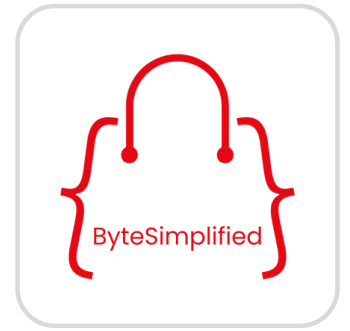


ByteSimplified

# Final-Year Projects Catalog

New Product Year 2024



Version: V24101

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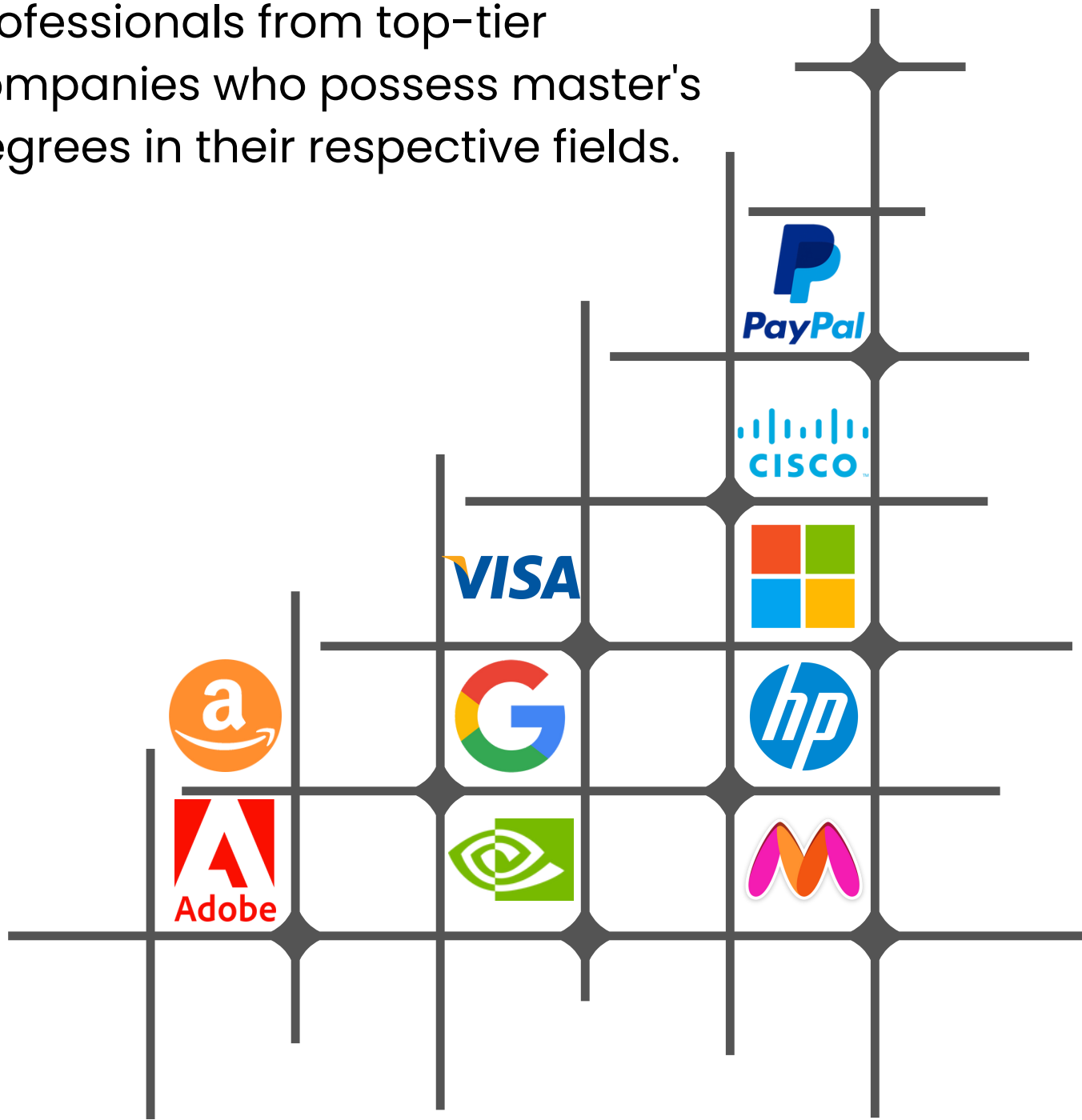
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# Crafted by Industry Professionals

At **ByteSimplified**,

All projects are crafted by working professionals from top-tier companies who possess master's degrees in their respective fields.



# Project Deliverables

1



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Project Repository

2



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Comprehensive  
Documentation

