighted the potential of mobile technology to offer scalable, accessible, and effective mental health interventions. This research contributes to the growing body of evidence supporting digital interventions in mental health care, offering insights into the integration of mobile technology with clinical practice. Future work will focus on expanding cognitive bias tasks, incorporating personalized interventions through machine learning, and exploring long-term impacts and broader applications for other anxiety disorders.

Psychological Disorder Simulation System

1. Burak Türkeri

Advisor: Assoc. Prof. Dr. Kökten Ulaş BİRANT

ABSTRACT:

This study aims to design and implement an augmented reality (AR) supported system for simulating psychological disorders. Understanding and treating psychological disorders constitute a significant part of psychiatry; however, experiencing and comprehending the symptoms of these disorders is often challenging. Therefore, the developed system is designed to allow users to experience the symptoms of various psychological disorders in a virtual environment. These symptoms include depression, anxiety, schizophrenia, and post-traumatic stress disorder, among others. The developed system enables users to realistically experience the symptoms of psychological disorders while also providing healthcare professionals and researchers with a tool to gain in-depth understanding of psychiatric disorders. This study suggests that the virtual reality-supported psychological disorder simulation system could be an important tool in understanding, treating, and educating about psychiatric disorders. The potential of this system to be used in the treatment and education of psychological disorders in the future could provide a significant contribution to the field.

Simultaneous Recognition and Transcription of Sign Language

1. *İlayda Doğan*
2. *Ahmet Kavlıç*
3. *Ebru Özkan*

Advisor: Assoc. Prof. Dr. Özlem AKTAŞ

ABSTRACT:

This thesis presents a project focused on translating sign language into text to enhance the communication abilities and social participation of hearing-impaired individuals. Despite significant historical developments in sign language, hearingimpaired individuals today face substantial communication barriers with those who do not understand sign language. The project aims to address this challenge by developing a real-time, accurate sign language-to-text translation system. Our methodology leverages advanced image processing techniques and deep learning models to recognize and interpret hand gestures captured through a webcam. We employ convolutional neural networks (CNNs) for gesture detection and translation, ensuring high accuracy and performance. The system integrates a large and diverse training dataset to support various sign languages and provides meaningful and structured text output.

This project underscores the importance of social justice and accessibility by providing better communication tools for hearing-impaired individuals, thereby increasing their access to educational and employment opportunities and fostering their personal and professional development. Through rigorous testing, we identified and addressed specific challenges in symbol recognition to improve overall system reliability and accuracy. This thesis highlights the potential of technological advancements in artificial intelligence and image processing to significantly impact the lives of hearing-impaired individuals by facilitating more inclusive communication and social integration.

Obesity Predisposition Detection and Recommendation System Based on User Symptoms and Routines

1. *Sıla İdil Murat*
2. *Dilara Karacan*

Advisor: Assoc. Prof. Dr. Özlem AKTAŞ

ABSTRACT:

The prevalence of obesity has surged globally, posing serious health risks and economic burdens. Traditional methods for detecting and managing obesity often lack precision and fail to consider individual variations in genetic predisposition, lifestyle, and environmental factors. Addressing this gap, our project introduces a sophisticated system designed to enhance obesity predisposition detection and provide personalized dietary and lifestyle recommendations. Utilizing advanced machine learning techniques, the system analyzes user-provided data on daily routines, dietary habits, and health parameters to identify individuals at high risk of obesity. The core innovation of our system lies in its ability to integrate a diverse range of data inputs, including real-time user symptoms and historical health data, to generate a comprehensive profile of each user.

By leveraging predictive analytics, the system can forecast potential health risks associated with obesity and offer customized advice tailored to individual needs. This proactive approach not only aids in early detection but also empowers users to make informed decisions about their health, potentially reducing the incidence of obesity-related complications. Furthermore, the system includes a user-friendly interface with a chatbot that provides interactive support, enhancing user engagement and adherence to recommended health guidelines. By addressing the limitations of existing obesity management strategies and incorporating cutting-edge technology, our project aims to significantly improve the effectiveness of obesity prevention efforts and contribute to the overall well-being of the population.

