

نخستین کنفرانس بین المللی هوش مصنوعی و خودروی هوشمند دانشگاه صنعتی امیرکبیر ۳ و ۴ خرداد ۱۴۰۲



International Conference on Artificial Intelligence and Smart Vehicle (ICAISV)

The International Conference on Artificial Intelligence and Smart Vehicle (ICAISV-2023) is hosted by the Amirkabir University of Technology. ICAISV-2023 will be held as a hybrid conference (in-person and virtual), with the physical conference conducted in Tehran, Iran, at May 24-25, 2023.

#### **CONFERENCE GOALS**

The purpose of the International Conference on



Artificial Intelligence and Smart Vehicles is to create a forum to collaborate by researchers, engineers, and professionals interested in the artificial intelligence and the advanced technologies of smart vehicles and intelligent transportation systems. This conference focuses on innovative tools of artificial intelligence such as machine learning, data mining, machine vision, image processing, signal analysis, DSS and expert systems, and their applications in smart vehicles. Data analyzing on vehicles black-box, ECUs, cellphones, smartwatches and wireless communications for pedestrians and vehicle safety are highly acknowledged. Connected vehicles advances by considering V2V, V2I and V2X connections are also welcome. In addition, smart manufacturing and data mining for vehicle designing and marketing are also our focus. Finally, intelligent infrastructures in roads and control centers to improve vehicle movement are also included in the specialized areas of the conference.



#### HOT TOPICS

3.

5.

- 1. Artificial intelligence methods
- 2. Machine learning applications
  - Image processing
- 4. Intelligent Transportation Systems (ITS)
  - Smart roads
- 6. Driver assistant systems
- 7. Electric & hybrid electric vehicles
- 8. Connected vehicles
- 9. Autonomous vehicles

10. Safety systems for vehicles, cyclists,

motorcyclists, and pedestrians

ICAISV-2023, Department of Mathematics and Computer Science, Amirkabir University of Technology, No. 350, Hafez Ave, Tehran, 15875-4413, Iran aismartvehicle.aut.ac.ir aismartvehicle@aut.ac.ir +98 21 6454 2501





نخستین کنفرانس بین المللی هوش مصنوعی و خودروی هوشمند دانشگاه صنعتی امیرکبیر ۳ و ۴ خرداد ۱۴۰۲

#### **CONFERENCE CHAIRS**

Professor Mehdi Ghatee & Professor S. Mehdi Hashemi with Department of Computer Science, Faculty of Mathematics and Computer Science, Amirkabir University of Technology (Tehran Polytechnic), Iran

#### **KEYNOTE SPEAKERS**

• Dr. Mahdi Rezaei

Associate Professor, Leader of Computer Vision & Safety Group, Institute for Transport Studies, University of Leeds, UK.

• Dr. Nima Mohajerin

Senior Research Lead at Nuro AI, California, US

• Dr. Mohammad Pirani

Department of Mechanical and Mechatronics Engineering, University of Waterloo, Toronto, Canada

• Dr. Hamze Zakeri

Head of the Center for the Development of Education, Studies and Innovation, Iran Road Maintenance & Transportation Organization, Iran

• Dr. Mohammad Mahdi Bejani

NORC Member, Department of Computer Science, Faculty of Mathematics and Computer Science, Amirkabir University of Technology (Tehran Polytechnic), Iran

### Thanks in advance to our generous sponsors:



ICAISV-2023, Department of Mathematics and Computer Science, Amirkabir University of Technology, No. 350, Hafez Ave, Tehran, 15875-4413, Iran aismartvehicle.aut.ac.ir aismartvehicle@aut.ac.ir +98 21 6454 2501



نخستین کنفرانس بین المللی هوش مصنوعی و خودروی هوشمند دانشگاه صنعتی امیرکبیر ۳ و ۴ خرداد ۱۴۰۲



International Conference on Artificial Intelligence and Smart Vehicle (ICAISV)

### **Key Speakers**



### Dr. Mahdi Rezaei

Associate Professor, Leader of Computer Vision & Safety Group, Institute for Transport Studies, University of Leeds, UK

#### ICAISV-2023

### Local and Global Contextual Features Fusion for Pedestrian Intention Prediction

**Biography:** Dr Mahdi Rezaei is an Associate Professor of Computer Science and a University Academic Fellow at the Institute for Transport Studies, University of Leeds. Dr Rezaei has a background in AI, Computer Vision, and Machine Learning and obtained his PhD from the University of Auckland, New Zealand. Having over 15 years of experience in academia and industry his primary research focus is the application of Computer Vision and ML in Autonomous Vehicles, Smart Cars, and Driver/Occupant Behaviour Monitoring. He is a member of the Academic Advisory Group in the LIDA data scientist development programme (LIPAG), and also an executive member of the "Universities Transport Study Group" (UTSG). Dr Rezaei has contributed as a PI or lead discipline CoI in various European and UK-funded projects, totalling over £3 million.

ICAISV-2023, Department of Mathematics and Computer Science, Amirkabir University of Technology, No. 350, Hafez Ave, Tehran, 15875-4413, Iran aismartvehicle.aut.ac.ir aismartvehicle@aut.ac.ir +98 21 6454 2501



نخستین کنفرانس بین المللی هوش مصنوعی و خودروی هوشمند دانشگاه صنعتی امیرکبیر ۳ و ۴ خرداد ۱۴۰۲



Abstract: Autonomous vehicles (AVs) are becoming an indispensable part of future transportation. However, safety challenges and lack of reliability limit their real-world deployment. Towards boosting the appearance of AVs on the roads, the interaction of AVs with pedestrians including "prediction of the pedestrian crossing intention" deserves extensive research. This is a highly challenging task as involves multiple non-linear parameters. In this direction, we extract and analyse spatio-temporal visual features of both pedestrian and traffic contexts. The pedestrian features include body pose and local context features that represent the pedestrian's behaviour. Additionally, to understand the global context, we utilise location, motion, and environmental information using scene parsing technology that represents the pedestrian's surroundings, and may affect the pedestrian's intention. Finally, these multi-modality features are intelligently fused for effective intention prediction learning. The experimental results of the

proposed model on the JAAD dataset show a superior result on the combined AUC and F1-score compared to the state-of-the-art.

ICAISV-2023, Department of Mathematics and Computer Science, Amirkabir University of Technology, No. 350, Hafez Ave, Tehran, 15875-4413, Iran aismartvehicle.aut.ac.ir aismartvehicle@aut.ac.ir +98 21 6454 2501



نخستین کنفرانس بین المللی هوش مصنوعی و خودروی هوشمند دانشگاه صنعتی امیرکبیر ۳ و ۴ خرداد ۱۴۰۲



International Conference on Artificial Intelligence and Smart Vehicle (ICAISV)

0



Dr. Nima Mohajerin

Senior Research Lead at Nuro Al, California, US

ICAISV-2023

# Long-Tail Learning and Out-of-Distribution Detection in Autonomous Driving

**Biography:** 

Nima Mohajerin is an accomplished researcher and engineer with a keen interest in the intersection of Machine Learning and Robotics. He has been an active participant in the Autonomous Vehicle industry and academia since 2012, where he has made significant contributions to the research and development of cutting-edge technologies. Currently, he serves as a Senior Research Lead at Nuro AI, a position he assumed after serving as a Senior ML researcher in Microsoft Applied Science Group (ASG). Nima obtained his B.Sc in Electrical Engineering from Shahid Beheshti University in 1998, and his M.Sc in Control from Amirkabir University in 2003. After several years of experience in the automobile industry in Iran, he moved to Sweden and joined AASS labs in Orebro Sweden, where he obtained another M.Sc in Computer Science and Robotic Intelligent Systems in 2012. Nima then relocated to Canada, where he obtained his Ph.D. in the Mechatronics and Mechanical Engineering department of

ICAISV-2023, Department of Mathematics and Computer Science, Amirkabir University of Technology, No. 350, Hafez Ave, Tehran, 15875-4413, Iran aismartvehicle.aut.ac.ir aismartvehicle@aut.ac.ir +98 21 6454 2501



نخستین کنفرانس بین المللی هوش مصنوعی و خودروی هوشمند دانشگاه صنعتی امیرکبیر ۳ و ۴ خرداد ۱۴۰۲



the University of Waterloo in 2017.Throughout his career, Nima has gained considerable expertise in various ML methods, including RNNs, Bayesian Inference, Generative models, Reinforcement Learning, Fuzzy Logic Controllers, Density Estimation, among others. His primary research interests revolve around the application of these techniques to solve complex problems in the Robotics field.