3



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Presentation Slides

4



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Video Lessons

5



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Reference IEEE Docs

6



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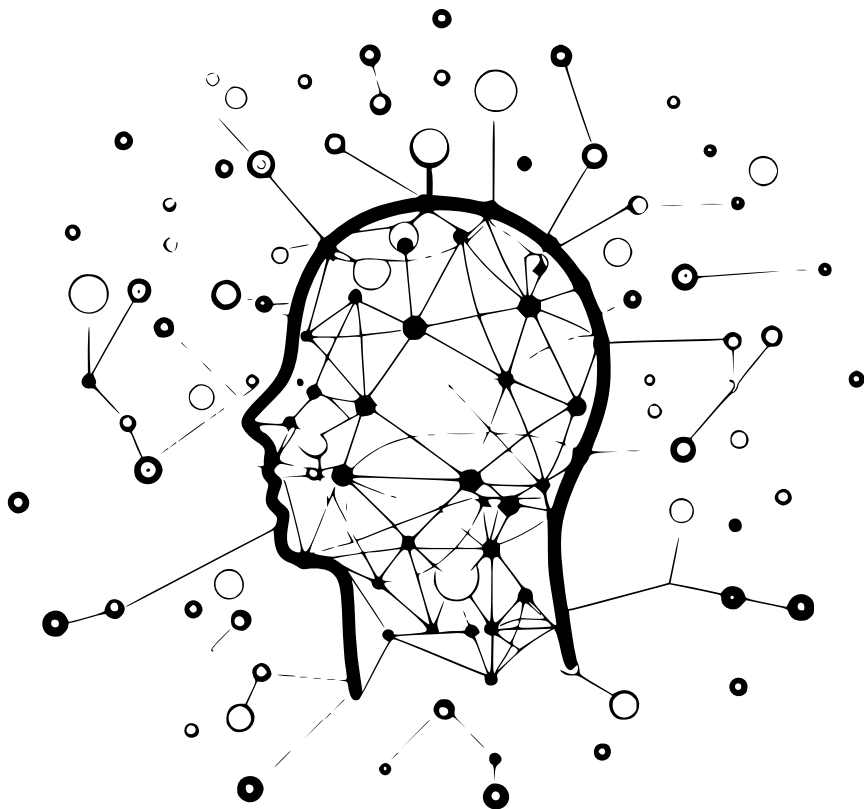
Support 24/7

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PRODUCT

# C O M P U T E R V I S I O N

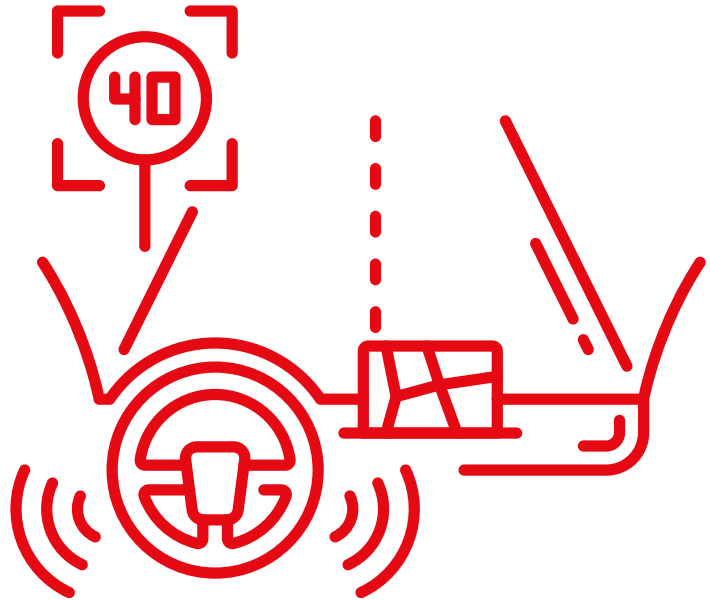
PROJECTS - 2024



# RoadSignVision - Audible and Visual Traffic Sign Recognition System

## Domain

Computer Vision  
Deep Learning  
Transfer Learning  
Autonomous Driving  
Driver Assistance Systems (ADAS)



## Abstract

The Traffic Sign Detection System is a sophisticated machine-learning application designed to enhance real-time traffic sign recognition. Leveraging the capabilities of the EfficientNetB3 model, this system is adept at identifying a wide range of traffic signs with high accuracy. It incorporates an intuitive GUI, developed using the Tkinter framework, to facilitate easy interaction and display of results. Upon recognizing a traffic sign from an uploaded image, the system uses a text-to-speech engine to audibly announce the sign and its classification, thereby assisting in both visual and auditory recognition. This system classifies each detected sign into categories such as mandatory, prohibitory, or danger, among others, based on predefined criteria. It is particularly beneficial for applications in autonomous driving and driver assistance systems, aiming to improve road safety through enhanced situational awareness.

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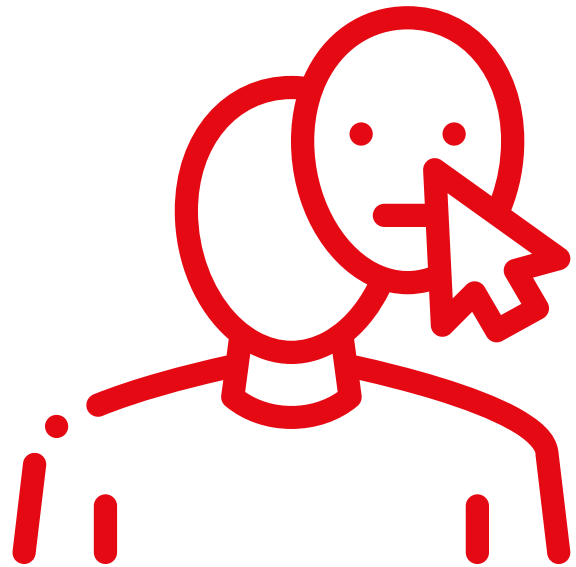


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# DeepfakeDetect - ViT-Based Image Classification System

## Domain

Computer Vision  
Deep Learning  
Transfer Learning  
Ethical AI



## Abstract

The rise of deepfake technology poses significant risks to the integrity and trustworthiness of visual content, as manipulated images and videos become increasingly difficult to distinguish from authentic ones. Addressing this challenge, this project aims to develop a robust deepfake image classification system using Vision Transformers (ViT). The objective is to accurately differentiate between real and fake images by leveraging advanced machine learning models, specifically ViT, which excels in processing visual data. The approach involves training a ViT model on a balanced dataset of real and deepfake images, utilizing techniques like oversampling, image preprocessing, and data augmentation to enhance model performance and generalization. By employing state-of-the-art transformers, the system is designed to handle complex image manipulations, providing a scalable and efficient solution for deepfake detection. This project is particularly relevant for industries concerned with digital media verification, cybersecurity, and content moderation, offering a powerful tool to combat the spread of false information. Unlike traditional methods, the use of ViT allows the system to capture intricate details and patterns, making it highly effective in identifying subtle artifacts of deepfake manipulation. The expected outcome is a high-accuracy deepfake classification model that improves the reliability of digital content verification, thereby enhancing the overall trust in media communications.