Early Diabetes Diagnosis with Enhanced Data-Driven Machine Learning Methods

1. *Fadime Kaplan*

Advisor: Assoc. Prof. Dr. Özlem AKTAŞ

ABSTRACT:

This project, titled "Early Diabetes Diagnosis with Enhanced Data Driven Machine Learning Models," aims to predict diabetes risk using machine learning techniques on the 2015 Behavioral Risk Factor Surveillance System (BRFSS) dataset by the CDC. The dataset includes 253,680 responses with 21 features and a binary target variable indicating the presence or absence of diabetes. The methodology involves data preprocessing steps such as handling missing values, outlier removal, and feature scaling. Feature selection was carried out using chi-square tests and Recursive Feature Elimination (RFE) to identify key predictors of diabetes. To address class imbalance, SMOTEENN was applied, combining oversampling and undersampling techniques. Several machine learning models, including KNeighborsClassifier, XGBoostClassifier, CatBoostClassifier, ExtraTreesClassifier, and an Artificial Neural Network (ANN), were trained and evaluated using metrics like accuracy, precision, recall, and F1-score. The best-performing models showed robust predictive capabilities.

The project also includes the development of an Android application to make the prediction model accessible to users. The frontend, designed in Kotlin, allows users to input their health data easily. The backend integrates a TensorFlow Lite model for efficient mobile inference, providing real-time diabetes risk assessment. This project effectively combines machine learning with mobile application development to provide a practical tool for early diabetes diagnosis. The approach holds significant potential for enhancing public health strategies and personal health management by facilitating early detection and intervention for diabetes.

Natural Language Processing Supported Psychological Counseling and Guidance Application

1. *Ramazan Hakan Cankul*
2. *Mustafa Efe Demir*

Advisor: Asst. Prof. Dr. Yunus DOĞAN

ABSTRACT:

This research involves the development of an automation system for psychological counseling and guidance teachers. This system will utilize artificial intelligence and natural language processing techniques to support students' career choices and understand their emotional states. The primary goal of our project is to provide psychological counseling and guidance teachers with a tool to guide students more effectively in their career choices. Additionally, we aim to integrate artificial intelligence technologies to understand students' emotional states and identify potential challenges in advance. The first module we will develop will facilitate the organization and monitoring of events held in schools. By creating a computer-based system for events like career introduction days, we will enable students to easily enroll and participate. Furthermore, surveys and feedback will be collected to monitor students' emotional states after the events. In the second module, we will use natural language processing and sentiment analysis techniques to identify students' emotional states in advance.

Compositions and surveys filled out by students will be encrypted and stored in the system, presenting the results to psychological counseling and guidance teachers. The primary motivation for our project is to provide psychological counseling and guidance teachers with a robust tool to guide students in their career choices and understand students' emotional needs more effectively. This will contribute to students making more informed and healthy career decisions in the future.

Earthquake Early Warning System Software for İzmir

1. *Fatih Semirgin*
2. *Ahmet Başbuğ*

Advisor: Asst. Prof. Dr. Yunus DOĞAN

ABSTRACT:

This study presents the development and comprehensive evaluation of a real-time Earthquake Early Warning System (EEWS) utilizing seismic data obtained from AFAD sources. The EEWS was rigorously examined using seismic events such as the 2020 Samos earthquake and the 2017 earthquake in Karaburun. Through simulation-based testing, the system demonstrated remarkable early warning lead times, issuing alerts 13 seconds before the Samos earthquake and 18 seconds in advance for the Karaburun earthquake. Leveraging diverse seismic scenarios, including earthquakes of varying magnitudes and epicenter locations, the efficacy of the EEWS was meticulously assessed. The seismic data was processed using complex algorithms, including MinMax Normalization and Euclidean Distance analysis, to detect seismic activity. Additionally, validation of the system's response was conducted through the analysis of historical seismic data, ensuring reliability across different seismic conditions. The results underscored the system's reliability, accuracy, and readiness for real-time deployment, highlighting its potential to significantly enhance earthquake preparedness and disaster response efforts.

By delivering timely and actionable warnings, the EEWS contributes to mitigating the impact of seismic events on communities. A comprehensive demonstration of testing results, including the 12/06/2017 Karaburun Earthquake and 30/10/2020 Samos Earthquake Data Test and the Software Interface, further emphasizes the effectiveness and reliability of the EEWS in safeguarding communities against seismic risks in real-time applications.