Abstract: Supervised Learning (SL) is predominantly the most often employed method in most of Machine Learning approaches in industry. One reason, perhaps, is the fact that collecting and labeling more data is always available and high-end processing power is more accessible. However, in applications where the ML algorithm must interact with the physical world, there is another important factor in play; that is, the rareness of objects and events. Examples include: unexpected objects on road (e.g., a tree branch), accidents scenes, parades, construction sites, etc. However, a rare event or object usually requires a dramatic change in the expected behaviour of the ego vehicle, hence, should be peroperly detected by the onboard system. The main challenges in detecting rare objects/events are the imbalance in the training dataset and, by nature, the limited amount of information that is carried by the training set. In this talk, the problem of Long-Tail Learning and Out-of-Distribution detection is introduced and state-of-the-art will be briefly summarized.

ICAISV-2023, Department of Mathematics and Computer Science, Amirkabir University of Technology, No. 350, Hafez Ave, Tehran, 15875-4413, Iran aismartvehicle.aut.ac.ir aismartvehicle@aut.ac.ir +98 21 6454 2501



نخستین کنفرانس بین المللی هوش مصنوعی و خودروی هوشمند دانشگاه صنعتی امیرکبیر ۳ و ۴ خرداد ۱۴۰۲



International Conference on Artificial Intelligence and Smart Vehicle (ICAISV)

0



### Dr. Mohammad Pirani

Department of Mechanical and Mechatronics Engineering, University of Waterloo, Toronto, Canada

ICAISV-2023

# Resilience of connected vehicles: a control-theoretic approach

**Biography:** Mohammad Pirani is a research assistant professor with the Department of Mechanical and Mechatronics Engineering, University of Waterloo. Before that, he held postdoctoral research positions at the University of Toronto (from 2019 to 2021) and KTH Royal Institute of Technology, Sweden (2018 to 2019). He received his M.A.Sc. in Electrical and Computer Engineering and Ph.D. in Mechanical and Mechatronics Engineering, both from the University of Waterloo, Canada, in 2014 and 2017, respectively. His research interests include resilient and secure networked control systems with applications to intelligent transportation systems and multi-agent systems. He is a member of the IEEE-CSS technical committee on smart cities.

**Abstract:** Recent developments in embedded computing systems, sensor technologies, communication devices, and artificial intelligence has changed the face of driving from completely manual to autonomous and connected vehicles. While this transformation has

ICAISV-2023, Department of Mathematics and Computer Science, Amirkabir University of Technology, No. 350, Hafez Ave, Tehran, 15875-4413, Iran aismartvehicle.aut.ac.ir aismartvehicle@aut.ac.ir +98 21 6454 2501



نخستین کنفرانس بین المللی هوش مصنوعی و خودروی هوشمند دانشگاه صنعتی امیرکبیر ۳ و ۴ خرداد ۱۴۰۲



driven major advancements in efficiency and safety, it has also introduced a range of new potential risks. As the scale of connected vehicles, in both intra and inter-vehicle networks, increases and interactions between different subsystems become more sophisticated, questions of their resilience to a spectrum of failures increase in importance. Human intervention in those systems increases this complexity, especially when it comes in the form of an adversary. In this talk, we first introduce two challenges we face in studying the resilience of connected vehicles: 1) Classical robust and fault-tolerant control techniques may not be sufficient to address the resilience of connected vehicles against certain type of failures, 2) The impact of the underlying vehicle network topology on the resilience of connected vehicles against failures is not well quantified. To address these two challenges, we 1) Extend the concept of fault detection and fault tolerance in control systems to incorporate strategic adversarial actions, using tools from systems theory, game theory, and graph theory, and 2) Reinterpret some notions of resilience in the language of graphs, using tools from graph theory and structured systems theory. Finally, some of our active research projects and industrial collaborations in safe and secure vehicle autonomy will be briefly explained.

ICAISV-2023, Department of Mathematics and Computer Science, Amirkabir University of Technology, No. 350, Hafez Ave, Tehran, 15875-4413, Iran aismartvehicle.aut.ac.ir aismartvehicle@aut.ac.ir +98 21 6454 2501



#### Clustering of Urban Traffic Patterns by K-Means and Dynamic Time Warping: Case Study

Sadegh Etemad, Raziyeh Mosayebi, Tadeh Alexani Khodavirdian, Elahe Dastan, Amir Salari Telmadarreh, Mohammadreza Jafari and Sepehr Rafiei Map Data Chapter, Snapp Map Team, Snapp Company, Tehran, Iran

Abstract: Clustering of urban traffic patterns is an essential task in many different areas of traffic management and planning. In this paper, two significant applications in the clustering of urban traffic patterns are described. The first application estimates the missing speed values using the speed of road segments with similar traffic patterns to colorify map tiles. The second one is the estimation of essential road segments for generating addresses for a local point on the map, using the similarity patterns of different road segments. The speed time series extracts the traffic pattern in different road segments. In this paper, we proposed the time series clustering algorithm based on K-Means and Dynamic Time Warping. The case study of our proposed algorithm is based on the Snapp application's driver speed time series data. The results of the two applications illustrate that the proposed method can extract similar urban traffic patterns.

**Keywords:** Urban Traffic Pattern · Clustering · K-Means · Dynamic Time Warping · Snapp.

**زمان ارایه** چهارشنبه، ۳ خرداد ۱۴۰۲ ۱۱:۳۰ – ۱۱:۵۰ (به وقت محلی تهران)



#### A novel MEC-enabled blockchain-based system architecture for smart vehicles data privacy: A deep reinforcement learning approach

Komeil moghaddasi, Shakiba rajabi faculty of engineering, Urmia, Iran

Abstract: Over the past few years, there has been considerable interest in the research of the Internet of Things (IoT) and Artificial Intelligence (AI). IoT is considered to be a component of the future internet and will be composed of billions of intelligent and communicating devices. The internet of the future will be made up of variously connected devices that will expand the boundaries of the world by integrating physical objects with virtual components. The combination of AI and IoT is driving the development of automatic transportation systems and the concept of intelligent cars and smart vehicles in the present century. In other words, the goal of creating smart vehicles is directly influenced by the integration of IoT and AI, which will not only enable cars to handle a broader range of scenarios but also introduce automobile manufacturers to a new realm of work. With the aid of AI and IoT, the transformation to fully smart vehicles and cars, such as self-driving cars, augmented reality (AR) dashboards, and smart device integration, is possible. In this paper, a blockchain-based Mobile Edge Computing (MEC) model is proposed for smart vehicles, which addresses the task offloading and user privacy preservation problems by utilizing deep reinforcement learning. The results of the combined experiment are compared with DQN and experimental results demonstrate a significant improvement in privacy levels and latency with the proposed scheme.