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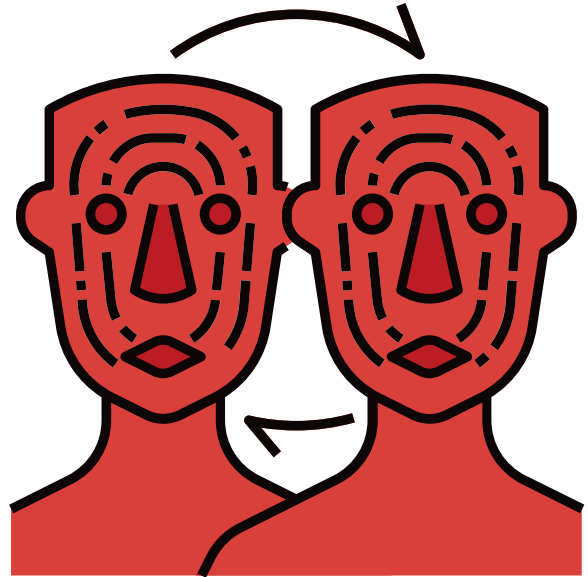


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# DeepfakeDetect - High-Accuracy Classification System for Deepfake Videos

## Domain

Computer Vision  
Deep Learning  
Transfer Learning  
Digital Forensics and Security  
Ethical AI



## Abstract

Deepfake videos pose a significant threat to digital content authenticity, making it crucial to develop reliable methods for detecting manipulated media. This project focuses on creating a Deepfake Video Classification System using advanced deep learning models to distinguish between real and fake videos effectively. The system utilizes a three-tier model approach involving InceptionResNetV2, EfficientNetB4, and VGG16 architectures, each fine-tuned with transfer learning and augmented with data preprocessing techniques to enhance detection accuracy. Video frames are extracted, and faces are detected and resized to standard dimensions before being processed by the models. The project employs various data augmentation strategies, optimizers, and regularization methods to reduce overfitting and improve generalization. Key performance metrics, including accuracy, precision, and recall, are used to evaluate and compare models, with confusion matrices providing detailed insights into classification outcomes. The best-performing model, based on validation accuracy, is selected for deployment, and the system is tested on sample videos to demonstrate its efficacy. This comprehensive approach ensures that the developed system is robust, scalable, and capable of real-time deepfake detection, offering a valuable tool in the fight against media manipulation.

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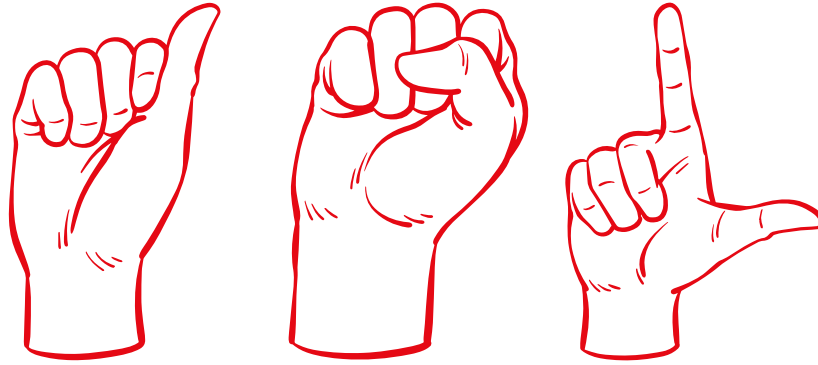
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# ASLTranslator - Real-Time ASL to Alphabet Converter with Google MediaPipe



## Domain

Machine Learning

Computer Vision

Human-Computer Interaction (HCI)

## Abstract

Communication between Deaf individuals and non-ASL speakers is often hindered by the complexity of American Sign Language (ASL) gestures, limiting accessibility in various settings. This project aims to develop a real-time ASL Sign-to-Alphabet Converting System that translates ASL signs into written English alphabet characters, enhancing communication between ASL users and non-users. Utilizing Google MediaPipe's advanced hand tracking and gesture recognition capabilities, the system employs machine learning and computer vision techniques to accurately map hand gestures to English letters. This solution is beneficial for educational, healthcare, and public service environments, improving accessibility and inclusivity. Unlike existing solutions, this project offers a real-time, high-accuracy translation system that is scalable across mobile and web platforms, bridging the communication gap between Deaf and hearing communities.

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# LanePilot - AI-Powered Lane Keep Assist System

## Abstract

Driving safely and autonomously requires the constant identification of lane lines, a critical reference for steering a vehicle. To enable self-driving systems to achieve this capability, this project aims to develop a robust lane line detection solution using computer vision techniques. The project utilizes Python and OpenCV to create a pipeline that processes images and video streams to detect and visualize lane boundaries. Key techniques include color selection, region masking, grayscale conversion, Gaussian smoothing, Canny edge detection, and Hough Transform. The resulting lane line segments are then averaged, extrapolated, and overlaid on the image for visualization. This solution aims to be a crucial component in autonomous vehicle systems, providing reliable lane detection in real-time scenarios. The methods employed ensure simplicity while maintaining high accuracy without relying on deep learning. The potential application of this work includes autonomous vehicle navigation and advanced driver-assistance systems, offering a vital step towards improved road safety and efficient lane management.