Artificial Intelligence Supported Diagnosis Mobile Application in Physical Therapy and Rehabilitation

1. *Berke Sözer*
2. *Özgür Cem Arslan*
3. *Mehmet Ali Berk*

Advisor: Asst. Prof. Dr. Yunus DOĞAN

ABSTRACT:

This research aims to improve the diagnostic processes in the field of physical therapy and rehabilitation by leveraging the potential benefits of artificial intelligence (AI) technology. Traditional methods can be challenging due to limitations in patient profiles and doctor experience. In this project, the use of AI algorithms is explored to overcome these limitations and optimize diagnostic processes. As part of the research, an application will be developed to enhance diagnostic processes using AI algorithms by analyzing clinical data of patients. Data sets for different symptoms will be collected, and decision support algorithms will be created based on these data. The developed decision support system will be available through a mobile application for use in clinical practice, assisting in optimizing treatment plans for patients. The research will be conducted by three students under the leadership of the supervising advisor and in collaboration with an expert doctor from Ege University Hospital.

The project budget will be carefully managed for data collection, analysis processes, and a detailed timeline. Regular reporting of project progress and results will be conducted. The resulting application from this research has the potential to significantly aid doctors in the field of physical therapy and rehabilitation. AI-based diagnostic methods can increase the efficiency and speed of diagnoses, thereby enhancing the workload of doctors and contributing to overall improvements in the treatment process.

Environmental Pollution and Air Quality Detection System

1. *Yasser El Hasan*
2. *Serdar Karaca*
3. *Aslan Tuyak*
4. *Rinat Zhulfayev*

Advisor: Asst. Prof. Dr. Yunus DOĞAN

ABSTRACT:

The "Environmental Pollution And Air Qualıty Detection System" is an innovative project designed to enhance urban environmental monitoring through advanced technologies and methodologies. This system integrates a network of sophisticated sensors deployed in city parks to collect real-time data on air quality, noise pollution, temperature, and humidity. Leveraging cloud computing and AI algorithms, the collected data is processed and analyzed to identify trends, predict pollution hotspots, and generate actionable insights. A key feature of the system is its ability to provide personalized recommendations to users via a mobile application, guiding them to the healthiest environments and suggesting optimal routes to minimize exposure to pollutants. The mobile app is designed for crossplatform compatibility, ensuring accessibility on both Android and iOS devices.

The project aims to broaden the scope of existing environmental monitoring systems by combining air and sound pollution tracking with advanced data analytics and user-friendly interfaces. By offering real-time, accessible, and actionable environmental data, the system empowers individuals and communities to make informed decisions that enhance public health and environmental sustainability. This comprehensive approach not only supports healthier urban living but also aids city planners and local authorities in developing strategic initiatives to improve overall environmental quality.

The Psychological Impact of Written Emotional Expression: Development of an Artificial Intelligence Application

1. *Bülent Çivan*
2. *Hatice Şule Alaoğlu*
3. *Serra Ceylin Öznalbant*

Advisor: Asst. Prof. Dr. Yunus DOĞAN

ABSTRACT:

This thesis explores the development of an artificial intelligence (AI)-supported, mobile-compatible website designed to facilitate the psychological practice of written emotional expression. The project integrates advanced natural language processing (NLP) techniques to analyze written texts, providing a platform for individuals to articulate their emotional experiences. Although the application itself is not deployed in a clinical setting, it lays the groundwork for future applications that could significantly impact mental health support systems. The objective of this work is to demonstrate how AI can enhance traditional psychological interventions by making them more accessible and efficient. By leveraging the capabilities of AI, the application aims to remove barriers typically associated with psychological support, such as geographical limitations and resource availability.

The system is designed to be user-friendly, ensuring that individuals with varying levels of technology proficiency can benefit from its features. The findings from this project suggest that AI can play a crucial role in the evolution of psychological practices, potentially leading to more personalized and responsive mental health care. This thesis contributes to the field by providing a detailed examination of the intersection of AI and psychology, offering insights into how digital tools can be used to foster emotional well-being. The research highlights the importance of continued innovation and adaptation in the development of mental health technologies, advocating for a future where AI-supported interventions are commonplace in psychological care.