Keywords: Smart vehicles, Mobile edge computing, Blockchain, Security, Deep reinforcement learning



#### Vehicle Insurance Fraud Detection using Supervised Neural Network Model

Isha Agarwal, HC Taneja, and Anjana Gupta Delhi Technological University, Rohini, Delhi 201011, India

**Abstract:** Vehicle insurance fraud is a serious problem that causes huge financial losses to insurance companies. In recent years, developing fraud detection models using machine learning techniques has been of great interest. This paper proposes a novel approach for vehicle insurance fraud detection using Supervised Neural network model on the Kaggle Vehicle Insurance Fraud Detection dataset. The initial step in this study involves performing data preprocessing and feature extraction on the dataset, which consists of various information such as the age of the insured, the gender of the policy holder, and the make and model of the vehicle. As traditional rule-based techniques are not adequate for detecting fraudulent claims, machine learning-based methods are being investigated. Our research proposes a supervised learning method using a neural network model for vehicle insurance fraud detection. The proposed model is trained on a large, publicly available dataset and assessed using standard evaluation metrics such as F1 score, recall and precision. Moreover, we compare the model's performance with other well-known machine learning algorithms such as decision trees and logistic regression. Our exploratory results show that the proposed approach gains increased accuracy in detecting fraud cases. The proposed learning algorithm outperforms other traditional supervised learning algorithms in terms of classification performance, demonstrating the effectiveness of the proposed approach. Overall, our suggested approach shows a promising solution for vehicle insurance fraud detection, with the potential to significantly reduce financial losses for insurance companies.

**Keywords:** Vehicle insurance  $\cdot$  Fraud detection  $\cdot$  supervised learning  $\cdot$  neural network  $\cdot$  classification  $\cdot$  data preprocessing  $\cdot$  imbalanced data  $\cdot$  precision  $\cdot$  recall  $\cdot$  F1 score.



#### A Saturation Modification Image Enhancement Method for Low Light Color Images

Sepideh Khormaeipour and Fatemeh shakeri

Department of Applied Mathematics, Faculty of Mathematics and Computer Sciences, Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran

**Abstract:** Images captured under low-light conditions often exhibit poor visual quality, characterized by low contrast and limited detail. To enhance the quality of these images, image enhancement algorithms are commonly employed. However, some of these algorithms may fail to accurately represent the image's structure and color, resulting in unsatisfactory image quality. This paper proposes a method to improve the saturation of color images obtained by combining two specific global and local enhancement methods. To achieve this, we consider a convex combination of a maximally saturated image obtained from the original image and an image obtained from the local enhancement method. We formulate an optimization problem to find the optimal coefficient for the convex combination. This enables us to control the color saturation of the final enhance image relative to the original image. To solve this optimization problem, we employ a combination of the golden-section search algorithm with parabolic interpolation. The final image is also subjected to a post-processing step to reduce noise and preserve the structure of the image. Our experimental results demonstrate a significant improvement in image quality compared to the original low-light image.

**Keywords:** Low-light images, Local enhancement method, RGB color space, Saturation, Golden-section search algorithm.



#### Convolutional Neural Network and Long Short Term Memory on Inertial Measurement Unit sensors for Gait Phase Detection

Mohammadali Ghiasi, Mohsen Bahrami, Ali Kamali Eigoli and Mohammad Zareinejad

Mechanical Engineering Department, Amirkabir University of Technology, Tehran, Iran

Abstract: Human gait phase detection is an essential technology in the field of exoskeleton robot control and medical rehabilitation. Inertial sensors with accelerometers and gyroscopes are easy to wear, inexpensive, and have great potential for analyzing gait dynamics. A new approach for gait phase identification based on the data of a foot-mounted Inertial Measurement Unit (IMU) and a Convolutional and Long Short-Term Memory neural network (CNN-LSTM) is presented. The approach begins by employing an information acquisition system for gait to collect data from the IMU sensor that is fixed on the lower leg. The framework creates a spatial feature extractor with a CNN module and a temporal feature extractor combined with an LSTM module through the data preparation. It was found that the gait phase can be properly identified using data from a single individual (F1-score > 0.92) by the classifier. However, more information is required to enhance its categorization performance. Therefore, the CNN-LSTM classifier is appropriate for usage in assistive devices since it can make fast adjustments to various gait kinematics while only requiring One IMU attached to the foot.

**Keywords:** Gait Phase Detection · Convolutional Neural Network · Long Short-Term Memory · Inertial Measurement Unit.



#### Using Deep Learning Techniques for Quality Control in Automotive Industry

Morteza Moradi

Faculty of Industrial Engineering, Urmia University of Technology, Urmia, Iran

**Abstract**: Quality control is an essential part of any successful business model that helps to ensure customer satisfaction. Quality control is a crucial component of the automobile production process since it guarantees the finished products are safe and reliable for consumers. Deep learning algorithms have lately been applied in quality control in the automotive industry due to their exceptional capabilities. However, no research has been done to review and synthesize the literature. As a result, a semi-systematic strategy was used in this study to review the papers that were published in indexed journals in the Scopus database. According to the results of a thorough analysis of 20 related studies the usage of deep learning-based methods for quality control in the automotive industry has significantly increased in 2022, with more than half of the articles published this year. It is expected the trend will follow more rapidly in the future. The most notable contributions to scientific publication came from China. Moreover, convolution neural network (CNN) variants have been applied more frequently than other algorithms. Deep learning was mainly used to evaluate welding, detect surface defects, and evaluate vehicle interior sound quality.

Keywords: Quality Control, Automotive Industry, Deep Learning, Literature Review



#### Driver Cellphone Usage Detection Using Wavelet Scattering and Convolutional Neural Networks

Ali Besharati, Ali Nahvi, and Serajeddin Ebrahimian

Virtual Reality Laboratory, K.N. Toosi University of Technology, Tehran, Iran

**Abstract:** Cellphone usage by drivers is a major cause of road accidents. This paper provides an automated system based on machine learning and computer vision to detect cellphone usage during driving. We used Wavelet Scattering Networks, which is a simple and efficient type of architecture. The presented model is straightforward and compact and requires little hyper-parameter tuning. The speed of this model is similar to the Convolutional Neural Networks. We monitored the driver from 2 viewpoints: a frontal view of the driver's face and a side view of the driver's whole body. We created a new dataset for the first viewpoint, and a publicly available dataset for the second viewpoint. Our model achieved the test accuracy of 91% for our new dataset and 99% for the publicly available one.

**Keywords:** Mobile use detection, Wavelet Scattering Network, CNN, Cascade Object Detector, Transfer Learning



#### Online vehicle detection using gated recurrent units

Arezoo Sedghi, Esmat Rashedi, Maryam Amoozegar and Fatemeh Afsari Faculty of Electrical and Computer Engineering, Graduate University of Advanced Technology, Kerman, Iran

**Abstract:** As road transportation increases and inner and outer city roads are extended, traffic control systems and intelligent monitoring of traffic flow are crucial. Vehicle detection is one of the primary tasks in computer vision applications, which is widely used in surveillance-related tasks, especially in intelligent traffic monitoring systems. To address this issue, a number of approaches have been presented out, the most of which are based on deep learning frameworks. We propose a method that solves the vehicle detection problem by online detection without needing labeled data so it can be used for traffic flow supervision. The proposed approach utilizes the deep gated recurrent neural networks that can extract moving objects (vehicles) from the original scenes by applying background model maintenance. The method is evaluated on BMC database of traffic videos. As the evaluation process is carried out from the first frame to the end of the video, the experimental results are presented by the well-known metrics and visually demonstrated, which is remarkable considering the unsupervised training and real-time performance.