## Doamin

Driver-Assistance Systems (ADAS)

Computer Vision

Image Processing

Autonomous Vehicles

Deep Learning

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# FocusFleet - Real-Time Driver Drowsiness and Distraction Detection

## Abstract

Driving under the influence of fatigue or distraction is a significant cause of road accidents, highlighting the need for effective monitoring systems. This project aims to develop a driver drowsiness and distraction detection system using advanced computer vision and machine learning techniques. The system continuously monitors the driver's facial features and behavioral cues, including eye closure rate, yawning, and head orientation, using real-time video feeds. By analyzing these features, the system can detect signs of drowsiness and distraction and trigger alerts to help prevent accidents. The detection algorithms leverage deep learning models for facial landmark recognition and feature extraction, ensuring high accuracy in a variety of lighting and driving conditions. This project is especially relevant for enhancing road safety in the automotive industry, providing a vital component for advanced driver-assistance systems (ADAS) and fleet management solutions aimed at reducing fatigue-related incidents.



## Doamin

Driver-Assistance Systems (ADAS)  
Computer Vision  
Image Processing  
Autonomous Vehicles  
Deep Learning

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# C Y B E R S E C U R I T Y

PROJECTS - 2024



# BreachDefender - A Data Breach Avoidance System Based on Honeypot Strategy

## Domain

Information Security

Cloud Computing

Machine Learning

Intrusion Detection Systems (IDS)

User and Entity Behavior Analytics (UEBA)



## Abstract

Data breaches have become one of the most pressing concerns for businesses and individuals in the digital age. With the continuous advancement of cyber-attack techniques, traditional security measures often fall short. This calls for a proactive approach to data protection. One such method that has gained traction is the honeypot strategy, which serves as a decoy to attract and detect cyber threats. The proposed Data Breach Avoidance System leverages the Honeypot Strategy to provide a proactive cybersecurity framework specifically designed for the MyBankCardsManager app. By deploying a sacrificial database alongside the original one, the system distracts would-be attackers, effectively monitoring and mitigating cyber threats. The architecture is built on MS Azure SQL Server and employs machine learning algorithms, Intrusion Detection Systems (IDS), and User and Entity Behavior Analytics (UEBA) to offer a robust security solution.

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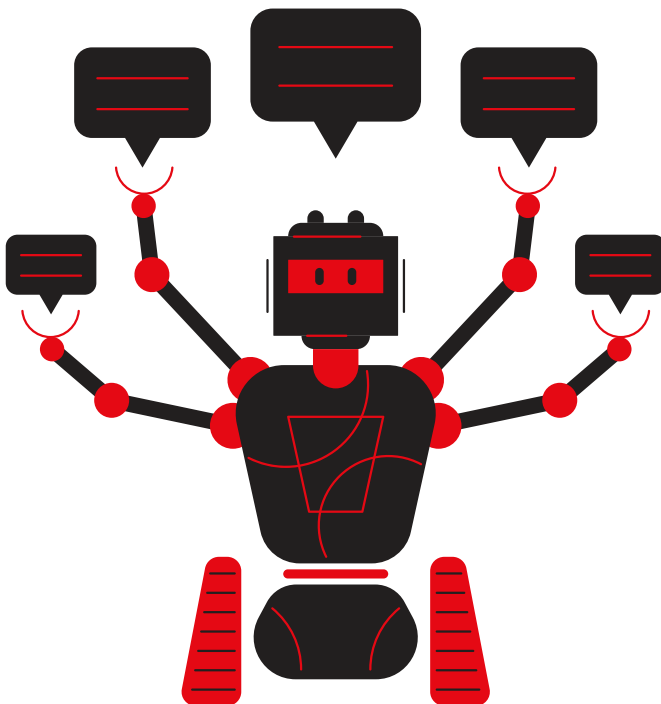


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# RoboCipher - AI-Powered Communication Framework for Autonomous Robotic Systems

## Abstract

The project aims at bolstering the security framework within autonomous robotic systems by devising and implementing AI-driven encrypted communication protocols. In the face of evolving security threats, traditional cryptographic methods may falter, making a case for intelligent, adaptive solutions. The project explores the fusion of machine learning models with encryption mechanisms to foster a dynamically secure communication environment among robotic entities. Through a series of simulated and real-world tests, the proposed protocols demonstrated a significant enhancement in thwarting security threats and ensuring seamless communication. The successful implementation underscores the potential of AI in advancing the security landscape of autonomous robotic networks, laying a solid foundation for more secure, reliable, and intelligent robotic ecosystems in the future.



## Doamin

Cybersecurity  
Machine Learning  
Robotics  
Cryptography  
Network Security

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# URLAnalyzer - Deep Insights into Malware Website Detection

## Abstract

The increasing prevalence of cyber threats, such as phishing and malware attacks, poses significant risks to individuals and organizations alike, making data breaches one of the most pressing security concerns in the digital era. Traditional security measures often fail to keep pace with sophisticated attack strategies, highlighting the need for more advanced, adaptive solutions. The URLAnalyzer project aims to address this challenge by developing a robust tool that leverages machine learning and web scraping techniques to detect and classify potentially malicious websites. The objective is to create a system that accurately identifies phishing and malware-laden URLs, thereby reducing the risk of cyber threats. The approach involves collecting a diverse dataset of URLs from trusted sources, extracting features such as domain characteristics, SSL/TLS certificate status, and traffic patterns, and applying advanced machine learning models for real-time URL analysis. By providing deep insights and categorizing URLs based on their potential for malicious content, this project is particularly beneficial for cybersecurity professionals, organizations, and general users seeking to enhance their online safety. The unique integration of machine learning and comprehensive feature analysis sets URLAnalyzer apart, offering a proactive security measure that evolves with the dynamic landscape of online threats. The expected outcome is a user-friendly tool that delivers accurate, real-time assessments of URL safety, empowering users to make informed decisions and bolstering overall cybersecurity defenses.