An Artificial Intelligence-based Application in the Field of Gastroenterology

1. *Ali Şiyar Arslan*
2. *Eren Çağlar Erdoğan*
3. *Ulaş Can Yusufoğlu*
4. *Okan Uçar*

Advisor: Asst. Prof. Dr. Yunus DOĞAN

ABSTRACT:

This study extends the existing web automation system of the Gastroenterology Department at Ege University Hospital to include both upper and lower gastrointestinal system analyses. The updated system employs artificial intelligence technologies to predict potential diagnostic outcomes for new patients based on historical patient data. This predictive capability not only provides significant support in the diagnostic processes of doctors but also saves patients and healthcare providers valuable time and resources by potentially reducing the need for additional tests and procedures. The primary goal of this project is to enhance the quality of healthcare services through the integration of artificial intelligence into medical decision-making processes. This integration aims to increase the efficiency of hospital operations, improved patient satisfaction, and elevated treatment success. This study exemplifies how artificial intelligence can be effectively utilized in the field of gastroenterology, underscoring the importance of technological innovations in medicine.

Mobile Application for Analyzing the Ingredients of Food, Cosmetic, and Cleaning Products

1. *Yavuz Yılmaz*
2. *Fatih Varol*
3. *Ceren Ersöz*

Advisor: Asst. Prof. Dr. Feriştah DALKILIÇ

ABSTRACT:

Long-lasting packaged foods, cosmetics, and cleaning products, the consumption of which is increasing day by day, pose a threat to the health of all individuals, especially children. Additives such as sweeteners, thickeners, preservatives, humectants, colorants, flavors, parabens, ammonia, bleach, and others can negatively impact human metabolism, the immune system, and genetics. Manufacturers are required to label the additives used on product packaging. However, due to uninformed consumption or lack of knowledge, consumers often use these harmful ingredients without realizing it. In the project, an Android-based application will be developed to help consumers examine product contents and become aware of harmful additives before making purchases.

Users can scan product barcodes with the app to check if a product is registered in the system. If the product the user wants to learn about is not registered in the system, they can take a photo of the "Ingredients" section on the packaging to analyze the content information. Detailed information about each additive and where else they can be found in other products will be available. Products will be rated and labeled as safe/harmful based on their contents. Additionally, the app will recommend products with higher safety scores in the same product category. The application will have an easy-to-use and user-friendly interface and will be available for free download on app marketplaces. Through this application, consumers will become more informed and inclined towards healthy products, ultimately leading to significant gains in public health and the national economy in the long run.

Artificial Intelligence Supported Role-Playing Game

1. *Murat Uğur*
2. *Tutku Ekin Bayrı*

Advisor: Asst. Prof. Dr. Feriştah DALKILIÇ

ABSTRACT:

Artificial Intelligence has seen significant advancements and its application in various domains is expanding. One of the emerging applications of AI is in the game industry, specifically in the area of dialogue generation for role-playing games. This thesis explores the implementation of an AI-driven dialogue system in an RPG game, aiming to elevate the level of interactivity, immersion, and storytelling. The project leverages advanced AI models to generate contextually relevant dialogues that vary based on the player's choices, actions, and progress within the game. This dynamic dialogue system enhances the traditional RPG experience by providing a more personalized and evolving storyline that reacts intelligently to the player's interactions. The primary goal of this project is to integrate AI models into the dialogue system of an RPG game developed using Unity for the Windows platform. The focus is on creating a system that not only understands and responds to player input but also aligns with the game's narrative and plot, thereby expanding the possibilities within the game.

This thesis covers various aspects including the motivation behind the project, the problem definition, the functional and non-functional requirements, the design and implementation details, and the testing and experimental results. The AI-driven dialogue system aims to overcome the limitations of pre-defined dialogues, offering players a more engaging and immersive experience. The main contributions of this thesis are the development and integration of AIdriven dialogues in an RPG game, the formal modeling and verification of the AI interactions, and the implementation of a tool to automate the entire process.