**Keywords:** Vehicle detection, Background model maintenance, Deep learning, Gated recurrent unit, Online training, Traffic surveillance system



#### How do drivers react after receiving forward collision warnings?

Amir Kamyab Moghaddam, Amirmasoud Hamedi and Hamed Emami Civil Engineering, Four Seasons Sunrooms, Toronto, ON, Canada Civil and Environmental Engineering Department, Florida International University, Florida, USA Department of transportation and infrastructure studies, Morgan State University, Baltimore, MD, 21251

**Abstract:** The aim of this research was to analyze how drivers respond to forward collision warnings in order to improve driving safety. The study utilized data collected from the Connected Vehicle Safety Pilot in Ann Arbor, Michigan, which involved 64 vehicles and 1,181 trips. The results indicated that drivers did not have extreme reactions to the warning signals, but instead applied their brakes gently to be more attentive to the road. On average, drivers responded within 1.56 seconds of receiving a warning, which is relatively fast and suggests that they were able to take quick action to avoid accidents. The findings also revealed that drivers tended to avoid overreacting and instead reacted in a way that was appropriate to the situation, which helped to enhance safety on the road. By responding quickly and calmly, drivers were able to prevent accidents and minimize the severity of any collisions that did occur. Overall, this study highlights the importance of using forward collision warnings as a tool for improving driving safety, as they can help to reduce the risk of accidents and save lives on the road.

Keywords: Forward Collision Warning System, Reaction Time, Connected Vehicle



#### Improving Safe Driving with Diabetic Retinopathy Detection

Niusha Sangsefidi and Dr. Saeed Sharifian

Department of Management, Science and Technology, Amirkabir University, Tehran, Iran

Department of Electrical Engineering, Amirkabir University, Tehran, Iran

**Abstract:** Driving is a complex activity that requires significant cognitive and physical capabilities. Various complications of diabetes, such as vision impairment can potentially impede driving performance. Diabetic retinopathy is the most prevalent eye disease that can arise due to diabetes. It can lead to vision loss and even complete blindness if not detected early. However, detecting it in the early stages is challenging as it may not show any symptoms. Although there are existing models for diabetic retinopathy, they may not be capable of detecting all stages of the disease. This paper used ResNet-50 pre-trained model and SVM classifier for grading of Diabetic retinopathy. The proposed method demonstrated a 75% accuracy in the APTOS dataset. We suggest a promising application for this model alongside smart glasses technology as a means of promoting safe driving practices among individuals with diabetic retinopathy. This innovative approach would provide real-time updates about an individual's condition and enable them to take appropriate actions to maintain their and others' safety while driving.

Keywords: Diabetic Retinopathy, ResNet-50, Transfer learning, SVM



#### Real-time mobile mixed-character license plate recognition via deep learning convolutional neural network

G. Karimi, Z. Ali Mohammadi, S.A. Najafi, S.M. Mousavi, D. Motiallah and Z. Azimifar

Department of Computer Science and Engineering Shiraz University, Shiraz, Iran

**Abstract:** Automatic license plate recognition (ALPR) has become an integrated part of intelligent transportation system (ITS) technologies. In this work, an efficient ALPR algorithm has been developed to detect, differentiate, and recognize the Iranian national and free zone license plates (LPs), automatically and simultaneously. Latest versions of detection algorithms YOLO (you only look once) has been trained based on an in-house developed dataset for Iranian motor vehicles containing both national and free-zone LPs. In addition, an open-source multi-lingual OCR application has been trained to recognize alpha-numeric characters in the both LP types. Experimental results show that the generated ALPR pipeline can detect and recognize mixed characters in the LPs in real time and with high accuracy.

Keywords: Recognition, Detection, License plate recognition, Optical character recognition, LPR, OCR

دهمین همایش سالیانه انجمن منطق ایران دانشگاه امیرکبیر؛ دانشکده ریاضی و علوم کامپیوتر ۳ و ۴ اسفند ۱۴۰۱

### Deep learning-based SOH estimation of Li-ion batteries in electrical vehicles: Current achievement and progress

Leila Amani and Amir Sheikhahmadi

Department of Computer Engineering, Islamic Azad University, Sanandaj, Iran

Abstract: State of Health (SOH) estimation is a critical issue in the maintenance and management of Li-ion batteries in electric vehicles (EVs). Accurate SOH estimation can extend the battery life and ensure the safety and reliability of the EVs. With the development of deep learning techniques, the application of deep learning in SOH estimation has attracted increasing attention in recent years. This paper provides an overview of the current achievements and progress in the field of deep learning-based state-of-health (SOH) estimation of Li-ion batteries in electric vehicles. Deep learning techniques such as convolutional neural networks (CNNs), recurrent neural networks (RNNs), and long shortterm memory (LSTM) networks have shown promising results in accurately predicting the SOH of Li-ion batteries. Current achievements include improved accuracy, faster prediction times, and the ability to handle multiple input data types. However, challenges like the need for more comprehensive datasets and the potential for overfitting still exist. The application of deep learning-based SOH estimation has the potential to improve significantly the performance and reliability of Li-ion batteries in electric vehicles, leading to increased driving range and reduced maintenance costs. Further research and development in this area are necessary for advancing the field and unlocking the full potential of electric vehicles.

Keywords: Data-driven Models, Electrical Vehicles, Neural Networks, SOH



#### Stacking Ensemble Learning For Traffic Accident Severity Prediction

Hazhir Salari and Seyed Amin Hosseini Seno

Ferdowsi University of Mashhad, Mashhad, Iran

**Abstract:** In the present day, people rely more heavily on transportation systems than ever before. Analysis of past accident data reveals that transportation systems consistently pose a threat to human life and property. In cases of severe accidents, it is necessary to alert an emergency center near the accident site, in addition to the police center, during the vital time period, in order to save lives and minimize casualties. Obviously, sending alert to the emergency center is not required for nonsevere accidents. This article aims to identify key features and create a stacked ensemble learning model, utilizing two models - LightGBM and XGBoost, to identify severe accidents. Based on the evaluation findings, the proposed model outperformed recent works, obtaining higher levels of accuracy (87.75%), precision (86.89%), recall (84.22%), and f1-score (85.54%).

Keywords: ITS · Road Safety · ML · Ensemble Learning · Stacking.



#### Evaluation of Drivers' Hazard Perception in Simultaneous Longitudinal and Lateral Control of Vehicle Using a Driving Simulator

Mohammad Pashaee and Ali Nahvi

Virtual Reality Laboratory, K. N. Toosi University of Technology, 7 Pardis Street, Mollasadra Avenue, Vanak Square, Tehran

Abstract: Evaluation of hazard perception skills in the training and certification process is very important in reducing traffic accidents. Hazard perception skill is the ability of a driver to estimate the probability of an accident and identify the risk factors. Unfortunately, most risk assessment skills are based on questionnaires and button presses, while hazard perception and skill in compensatory actions can only be effective during the driving process and based on driving assessment criteria. Therefore, in this paper, the motivational factors were initially defined based on psychological basis. Then the determined motives were correlated with the physical conditions of the traffic were estimated with numerical values. Significant physical variables such as collision time, collision avoidance time, and decision execution time were used to correlate the motivational factors with the physical signals of the traffic environment including position, speed and acceleration. Finally, the behavioral model of driving, based on these motivational factors, is considered and further used to detect the type of driver anomaly. In the driving simulator, the anomalies of female and young drivers were divided into three categories: perceptual, decision making and decision executing. In addition, the driver model with risk perception function was able to avoid collision with high perception in all tests. This model can be used as an efficient basis for comparing the behavior of drivers the anomalies during the driving process. In many cases, this function is activated less than 1 second before the drivers and, and successfully prevented the collisions.