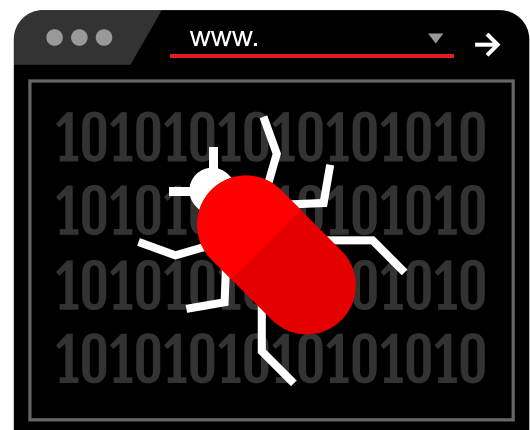
## Domain

Cybersecurity

Deep Learning

Network Security

Natural Language Processing (NLP)



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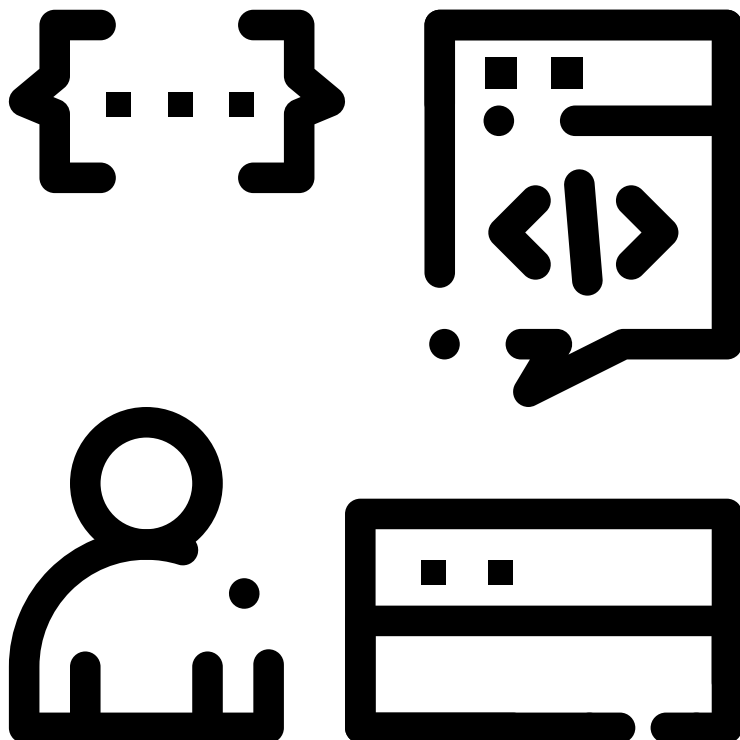
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S O F T W A R E  
E N G I N E E R I N G

PROJECTS - 2024



# TAMatch - Smart Teaching Assistant (TA) Application and Management Suite

## Abstract

TA Management Suite, a sophisticated platform tailored to enhance teaching assistant (TA) management within educational settings. This system aims to streamline TA applications, assignments, and evaluations through a unified, technology-driven approach. The suite will feature secure, role-based access and integrate cutting-edge data management technologies, leveraging tools such as Azure and Python within a robust web development framework. The anticipated benefits of this suite include significantly improved operational efficiency, an enhanced user experience for TAs, instructors, and administrative personnel, and a robust and secure data handling mechanism. This project addresses crucial needs in educational administration by automating and optimizing the management of TA resources, thus promising to markedly enhance both administrative operations and educational outcomes.



## Doamin

Web Development  
Cloud Computing  
Database Management  
Software Engineering

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# ShipSecure - Blockchain-Enhanced Shipment Management and Tracking System

## Abstract

The Blockchain-Enhanced Shipment Management and Tracking System is a project designed to augment the security, transparency, and efficiency of postal services through blockchain technology. Utilizing a simplified Hyperledger framework, developed in Python, the system aims to create an immutable ledger for recording shipment data. This setup, by supporting permissioned access control, crucial for safeguarding sensitive shipment information, and employs efficient, customizable consensus mechanisms for faster, real-time transaction processing, will provide a clear and trustworthy tracking mechanism, reducing risks like theft and fraud, and improving overall logistics efficiency. The project's end goal is a user-friendly web application that serves various stakeholders—enabling consumers to track shipments in real time, allowing sellers to list products, and facilitating logistics companies in updating shipment statuses. With phases encompassing research, development, testing, deployment, and maintenance, the project aspires to enhance customer satisfaction, streamline postal operations, and provide a reliable platform for all users involved in the shipping process.

## Doamin

Web Development

Blockchain

Database Management

Software Engineering

Supply Chain



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# NFTicket - Secure NFT-Based Event Ticketing System

## Abstract

Traditional event ticketing systems face issues like fraud, counterfeiting, and lack of personalization, which impact security and user experience. "Innovating Event Ticketing: A Python-based NFT Ticketing System" aims to address these challenges by integrating Non-Fungible Tokens (NFTs) into the ticketing process, providing secure, verifiable, and collectible digital tickets. This project uses Python and blockchain technology to mint NFT tickets, manage transactions via smart contracts, and offer a user-friendly interface for purchasing, transferring, and managing tickets. By enhancing ticket authenticity and engagement, this system benefits event organizers and attendees, creating new opportunities for personalized and premium event experiences. Unlike existing solutions, this approach combines blockchain's security with event ticketing, reducing fraud and enhancing the overall ticketing process, setting a new standard for the industry. The expected outcome is a scalable, efficient NFT-based ticketing platform that improves security and user engagement in the digital age.