AI Recruitment Web Application for Smart Hiring

1. *Mecit Kaan Kartal*
2. *Nafi Can Uğurlu*
3. *Emre Koçak*

Advisor: Asst. Prof. Dr. Feriştah DALKILIÇ

ABSTRACT:

Recai project aims to enhance recruitment processes by integrating AI into web hiring platforms, addressing inefficiencies and biases commonly associated with traditional methods. Embracing technological advancements, particularly AI, is pivotal for efficient talent acquisition in today's competitive landscape. Despite the growing significance of AI in recruitment, there exists a gap in understanding its effective integration within web hiring platforms. The primary aim of Recai project is to investigate this integration, specifically focusing on the effectiveness of AI-driven interview sessions in candidate assessment and its impact on recruitment outcomes. This project adopts a mixed-methods approach, combining quantitative analysis with qualitative insights. Data will be collected through surveys, interviews, and user behavior analysis on a prototype web hiring platform integrated with AI functionalities. Statistical analysis and thematic coding will be employed to interpret the findings.

In addition to its investigative focus on the integration of AI into web hiring platforms, Recai project emphasizes the transformative potential of this integration. By enhancing efficiency, accuracy, and fairness in candidate selection, Recai aims to revolutionize traditional recruitment practices. Through rigorous data analysis and methodological triangulation, the project not only seeks to address current gaps in understanding but also aims to provide actionable insights for organizations seeking to leverage AI in their recruitment strategies. Ultimately, Recai represents a significant step forward in the advancement of recruitment methodologies, offering a comprehensive solution to the challenges faced by modern organizations in talent acquisition.

ROTA

1. *Elif Aras*
2. *Rana Gül*
3. *Ecem Tunur*

Advisor: Asst. Prof. Dr. Feriştah DALKILIÇ

ABSTRACT:

Recent research shows that mobile users prefer apps for their ability to provide instant access to information and increase the visibility of businesses. With this awareness, our project aims to develop a mobile application that addresses these preferences and offers users a comprehensive travel planning tool. The application was designed to provide detailed information about places to visit, facilitate the creation of travel programs, and optimize travel routes by taking into account factors such as time constraints. In addition to optimizing travel routes, our mobile application also stands out by offering special recommendations for different user groups. The app offers highly personalized recommendations, taking into account personal interests, available time and previously used routes. Additionally, the integration of artificial intelligence algorithms plays an important role in improving user experience. These algorithms analyze user preferences and behavior, providing the application with recommendations based on individual preferences and analytical insights.

The motivation behind our project is to ease the complexity of travel planning, especially for large groups of people. Traditional travel planning processes are often time consuming and involve numerous factors to consider. Our application aims to eliminate these obstacles by providing instant, personalized information about places to visit, thus saving users time. The application offers users a more efficient and enjoyable travel planning experience by creating customized routes according to available time zones and locations. Our project offers a more innovative approach compared to existing travel planning applications that focus on general route features. By incorporating artificial intelligence algorithms, the application not only better understands users' preferences over time, but also offers more accurate and personalized recommendations. This approach aims to significantly improve the user's travel experience and differentiate our application in the competitive landscape of travel planning tools.

DOKUZ EYLÜL ÜNİVERSİTESİ MÜHENDİSLİK FAKÜLTESİ
BİLGİSAYAR MÜHENDİSLİĞİ BÖLÜMÜ
Bitirme Projeleri Sergisi, 2024

Bluetooth, GPS and QR Code Supported Mobile Student Attendance System

1. *Abdullah Dinç*
2. *Alperen Turhan*
3. *Deniz Doğan*

Advisor: Asst. Prof. Dr. Feriştah DALKILIÇ

ABSTRACT:

In the context of modern educational institutions, efficient and secure attendance tracking is crucial. This project presents a comprehensive mobile student attendance system that leverages Bluetooth, GPS, and QR code technologies. The primary objective is to replace traditional, time-consuming attendance methods with a digital solution that ensures accuracy, enhances data security, and simplifies the attendance process for both students and instructors. The proposed system employs Bluetooth Technology to identify and verify students' presence in classrooms, while GPS data provides an additional layer of location-based security. QR codes facilitate quick and user-friendly attendance marking. The integration of these technologies not only streamlines the attendance process but also addresses privacy and data security concerns by implementing robust anonymization and encryption measures. Experimental results demonstrate the system's reliability and effectiveness, with a negligible margin of error in location tracking and successful Bluetooth-based identification.