Keywords: Hazard Perception, Driving Motivations, Detecting Drivers Anomalies



### State-Of-The-Art Analysis of the Performance of the Sensors Utilized in Autonomous Vehicles in Extreme Conditions

Amir Meydani

Amirkabir University of Technology, Tehran, Iran

Abstract: Today, self-driving car technology is actively being researched and developed by numerous major automakers. For autonomous vehicles to function in the same way that people do-perceiving their surroundings and making rational judgments based on that information-a wide range of sensor technologies must be employed. An essential concern for fully automated driving on any road is the capacity to operate in a wide range of weather conditions. The ability to assess different traffic conditions and maneuver safely provides significant obstacles for the commercialization of automated cars. The creation of a reliable recognition system that can work in inclement weather is another significant obstacle. Unfavorable climate, like precipitation, fog, and sun glint, and metropolitan locations, with their many towering buildings and tunnels, which can cause problems or impair the operation of sensors, as well as many automobiles, pedestrians, traffic lights, and so on, all present difficulties for selfdriving vehicles. After providing an overview of autonomous vehicles and their development, this paper evaluates their usefulness in the real world. After that, the sensors utilized by these automobiles are analyzed thoroughly, and subsequently, the operation of the autonomous vehicle under varying settings is covered. Lastly, the challenges and drawbacks of sensor fusion are described, along with an analysis of sensor performance under varying environmental circumstances.

**Keywords:** Autonomous Vehicle, Self-Driving Car, Perception, Ego-Position, Sensor Fusion

سالن ۳۱۳ (دانشکده ریاضی و علوم کامپیوتر)

**زمان ارایه** چهارشنبه، ۳ خرداد ۱۴۰۲ ۱۸:۲۰ – ۱۸:۳۰ (وقت محلی تهران)



# Roll stability enhancement of a 3-axle heavy vehicle by Active Roll and AFS control

Erfan Sabzalian, Mahyar Naraghi and Maryam Ghassabzadeh Saryazdi

Department of Mechanical Engineering and Technology Institute of Mechanical Engineering, Amirkabir University of Technology, 424 Hafez Avenue, Tehran 15914, Iran

Abstract: Ensuring the stability of heavy-duty trucks is crucial to prevent accidents, as their high center of gravity makes them prone to rollovers. Roll stability, in particular, is a critical control parameter, and this paper proposes a strategy that uses two subsystems to simultaneously control the roll angle and yaw rate of the vehicle. The active roll subsystem employs a PD controller to prevent the vehicle from rolling by generating the desired torque, while the active front steering subsystem uses a sliding mode controller to track the desired yaw rate. The study conducts an independent analysis of each sub-control system and evaluates their inter-relationship. To test the effectiveness of the proposed strategy, simulations are carried out using a full Trucksim model as a simulation model. The controller model consists of a 2-DOF 3-axle generalized bicycle model and a 1-DOF roll model. A J-turn and a Sine maneuver are used to put the vehicle in a critical condition, and the proposed strategy is evaluated to determine its ability to restore the stability of the truck. The simulation results demonstrate that the proposed strategy effectively improves the stability of the vehicle, particularly when the two subsystems work simultaneously. Compared to using only one subsystem, the proposed control system covers a wider range of stability, thereby enhancing the safety of heavy-duty trucks. This study presents a new approach to control roll stability in heavy-duty 3-axle trucks, and the results indicate that it has the potential to significantly reduce the number of rollover accidents.

Keywords: Active front steering, Active roll, roll stability, 3-axle heavy vehicle



#### Driver Identification by An Ensemble of CNNs Obtained from Majority-Voting Model Selection

Rouhollah Ahmadian, Mehdi Ghatee, and Johan Wahlström

Department of Computer Science, Amirkabir University of Technology, Hafez Ave., Tehran 15875-4413, Iran

Department of Computer Science, University of Exeter, Exeter, EX4 4QF, UK

**Abstract:** Driver identification refers to the task of identifying the driver behind the wheel among a set of drivers. It is applicable in intelligent insurance, public transportation control systems, and the rental car business. An critical issue of these systems is the level of privacy, which encourages a lot of research using non-visual data. This paper proposes a novel method based on IMU sensors' data of smartphones. Also, an ensemble of convolutional neural networks (CNNs) is applied to classify drivers. Furthermore, the final prediction is obtained by a majority vote mechanism. This paper demonstrates that model selection using a majority vote significantly improves the accuracy of the model. Finally, the performance of this research in terms of the accuracy, precision, recall, and f1-measure are 93.22%, 95.61%, 93.22%, and 92.80% respectively when the input length is 5 minutes.

**Keywords:** Driver Identification · Deep Learning · Majority Vote · IMU Sensors · Smartphone Data



# Semantic Segmentation using Events and Combination of Events and Frames

M. Ghasemzadeh and S. B. Shouraki

Department of Electrical Engineering, Sharif University of Technology, Tehran, Iran

**Abstract:** Event cameras are bio-inspired sensors. They have outstanding properties compared to frame-based cameras: high dynamic range (120 vs 60), low latency, and no motion blur. Event cameras are appropriate to use in challenging scenarios such as vision systems in self-driving cars and they have been used for high-level computer vision tasks such as semantic segmentation and depth estimation. In this work, we worked on semantic segmentation using an event camera for self-driving cars. i) This work introduces a new event-based semantic segmentation network and we evaluate our model on Alonso dataset and Event-Scape dataset which was produced using Carla simulator. ii) Eventbased networks are robust to light conditions but their accuracy is low compared to common frame-based networks, for boosting the accuracy we propose a novel event-frame-based semantic segmentation network that it uses both images and events. We also introduce a novel training method (blurring module), and results show our training method boosts the performance of the network in recognition of small and far objects, and also the network could work when images suffer from blurring.

**Keywords:** Event-Based Camera, Semantic Segmentation, Computer Vision, Deep Learning, Sensor Fusion.

سالن ۳۱۳ (دانشکده ریاضی و علوم کامپیوتر)

**زمان ارایه** چهارشنبه، ۳ خرداد ۱۴۰۲ ۱۸:۵۰ – ۱۸:۳۰ (وقت محلی تهران)



#### **Driver Identification Using Face Liveness Detection**

Seyed Ali Mousavi Fard and Seyed Saeed Hayati

Department of Electrical Engineering, Faculty of Engineering, Shahid Chamran University, Ahvaz, Iran

Department of Marine Engineering, Khorramshahr University of Marine Science and Technology, Khorramshahr, Iran

**Abstract:** In this paper, a new car security system is proposed based on liveness detection of driver face. Conventional security systems that rely on face images are vulnerable to spoofing attacks. We address this problem by considering liveness detection step before face recognition to alleviate probability of system failure. We applied two well-known neural networks MobileNetV2 and ResNet50 for liveness detection. Our experimental results shows that these two networks have similar accuracy around 99% for dataset of final\_antispoofing while the memory size of weights in MobileNetV2 is one tenth of ResNet50. For removing unnecessary information of the image, a face detection step is conducted using Haar cascade method. The experimental results show that Haar cascade is an appropriate face detector with small memory usage and low computational overload in comparison with MTCNN and RetinaFace.Classification of driver's image to authentic or unauthentic is conducted by VggFace network. Comparison of VggFace with FaceNet network shows that two networks have similar accuracies while VggFace weights size is smaller which makes it more acceptable for practical use.