## Domain

Blockchain/ NFT  
Cryptography and Security  
Web Development  
Database Management  
Software Engineering

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# SavePlate - Comprehensive Food Management and Waste Reduction System

## Abstract

Food waste is a significant global issue, leading to environmental harm and economic losses. SavePlate is a comprehensive Food Management and Waste Reduction System designed to mitigate this problem by providing an integrated platform for managing surplus food, optimizing inventory, and facilitating efficient coordination among stakeholders. The system features role-based access control, real-time notifications, and detailed analytics to streamline operations. Built using a Model-View-Controller (MVC) architecture with Flask for the backend, SQLite3 for the database, and HTML, CSS, and JavaScript for the frontend, SavePlate ensures a user-friendly and responsive interface. It serves diverse user roles, including administrators, managers, staff, volunteers, and external posters, each with tailored functionalities to meet their specific needs. By incorporating data visualization tools like Chart.js, the platform offers insightful reports and analytics, enabling informed decision-making and effective monitoring of food distribution and waste metrics. SavePlate's holistic integration of multiple functionalities promotes collaboration, transparency, and sustainability within the food management ecosystem. By automating key processes and delivering actionable insights, SavePlate aims to significantly reduce food waste, enhance surplus food distribution, and contribute to a more sustainable and efficient food management system.



## SAVEPLATE

## Domain

Software Engineering  
Web Development  
Database Management  
Inventory Management

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# Snapster - Privacy-First Social Media Platform

## Abstract

Social media platforms today are largely centralized, creating significant challenges regarding data privacy, user control, and scalability. These centralized models often expose users to data breaches, limit ownership over their content, and result in scalability bottlenecks as platforms grow. This project aims to develop SNAPSTER™, a decentralized social media platform that empowers users by enabling peer-to-peer (P2P) content sharing, enhancing data privacy, control, and scalability through blockchain and IPFS (InterPlanetary File System) technology. The application will be developed using IPFS for decentralized content storage and blockchain to ensure data security, privacy, and content ownership, while Android development tools will be used to create a robust and user-friendly mobile application. This decentralized social media platform will benefit a diverse range of users, including content creators and consumers, by giving them complete control over their data, minimizing reliance on centralized servers, and introducing an incentivization model that rewards user engagement. Unlike existing social media platforms, SNAPSTER™ offers a unique, user-centric approach by eliminating the need for centralized data storage, thereby reducing costs, enhancing security, and allowing users to maintain complete control over their digital presence. The expected impact of SNAPSTER™ is to create a secure, scalable, and user-driven social media ecosystem that addresses existing concerns regarding data privacy, while encouraging user engagement through a transparent rewards system.



**Snapster**

## Domain

Mobile Application Development (Android)  
Software Engineering  
Peer-to-Peer (P2P) Communication  
Social Media and Networking  
Decentralized Systems

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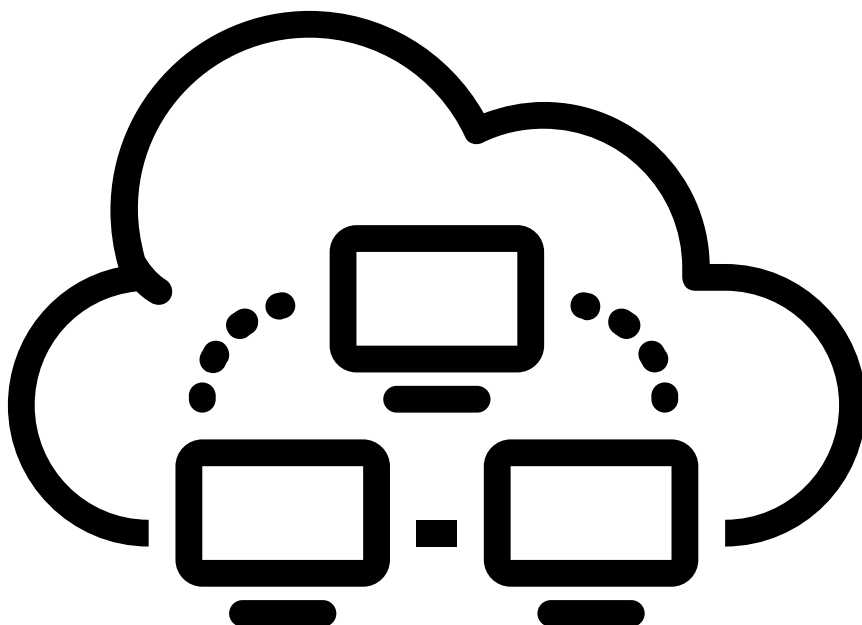
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DOMAIN: AI/ML

PRODUCT

# C L O U D C O M P U T I N G

PROJECTS - 2024



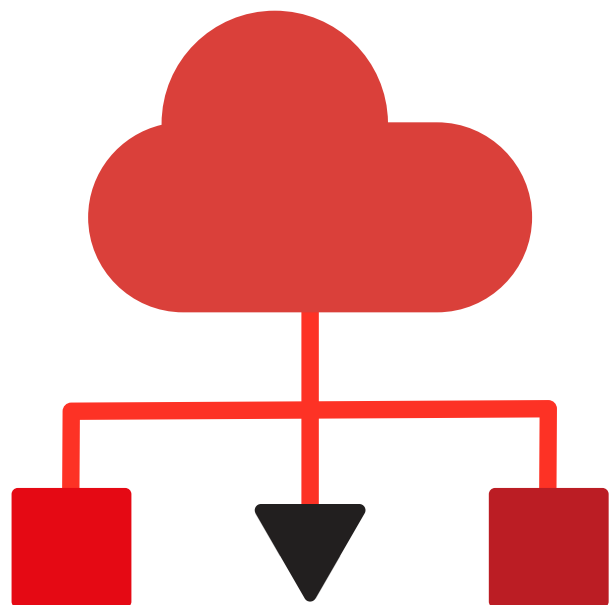
# RLLoadBalancer - Intelligent Cloud Load Balancer with Reinforcement Learning

## Abstract

Efficient load balancing is essential in cloud computing to ensure optimal performance and resource utilization across multiple servers. Traditional load balancing methods often rely on static rules, making them inadequate for the dynamic and fluctuating nature of cloud environments. This project aims to develop a Reinforcement Learning (RL)-based cloud load balancer that dynamically adjusts its traffic distribution strategy in real-time, addressing key challenges such as server overloading, underutilization, and increased latency. By leveraging RL algorithms, the load balancer will continuously learn and adapt to changing network conditions and user demands, optimizing server selection to minimize latency and maximize resource utilization. The system's scalability and efficiency will be evaluated using the Google Cluster Data 2019 Sample, demonstrating its ability to handle high traffic volumes and large server pools effectively. The expected outcome is a cloud load balancer that significantly outperforms traditional methods by providing adaptive, efficient, and scalable traffic management, thus advancing cloud resource management and performance.