The user-friendly interface and real-time data access contribute to a seamless experience for both students and administrators. Despite initial challenges related to technological integration and user adaptation, the system significantly reduces attendance tracking time and improves overall classroom management efficiency. This innovative approach to student attendance tracking highlights the potential of combining multiple modern technologies to create a secure, efficient, and usercentric solution, setting a new standard for educational institutions.

Speech Emotion Recognition using Machine Learning Techniques

1. *Armağan Aysu*
2. *Harun Dursun*

Advisor: Asst. Prof. Dr. Feriştah DALKILIÇ

ABSTRACT:

According to the Mehrabian rule (Mehrabian and Ferris, 1967), people give only 7% of the message they want to give with the words they use during their conversations, while 38% of it is given with voice and intonation (the rest is body language). Perception of emotions by analyzing this large share of auditory communication has the potential to improve human-machine interaction. This can provide commercial advantages. It can help users understand what they actually want and make decisions based on their mood. In this study, we tried to develop a system that can effectively classify emotion from audio data by comparing different machine learning techniques. Two forms of representation were obtained using data visualization and feature extraction methods from audio data. These were given to different classifiers and the model performances were evaluated. As a result, the highest accuracy was achieved with the Stacked model (84%), which was achieved by combining models.

Assessment of the Performance of Basketball Games and Their Players by Applying Machine Learning Techniques

1. Cemil Dalar

Advisor: Asst. Prof. Dr. Göksu TÜYSÜZOĞLU

ABSTRACT:

This research aims to utilize machine learning techniques to analyze the performance of basketball teams and players in the Turkish Basketball Super League. The study begins by collecting basketball data from reliable sources such as the Turkish Basketball Federation website and FlashScore. Web scraping operations are conducted during the data collection process using Python libraries such as Selenium and BeautifulSoup. Subsequently, the collected data undergoes preprocessing stages where missing values are handled, outliers are removed, and feature engineering is applied. Various machine learning algorithms are employed to analyze basketball matches and predict match outcomes. These algorithms include methods like Decision Tree, Support Vector Machine, and Light Gradient-Boosting Machine.

Grid search techniques are utilized to determine the best-performing hyperparameters for each model, allowing for the examination of each model's performance. The findings indicate that multi-layer perceptron (MLP) and support vector machine (SVM) algorithms achieve the highest accuracy rates, with other models also demonstrating significant accuracy rates. Additionally, it is observed that other models such as LGBM, GB, and XGB also achieve notable accuracy rates. This study showcases the effective utilization of machine learning techniques in the field of sports analytics.

Analysis of the Automotive Sector with Machine Learning Techniques Using Online Sales Data

1. *Alptuğ Topalhan*
2. *Semih Furkan Karaman*
3. *Oktay Yedibela*

Advisor: Asst. Prof. Dr. Göksu TÜYSÜZOĞLU

ABSTRACT:

In this study, we aim to accurately predict vehicle prices by utilizing data obtained from online car sales platforms. The main objective is to develop robust and reliable prediction models that will assist buyers and sellers in making informed decisions. Our approach consists of several fundamental steps: data extraction via web scraping, data preprocessing to clean and organize the collected information, feature selection to determine the most relevant attributes, and the application of various machine learning algorithms such as K-Nearest Neighbors (KNN), Random Forest, XGBoost, Linear Regression, Support Vector Regression (SVR), and Decision Trees. Through comprehensive analysis and optimization, our findings demonstrate that the XGBoost algorithm consistently provides the highest level of accuracy in vehicle price prediction and outperforms other models on both test datasets and user input evaluations.

Additionally, multiview learning confirms XGBoost as the top-performing model. This study aims to improve online vehicle trading processes by allowing users to more accurately predict vehicle prices. The developed reliable prediction models can help users make more informed decisions about vehicle prices, potentially reducing costs or obtaining fairer prices.

Smart Parking Application

1. *Kemalcan Şimşek*

Advisor: Lecturer Doctor Özlem ÖZTÜRK

ABSTRACT:

Nowadays, as technology has developed more than ever before, people can meet their daily needs with a few clicks from where they sit, thanks to the possibilities of technology. Since the situation is like this in today's age, countries are making huge investments every year to make their cities more modern and technologically advanced. Since technology entered people's lives, people can easily carry out their work thanks to the opportunities of technology. As technology has developed more than ever before, countries are introducing new types of technological applications in their cities and introducing new technological regulations in social areas, stores and markets, and most importantly, in parking lots. One of those technologies is parking guidance systems.