**Keywords:** Car security systems, Face Recognition, Face liveness detection, deep neural networks.



#### A Bibliometric Analysis On Artificial Intelligence and Smart Vehicles

Durga Prasad Singh Samanta, B.C.M. Patnaik and Ipseeta Satpathy

K.I.I.T University, Bhubaneswar, Odisha, India

Abstract: The paper is based on a two-step procedure known as "Systematic Literature Network Analysis (SLNA)", which includes a systematic literature review (SLR) and a subsequent analysis of the relevant articles' subset obtained through a bibliographic network analysis (NA): specifically, the citation network analysis, the co-occurrence networks analysis, and the basic statistics. The first qualitative evaluation, in contrast to the bibliometric review, which offers more objective insights using quantitative and statistical data, is primarily concerned with the researchers' opinions regarding the choice of keywords and relies on an explanatory approach. The most significant author names, journal titles, article titles, article keywords, and publication years are just a few examples of the bibliographic data that bibliometric approaches evaluate. The authors have compiled a list of publications relating to the keywords artificial intelligence and smart vehicles specifically which is limited to the area of how insurance and InsurTech are impacted. The field of finance is chosen from the reservoir of academic databases like Scopus.

**Keywords:** Artificial Intelligence, machine learning, smart systems, smart vehicles, bibliometric analysis.



## Improving speech emotion recognition using audio transformer and features fusion

Fateme Mehrpouyana, Mehdi Ezoji

Faculty of Electrical and Computer Engineering, Babol Noshirvani University of Technology, Mazandaran, Iran

**Abstract:** The purpose of speech emotion recognition is to recognize different speaker emotions by extracting and classifying salient features from a preprocessed speech signal. In this paper, a basic method based on the fusion of features, extracted from pre-trained AlexNet, BiLSTM and Wav2vec2.0 models is improved for speech emotion recognition. To this end, similar to the basic model, spectrogram, MFCC and raw signal features are used, respectively. To improve the performance of the basic model, on the one hand, in addition to the MFCC, its first and second derivatives are also extracted. On the other hand, for feature extraction of the concatenated vector, the Audio Transformer with Patchout (PaSST) replaces the BiLSTM of the base model. Then, the attention unit is used to use the effective information extracted from the MFCC and the spectrogram and also to weight the Wav2vec2.0 output. Finally, the extracted features from AlexNet, PaSST, and also the weighted output of Wav2vec2.0 are fused and fed to the Softmax as the classifier. Experiments have shown that the proposed algorithm has reached a weighted accuracy of 64.06% on RAVDESS dataset, which is 5% improvement compared to the basic method.

**Keywords:** Speech Signal Feature fusion Transfer learning Audio transformer Speech emotion recognition



#### A survey on usage of smartphone accelerometer sensor in intelligent transportation systems

Hamid Reza Eftekhari

**Abstract:** The numerous capabilities and sensors used in smartphones have made it a suitable alternative to expensive tools and methods in intelligent transportation systems. This article surveys the literature over the role of the accelerometer of smartphones in intelligent transportation applications. At first, the opportunities and challenges of using the accelerometer are stated. Then, the architecture of using this sensor including preprocessing, feature extraction, mode detection, reorientation and applications are explained. Finally, six areas of the intelligent transportation system that have used the accelerometer of mobile phones in the presented articles have been investigated.

Keywords: Smartphone Sensors, Accelerometer, Intelligent Transportation System



#### A Survey on Fraud Detection in Car Insurance

Behnam Yousemehr and Mehdi Ghatee

Department of Mathematics & Computer Science, Amirkabir University of Technology (Tehran Polytechnic), Iran

**Abstract:** This survey examines the use of machine learning techniques to detect car insurance frauds. As the insurance industry expands, insurance frauds become more complicated. Car insurance frauds appear in many forms, including artificial accident scene, fictitious injuries, and many other falsehoods. To detect them carefully, a lot of academic researchers try to use statistical and machine learning approaches. Machine learning algorithms offer promising solutions to this problem by enabling automatic detection of fraudulent behavior in real-time. One of the main challenges currently faced by researchers is the imbalanced fraud data. This survey highlights the potential effects of balancing techniques to improve car insurance fraud detection, gives a comparison between different machine learning algorithms for the same purpose and summarizes the future research directions.

Keywords: Car insurance · Fraud detection · Machine learning · Imbalanced data.



#### An Overview of Blockchain-based V2X System

Shabnam Bohlooli, Seyyed Amir Asgharia, Mohammadreza Binesh Marvastia, Vahid Moeini

Department of Electrical and Computer Engineering, Kharzmi University, Iran

Abstract: The Internet of Vehicles is trying to meet goals such as: minimizing fuel consumption, increasing road safety, traffic management, maximum use of road capacity, preventing air pollution, etc. Achieving these goals is possible through vehicle-toeverything (V2X)1 information exchange. This information, which may sometimes play a decisive role in saving the lives of the driver and passengers, should not be able to be penetrated, eavesdropped and manipulated. But in the real world and in the dynamic network of vehicles, it is very difficult to achieve this. In the vehicular network, there is a fundamental need for security, authentication, transparency, message integrity, access control, confidentiality, data immutability, and privacy protection. Since it is possible that unauthorized entities can deceive connected vehicles and violate the security, accuracy and integrity of the message and cause irreparable financial and human losses, therefore, in all infrastructures of smart transportation systems, the issue of authentication The identity and integrity of messages are fundamental security considerations that must be provided. Connected cars must be able to trust each other and communicate and exchange messages in a transparent and secure environment while maintaining privacy. In this regard, using blockchain technology and benefiting from its strengths in order to meet the needs of the Internet of vehicles has been proposed as an important option. In this article, recent studies on the integration of blockchain technology and the Internet of Vehicles have been reviewed in order to solve the challenges of the Internet of Vehicles and prevent the intrusion of unauthorized entities and the violation of user privacy.

Keywords: Blockchain Intelligent transportation system Internet of vehicles Connected vehicles Rsu



### Deep learning-based concrete crack detection using YOLO architecture

Elham Nabizadeh and Anant Parghi

Department of Civil Engineering, Hakim Sabzevari University, Sabzevar, RK M3J+373, IRAN

Department of Civil Engineering, Sardar Vallabhbhai National Institute of Technology, Surat, GJ 395007, India

**Abstract:** Buildings, dams, and bridges are significant constructions containing concrete; hence it is essential to understand how the concrete cracks when constructing and maintaining them. The most common flaw in concrete structures is cracking, which reduces load-carrying capacity, stiffness, and durability. This study uses deep learning technique to identify cracks on concrete structure surfaces. The Concrete crack detection has been performed using a different version of the YOLOv8 algorithm (You Only Look Once) technique. In order to analyze the detection performance of the model described here, the models underwent quantitative assessments using evaluation metrics including precision, recall, and mean average precision. Results show that the YOLOv81 model has the highest precision value, the YOLOv8x has the highest recall value, and the YOLOv8m and YOLOv8x have the highest mAP@50 value. Also, the mAP@50-90 values of these models are approximately equal and are the highest among other models.

Keywords: Concrete crack detection, Computer vision, YOLO.



#### Deep Parallel Self-Organizing Maps for Visual Classification

Mahsa Famil Barraghi and Habib Izadkhah

Department of Computer Science, University of Tabriz, Iran

**Abstract:** In this paper, we propose a deep self-organizing map algorithm that consists of parallel layers of self-organizing map and sampling. The self-organizing layer has certain numbers of self-organizing maps, with each map only looking at a local region on its input image. The winning neuron from every self-organizing map in the layer is then sent to the sampling layer to generate an image which could then be fed to the next self-organizing layer. To analyze the effectiveness of the deep self-organizing maps, we apply it for visual classification. The visual classification of deep self-organizing maps is evaluated using the three visual data mining methodologies: 1) U-matrix, 2) hit-maps, and 3) class label distribution. Compared to self-organizing map single-layer networks, results demonstrate that deep self-organizing maps produce more accurate visual representations of the distribution of the data.