## Domain

Reinforcement Learning  
Cloud Computing  
Data Analysis and Simulation  
Network Management



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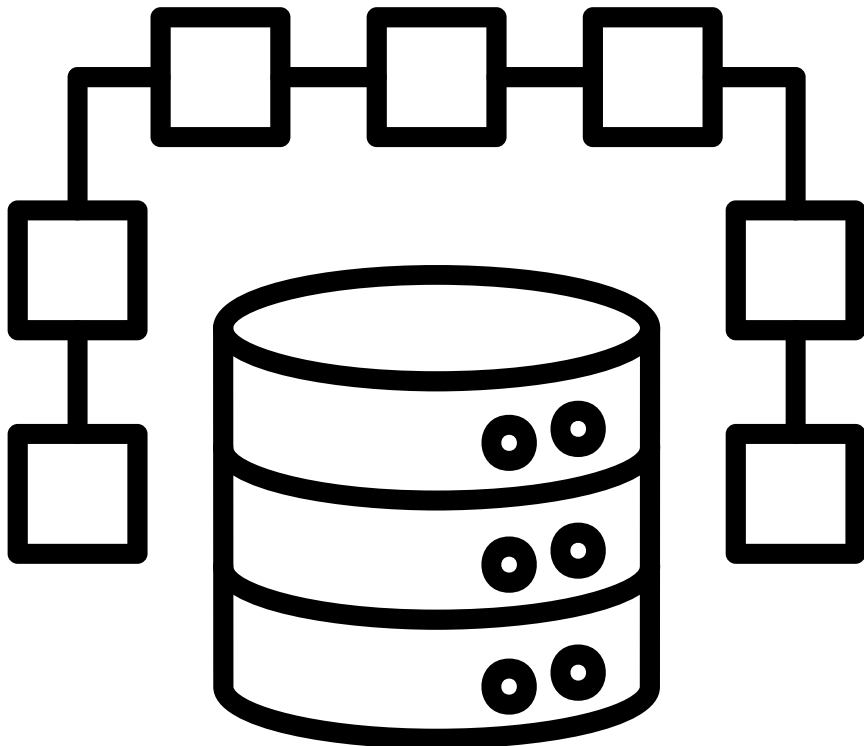
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DOMAIN: AI/ML

PRODUCT

# B I G D A T A

PROJECTS - 2024



# StreamTrack - Dynamic User Behavior Analytics Using Kafka for Shipment Tracking

## Domain

Big Data Analytics (BDA)

Data Engineering

Logistics and Transportation Technology

Data Visualization



## Abstract

Traditional batch processing methods in shipment tracking systems often suffer from high latency and limited real-time insights, hindering stakeholders' ability to respond promptly to operational issues and user needs. This project implements and compares batch processing and Kafka-based streaming approaches for user behavior analytics within a shipment tracking system. By analyzing simulated user behavior data across various user types—including consumers, sellers, logistics companies, and administrators—using Python with Pandas for batch processing and integrating Apache Kafka for real-time data streaming, the project demonstrates the advantages of real-time data processing. Visualization tools like Matplotlib and Seaborn are utilized to provide actionable insights. The integration of Kafka-based streaming enables immediate insights, improving operational efficiency, enhancing customer experiences, and facilitating informed decision-making through real-time analytics. The project showcases significant improvements in latency (from 2000 ms in batch processing to 100 ms with Kafka streaming) and increased throughput, highlighting the importance of adopting real-time data processing technologies in modern shipment tracking systems to meet the demands of dynamic supply chain environments.

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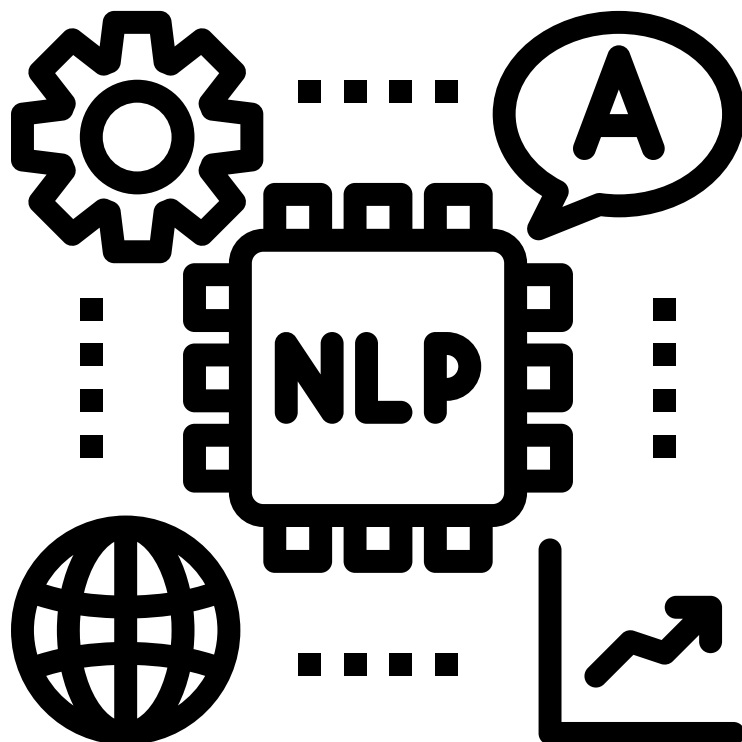
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DOMAIN: AI/ML