Driver Fatigue Detection System

1. *Batuhan Doğan*
2. *Mustafa Tuğrul Karaağaç*

Advisor: Lecturer Doctor Özlem ÖZTÜRK

ABSTRACT:

Driver fatigue is a significant factor contributing to road accidents, necessitating the development of systems capable of detecting and alerting drivers to signs of drowsiness in real time. This thesis presents a robust driver fatigue detection system utilizing advanced computer vision techniques. The system leverages OpenCV, Dlib, NumPy, SciPy, and Imutils libraries to process real-time video feed and analyze facial features to determine the driver's fatigue levels. The core of the system involves the detection and tracking of facial landmarks using Dlib's pre-trained shape predictor, which allows for the accurate computation of eye aspect ratio (EAR) and mouth aspect ratio (MAR). These metrics are critical in identifying states of eye closure and yawning, which are key indicators of fatigue. The system continuously monitors these indicators and provides real-time visual alerts directly on the video feed to warn the driver. Extensive testing demonstrated that the system effectively detects signs of drowsiness and provides timely alerts, thereby enhancing driver safety. However, challenges such as varying lighting conditions and rapid head movements were identified, highlighting areas for further improvement.

Future work aims to enhance the robustness and generalizability of the system, explore integration with vehicle control systems, and expand the monitoring scope to include additional fatigue indicators. This thesis underscores the potential of real-time computer vision applications in mitigating driver fatigue-related accidents, paving the way for safer driving environments through technological innovation.

Exploring Personalized Movie Recommendations: Data-Driven Approaches to Enhance User Experience

1. *Volkan Ülker*

Advisor: Lecturer Şerife YILMAZ

ABSTRACT:

In an era characterized by the exponential growth of digital content, effective information filtering mechanisms have become imperative, especially in the domain of movie recommendations. This thesis embarks on a comprehensive exploration of movie recommendation systems and the development of a web application that leverages data-driven algorithms to facilitate personalized movie suggestions. The research commences with an in-depth survey of existing movie recommendation systems, providing insights into their methodologies, strengths, and limitations. This critical examination serves as the backdrop for the subsequent investigation, highlighting the evolving landscape of recommendation algorithms.

The core of this research lies in the design, development, and evaluation of a movie recommendation system integrated into a user-friendly web application. We delve into the methodology employed in this system, the details of a variety of recommendation algorithms, including collaborative filtering and content-based techniques. This web application aims to provide users with a seamless experience in discovering films aligned with their preferences and tastes. The results of this study underscore the pivotal role of recommendation systems and offer valuable insights that can shape the development of future personalized recommendation systems. In summary, this thesis is a dual-pronged exploration into movie recommendation systems and the creation of a practical web application, merging theoretical foundations with empirical analysis to advance our understanding of movie recommendation systems, their real-world applications, and the potential for improved content discovery, while contributing to the ongoing discourse on the evolving landscape of digital content consumption and recommendation strategies.

The Application of Machine Learning in Real Estate

1. *Zeynep Öztürk*
2. *Eda Kurtoğlu*
3. *Ayşe Ceren Yaman*

Advisor: Dr Ufuk Demir ALAN

ABSTRACT:

Embarking on a transformative journey within the real estate sector, this project harnesses the cutting-edge capabilities of machine learning and deep learning models the way properties are presented to potential buyers and renters. At the heart of this endeavor lies a multifaceted approach aimed at bridging the gap between consumer expectations and the realities of the market, thereby simplifying the process of finding a suitable property. By employing advanced algorithms, the project seeks to analyze vast datasets, incorporating both traditional and non-traditional factors such as property prices, locations, sizes, conditions, and even neighborhood amenities, to offer highly personalized matches based on individual preferences and budgets.