**Keywords:** Deep Learning, Self-Organizing Map (SOM), Deep Self-Organizing Map (DeepSOM), MNIST, Visual classification



#### Evaluating Influential Parameters on Camera Calibration in Close Range Photogrammetry

Fatemeh Hosseini, Mehrtash Manafifarda

Assistant Professor and student at Arak University of Technology, Arak, Iran

**Abstract:** Camera Calibration is an important step in the close-range photogrammetry projects. Different parameters can effect calibration of a digital camera. In this paper, some influential parameters are assessed. For this purpose, by building a 3D test field and several experiments, the effects of 90-degree camera rotation, environmental illumination, number of images and image overlap on camera calibration are assessed. As a result, the precision improved by 90-degree camera rotation, increase in the number of images and sufficient image overlaps.

Keywords: Calibration Digital Camera Close range photogrammetry



#### Generating Control Command for an Autonomous Vehicle Based on Environmental Information

Fatemeh Azizabadi Farahani, Saeed Bagheri Shouraki and Zahra Dastjerdi

Electrical Engineering Department, Sharif University of Technology, Tehran, Iran

**Abstract:** This paper presents a novel CNN architecture using an end-to-end learning technique to predict the steering angle for self-driving cars. The front camera is the only sensor used to generate this control command. This network was trained and tested on Sully Chen Public Dataset, which contains image frames and steering angle data for each image. The test outcomes demonstrated that this model could generate a reasonably accurate steering angle for autonomous vehicles and perform about 60% better than the networks designed from 2017 to 2021. In addition, the problem of overfitting in previous networks has mainly been addressed with the help of the new network architecture and different data preprocessing.

Keywords: Self-Driving Cars, Deep Learning, Steering Angle.



#### An ILP Model and Optimal Placement Strategy for Electric Vehicle Charging Stations; Case Study of Tehran's Populated Areas

Alireza Rajabi Ranjbar, Morteza Mollajafari, Pooriya Sanaie

School of Automotive Engineering Iran University of Science and Technology Tehran,Iran

**Abstract:** One of the most effective methods for tackling environmental pollution and global warming is the development of electric vehicles as a clean transportation option. However, there are several challenges associated with this approach, including the need to establish a robust charging infrastructure and strategically locate the charging stations. This paper addresses the issue of determining the optimal location for charging stations in densely populated areas of Tehran, taking into account parking lots and gas stations. To accomplish this, an Integer Linear Programming (ILP) model was created, incorporating various constraints and statistical distributions to ensure the realism of the problem. The discrete Genetic Algorithm (GA) was then employed to obtain the best possible solution, minimizing the amount of investment required for the construction of stations while also providing maximum comfort for passengers in their daily lives. Specifically, the algorithm ensures that drivers can access the nearest charging station by traveling the shortest distance possible, while the government can minimize the cost of installation.

**Keywords:** electric vehicle, Integer Linear Programming, genetic algorithm, optimization



## Modeling and Understanding the Surrounding of an Autonomous Vehicle

Fateme Azizabadi, Saeed Bagheri Shouraki, Zahra Dastjerdi

Electrical Engineering Department, Sharif University of Technology, Tehran, Iran

Abstract: Self-driving car can move like an experienced driver without human intervention. For this purpuse, she must be able to fully understand and feel her surroundings like a human being. Accurate understanding of the surrounding environment in real time is one of the important factors that affect the performance of self-driving vehicles. Perception refers to the ability of an autonomous vehicle to collect sensor data, extract relevant knowledge, and develop contextual understanding of the environment, for example, identifying obstacles and the drivable area ahead the car. For this purpose, we use the Kitti dataset. This dataset is the largest dataset for machine vision algorithms for self -driving cars, which includes images captured by a moving vehicle from various positions in the streets of Karlsruhe city. For the road detection part, we were able to reach a precision value of 97.23% and a processing rate of 22 frames per second by replacing the convolutional layer instead of the fully connected layer and combining the spatial features with the features of the deep layers, which is acceptable accuracy compared to the previous results achieved while having the desired speed. In the obstacle detection section, we first regressed the three-dimensional features of the object using a convolutional neural network, and then by combining these features with the limitations of the two-dimensional frames, we were able to predict the three dimensional frames and direction for the vehicles on the road. Using regression instead of deep convolutional networks greatly improved the speed of model training and testing. Finally by defining the loss function as a sum of coefficients, we were able to reduce the loss value to -0.8026 and reach a processing rate of 20 frames per second, which according to the results obtained this network has a favorable and acceptable performance compared to the results of previous works.

keywords: Autonomous vehicles Road detection 3d detection Regression

سالن ۳۱۳ (دانشکده ریاضی و علوم کامپیوتر)



#### Fractal-Based Spatiotemporal Predictive Model for Car Crash Risk Assessment

Behzad Zakeri and Pouya Adineh

School of Mechanical Engineering, College of Engineering, University of Tehran, Tehran, Iran

Department of Computer Engineering, Faculty of Engineering, Islamic Azad University South Tehran Branch, Tehran, Iran

**Abstract:** Car collisions are a noteworthy public safety concern, with a significant number of fatalities and injuries worldwide each year. In this study, we developed a spatiotemporal prediction model for car collision risk by combining fractal theory and deep learning techniques. We collected and analyzed car collision data for the United States between 2016 and 2021, and used fractal theory to extract effective parameters and the Hurst exponent to analyze temporal patterns. Finally, we trained a predictive model using Generative Adversarial Networks (GANs) and Long Short-Term Memory (LSTM) networks. Our results demonstrate the potential of fractal theory and deep learning techniques for developing accurate and effective spatiotemporal prediction models, which can be utilized to identify areas and time periods of heightened risk and inform targeted intervention and prevention efforts.

Keywords: Car Collision · Spatiotemporal prediction · Fractal theory · Deep learning



# Combining SVM with an efficient feature selection mechanism to predict the stock-market trend

M. Pardakhti and F. Hooshmand

Department of Mathematics and Computer Science, Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran,

**Abstract:** Support vector machine (SVM) is a popular classification method and selecting appropriate features and tuning parameters have a great impact on its efficiency. In this paper, SVM is utilized to predict the movement of stocks in the Iran market. First, a broad set of features including different important ratios and technical indicators and signals are gathered. Then, a combined approach based on particle swarm optimization (PSO) is developed as a feature selection and parameter tuning mechanism. A clustering method is suggested to generate the initial particles of PSO. Computational results over real datasets confirm the performance of our algorithm in comparison with other approaches.

**Keywords:** Support vector machine, Particle swarm optimization, Feature selection, Parameter tuning, Iran stock market



#### **Cross-modal Image-Text Retrieval Using Support Vector Machine**

Ali Goudarzi, Fatemeh Taheri, Kambiz Rahbar

Department of Computer Engineering Islamic Azad University, South Tehran Branch, Tehran, Iran

Abstract: With the increasing growth of multimodal data in the form of audio, video, image and text data, the importance of multimodal retrieval has also increased. One of the main challenges of cross-retrieval is to reduce the heterogeneity gap between different methods, such as retrieving images through texts or vice versa. Therefore, in this paper, a reciprocal retrieval method based on supervised learning is proposed. Image features including color, texture and shape are extracted using color autochronogram, Gabor filter and Zernike moments. Text features are also extracted using latent Dirichlet allocation method. Also, two support vector machines are trained separately to learn the features of images and side texts. Finally, mutual retrieval is done based on the classification results of the search modality and considering the smallest distance between the samples of the opposite modality.