PRODUCT

# N A T U R A L L A N G U A G E P R O C E S S I N G

PROJECTS - 2024



# ReviewSense - Aspect-Based Sentiment Analysis of Product Reviews

## Abstract

E-commerce platforms often struggle to extract actionable insights from vast volumes of unstructured customer reviews, which typically lack specific categorizations beyond overall sentiment. This project addresses this challenge by developing an analytical tool that integrates both BERT (Bidirectional Encoder Representations from Transformers) and GPT-2 (Generative Pretrained Transformer 2) models for dual sentiment analysis and aspect-based categorization of reviews. By leveraging BERT's deep contextual understanding for precise aspect extraction and sentiment classification, and integrating GPT-2's generative capabilities to enhance aspect term prediction and handle complex language patterns, the tool classifies Amazon product reviews into sentiments—positive, negative, or neutral—and categorizes feedback into specific aspects such as Product Quality, Price, Usability, Performance, User Experience, Customer Service, Design, Features, Accessibility, Durability, and Shipping. Utilizing advanced NLP techniques, the project combines these models within a Python-based backend, employs PostgreSQL or MongoDB for efficient data management, and features a ReactJS or VueJS frontend for visualizing insights. This approach is particularly relevant for e-commerce businesses aiming to enhance product development and customer service through detailed, aspect-specific insights. Unlike traditional methods focusing solely on overall sentiment, this project uniquely combines the strengths of BERT and GPT-2 to transform unstructured review data into a strategic resource for data-driven decision-making, ultimately leading to improved customer satisfaction and more informed business strategies.

## Domain

Natural Language Processing (NLP)  
Deep Learning  
E-commerce Analytics  
Data Science



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# SupportBERT - Automated Ticket Routing System through Topic Modeling in Customer Support

## Abstract

Customer support centers often struggle with efficiently routing incoming queries to the appropriate departments, leading to delays and decreased customer satisfaction. This project aims to develop an automated ticket routing system that utilizes advanced natural language processing techniques, specifically BERT (Bidirectional Encoder Representations from Transformers) and topic modeling algorithms, to analyze and categorize customer queries in real-time. By employing BERT for deep semantic understanding and combining it with topic modeling, the system can accurately classify queries based on their content and context, automatically directing them to the relevant department or providing instant solutions if the issue has been previously addressed. This approach not only enhances operational efficiency by reducing manual triage efforts but also improves customer experience through faster response times. The innovative integration of state-of-the-art NLP models like BERT distinguishes this system from traditional keyword-based methods, offering higher accuracy and adaptability to diverse and evolving customer inquiries. The expected outcome is a scalable, intelligent routing solution that optimizes support workflows and elevates overall service quality.

## Domain

Natural Language Processing (NLP)  
Deep Learning  
Text Classification  
Data Science



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# HRHiveBot - An AI ChatBot for HR Related Questions

## Domain

Natural Language Processing (NLP)  
Deep Learning



## Abstract

In recent years, natural language processing (NLP) has seen a lot of advancements thanks to deep learning models such as BERT (Bidirectional Encoder Representations from Transformers). These models can be fine-tuned on specific tasks to achieve state-of-the-art results. One such task is question answering, where the goal is to provide a concise answer to a question posed in natural language. In this project, we build a simple Employee Experience bot using the pre-trained BERT model. The bot is able to answer HR-related questions asked by the user in natural language.

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# QuickUniSearch - An NLP-Powered Search Engine for the University Website

## Abstract

The proliferation of digital content on university websites poses a significant challenge in efficiently accessing specific information. Traditional search mechanisms often fail to interpret the complex and context-rich academic content, resulting in ineffective information retrieval. This project proposes the development of an NLP-powered search engine tailored specifically for a university's website, designed to enhance the accuracy and relevance of search results. The system utilizes Selenium for dynamic web scraping of university pages and implements advanced algorithms such as TF-IDF, BM25, and vector space models to process user queries. Upon receiving a query, the system lists the top relevant URLs of the university's webpages, along with a relevance score and justification for each result, providing users with a clear rationale for the suggested links. This approach aims to create an efficient, user-friendly tool that caters to the diverse informational needs of students, faculty, and visitors, significantly improving the digital experience by facilitating access to the most relevant academic content.

## Domain

Natural Language Processing (NLP)  
Deep Learning  
Web Development  
Web Scraping



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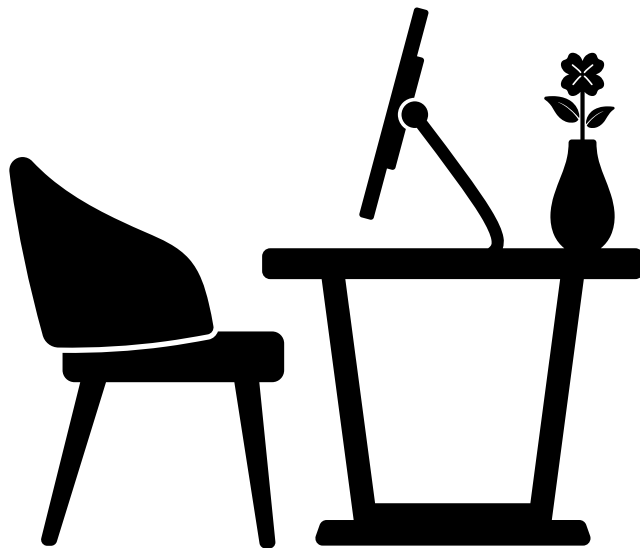
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