The project's innovative methodology extends beyond mere data analysis, incorporating user-centered design principles to ensure that the platform's interface is intuitive and accessible. This focus on usability is pivotal, as it directly impacts the user experience, potentially influencing the success of the matching process. By prioritizing ease of navigation and comprehension, the project aims to demystify the complexities inherent in the real estate market, thereby empowering users with the confidence to make informed decisions. Moreover, the project acknowledges the significant challenges faced by individuals navigating the real estate landscape, particularly in the face of discrepancies between market offerings and personal criteria. Recognizing that the quality of available listings may not always align with user expectations, the project leverages machine learning to uncover hidden opportunities within the market. This proactive approach ensures that users are exposed to a wider array of possibilities, increasing the likelihood of finding a property that meets their unique needs and preferences.

Product Recognition System for the Visually Impaired

1. *Erdoğan Kayalı*
2. *Harun Adem Temur*
3. *Yiğit Can Akçay*
4. *Veli Melih Kocabaş*

Advisor: Asst. Prof. Dr. Yunus DOĞAN

ABSTRACT:

In recent years, developments in technology have paved the way for innovative solutions that improve the quality of life of disabled individuals. This project aims to develop an artificial intelligence-supported mobile application to assist visually impaired individuals in grocery shopping. This project utilises object detection and QR reading technologies to create a user-friendly and accessible shopping assistant. The mobile application, which enables visually impaired users to recognise products on supermarket shelves with voice commands, provides basic information such as product name, brand, variety and price. The application promotes greater independence and social inclusion for visually impaired individuals by improving the shopping experience. The main objectives of the project are to enable users to carry out their daily activities autonomously, increase their social participation and demonstrate the positive impact of technology on human life.

During the development and testing phases, the specially trained object detection model achieved significant success in terms of precision and recall. The application showed a precision of around 0.8 and a recall of around 0.7 with data preprocessing; it performed well in terms of classification rate and recognition time. In addition, the object detection model used achieved a high Mean Average Precision (mAP) score, indicating precise and consistent product identification. This value is approximately 0.6. These results emphasise the effectiveness of the application in real-world scenarios and provide a reliable tool for visually impaired users to independently navigate grocery shopping. This comprehensive solution is designed to be compatible with existing smartphones, providing affordability and ease of use without requiring additional hardware. The customised approach offers a personalised experience that meets the unique needs of visually impaired users, with a particular focus on grocery shopping.

Stock Price Forecasting Using Machine Learning Algorithms

1. *Yaman Efe Gümüş*

Advisor: Dr. Mustafa ERŞAHİN

ABSTRACT:

In recent years the area of stock market forecasting have seen a notable rise in interest and innovation caused by advancements in technology and data analytics. The proliferation of big data and the integration of sophisticated algorithms have transformed traditional forecasting approaches enabling more elaborate analyses and predictions. The creation of increasingly complex frameworks that incorporate direction and causal connections between stocks as well as price projections is one significant area of focus. To address the difficulties caused by the inherent volatility of the stock market, studies about innovative approaches are being done. Ensemble models like random forest and gradient-boosted regression models are becoming more and more popular because they can improve prediction accuracy by combining the expertise of several different algorithms. Furthermore, directional forecasting has gained popularity as a possible path toward more accurate predictions because it predicts profits and losses rather than specific prices. These systems often involve hybrid models that integrate various techniques. This thesis offers a new prediction model using established methods.

Medical Appointment System

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ABSTRACT:

This project aims to digitize and enhance the appointment scheduling process between healthcare providers and patients by developing a comprehensive online platform. Traditional appointment scheduling methods often involve manual processes, leading to inefficiencies, errors, and inconvenience for both patients and healthcare providers. The proposed solution leverages modern web technologies to create an intuitive and efficient system that improves accessibility and streamlines the appointment booking experience. The platform was developed using PHP and the CodeIgniter framework, adhering to the MVC architecture. It features user-friendly interfaces for both patients and administrators, allowing for easy registration, browsing of available time slots, and appointment scheduling.

The backend supports secure data management and interaction through MySQL, while AJAX is employed for dynamic content loading and interaction. The testing phase included functionality, performance, and security assessments to ensure the platform's reliability and user satisfaction. Results indicated robust performance across all components, with high levels of user satisfaction regarding usability and convenience. The platform's ability to handle concurrent users, secure patient data, and provide automated notifications underscores its potential as a valuable tool in modern healthcare. Overall, this project contributes to the ongoing digital transformation in healthcare, offering a solution that enhances the efficiency and accessibility of medical appointment scheduling across various specialties and clinics.