**Keywords:** Cross-modal retrieval Support vector machine Auto correlogram Gabor filter Latent Dirichlet allocation



#### Learning-based One-bit DoA Estimation with Single Snapshot

Yasin Azhdari and Mahmoud Farhang

Shiraz University, Shiraz, Iran

**Abstract:** DoA estimation is one of the fundamental and practical problems in the field of array signal processing. One-bit quantization of measurements using a simple comparator can significantly reduce computational complexity, cost, and power consumption. In this paper, we examine the DoA estimation problem with a single snapshot based on both unquantized and also one-bit quantized measurements using an Artificial Neural Network (ANN). When either raw measurements or the calculated sample covariance matrix is fed to the input layer, under scenarios with one, two, or three possible sources. We show that under the conditions mentioned above, the learning-based DoA regression represents a better performance than the subspace-based MUSIC and also the compressed sensing-based method Complex Binary Iterative Hard Thresholding (CBIHT) under their best performance. Moreover, it is preferable to simply use raw measurements as the input of the ANN, compared to calculating the sample covariance matrix.

Keywords: DoA estimation · One-bit quantization · Artificial Neural Network (ANN)



#### Exploring the Use of Efficient Deep Learning Algorithms for Lower Grade Gliomas Cancer Image Segmentation: A Case Study

AmirReza BabaAhmadi, Farzaneh FallahPour

School of Mechanical Engineering, College of Engineering, University of Tehran, Tehran, Iran

School of Computer Engineering, College of Engineering, University of Shiraz, Shiraz, Iran

Abstract: This paper presents a study on the use of efficient deep learning algorithms for lower grade gliomas (LGG) cancer image segmentation. The study compares the performance of various pretrained atrous-convolutional architectures and pretrained U-Nets, and proposes a transformerbased approach for fast and efficient LGG segmentation. The study evaluated the performance of various models and found that DeepLabV3+ with MobileNetV3 as a backbone achieved the best performance among the pretrained models. However, the proposed transformer-based approach surpassed the aforementioned methods and achieved competitive results with higher scores. The study also employed transfer learning techniques to fine-tune the pretrained models on the LGG dataset, which significantly improved segmentation performance with a relatively small amount of training data. The study highlights the importance of selecting the appropriate pretrained model for the specific segmentation task. The proposed transformer-based approach offers several advantages over traditional convolutional neural networks, including efficient use of memory and better parallelization. It can also process images of arbitrary sizes, making it more flexible and scalable for use in clinical settings. Medical image segmentation is a challenging task due to the complexity of medical images and variations in imaging conditions. The use of efficient deep learning algorithms can help address these challenges by reducing computational cost, training time, and improving segmentation performance. The findings of this study can be useful in the development of accurate and efficient diagnostic tools for LGG cancer detection and treatment planning. The proposed transformer-based approach has the potential to improve medical image segmentation for other types of cancers and diseases. Overall, the study demonstrates the potential of deep learning and transfer learning techniques in medical image segmentation and has significant implications for improving cancer diagnosis and treatment.

**Keywords:** Brain Tumor Segmentation, Medical Image Processing, Lower Grade Gliomas, DeepLabV3+, UNet, Transformers, SegFormer, Transfer Learning, MRI Images, Cancer Detection



#### پیشبینی قیمت رمز ارزها در بازار با استفاده از الگوریتم ازدحام ذرات آشوبگون و شبکه

عصبى

پریسا طیب نائینی، جمال غالمی آهنگران

كارشناسي ارشد مهندسي كامپيوتر گرايش نرم افزار، گروه كامپيوتر، موسسه آموزش عالى علامه نائيني، نائين، ايران

هیات علمی گروه برق، واحد نائین، دانشگاه آزاد اسلامی، نائین، ایران

چکیده: ارز دیجیتال نوعی پول الکترونیکی است و اکثر ارزهای دیجیتال برای افزایش امنیت، حذف واسطه ها و تضمین ناشناس بودن توسعه یافته اند. با توسعه بیشتر ارزهای دیجیتال، سرمایه گذاری افراد مختلف در آنها نیز گستترش یافته است، به طوری که در طی سال های اخیر بیشترین سرمایه گذاری در این حوزه رقم خورده است. برای سرمایه گذاران رمزارزها، پیش بینی رفتار بازار بسیار مهم است. پیشبینی اغلب شامل استفاده از داده های قبلی برای تخمین رفتار آتی قیمت های بازار است. در سالهای اخیر، الگوریتمهای الهامگرفته از طبیعت بهطور مؤثر در بهینهسازی مدل های پیش بینی قیمت استفاده شدهاند. الگوریتمهای فراابتکاری ازدحام ذرات آشوبگران، گروهی از الگوریتمهای الهامگرفته از طبیعت، نشان دادهاند که الگوریتمهای فراابتکاری ازدحام ذرات آشوبگران، گروهی از الگوریتمهای الهامگرفته از مستند. این پژوهش به منظور پیش بینی قیمت ارزهای دیجیتال از روش ترکیبی شبکه عصبی و ازدحام ذرات آشوبگون استفاده نموده که در آن فرآیند کشف و استخراج ویژگی از طریق لایه های شبکه عصبی ازدام ذرات آشوبگون الگوریتم ازدحام ذرات به منظور پیش بینی قیمت استفاده می شود. نتایج حاصل از پیاده سازی و اجرای الگوریتم پیشنهادی پژوهش نشان داده که این الگوریتم ترکیبی می و نواع کاربردهای عملی و سپس داشتاده نموده که در آن فرآیند کشف و استخراج ویژگی از طریق لایه های شبکه عصبی انجام خواهد شد و سپس پیشنهادی پژوهش نشان داده که این الگوریتم ترکیبی می تواند در پیشبینی قیمت از زهای دیجیتال کارایی مناسبی پیشنهادی پژوهش نشان داده که این الگوریتم ترکیبی می تواند در پیشبینی قیمت از های دیجیتال کارایی مناسبی

كليد واژهها: ارز ديجيتال، شبكه عصبي، الكوريتم ازدحام ذرات آشوبكون، پيش بيني قيمت، استخراج ويژكي.

سالن ۳۱۳ (دانشکده ریاضی و علوم کامپیوتر)



# Routes analysis and dependency detection based on traffic volume: a deep learning approach

Maryam Esmaeili, Ehsan Nazerfard

Department of Computer Engineering, Amirkabir University of Technology, Tehran, Iran

**Abstract:** The previous decades have witnessed the remarkable growth of information technology and the emergence of novel algorithms in identifying and predicting future situations. Accordingly, many different methods were proposed in this field. The current paper focuses on two issues. The first detects the movement modes of moving objects in the future based on the current movement route of moving objects. The second calculates the movement dependence degree of moving objects. As a result, the impact of the increase in moving objects is analyzed according to the amount of traffic on the routes. In order to achieve more accurate results, Deep Learning (DL) was used to predict the movement states of moving objects for the future. For this purpose, the raw motion data of moving objects are computed in the Global Positioning System (GPS) format. The extent of route interactions is evaluated by applying new properties to the volume of moving objects and calculating the correlation coefficient and distance criterion, which results in creating a distance matrix for both current and future states. This paper's findings benefit the experts in urban traffic management that can analyze and evaluate the impact of new decisions in advance without spending much time and money.

**Keywords:** Moving objects, Urban transportation network, Distance criterion, Correlation coefficient, Route 29 prediction, Deep learning



#### User Sentiments of ChatGPT Natural Language Processing AI

Dr.Aftab Ara

Assistant Professor, Business Department, University of Hail, Hail, Saudi Arabia

Affreen Ara Ph.D. Researcher Department of Computer Science, Christ College Bangalore, India

Abstract: There is a close connection between knowledge and conversation for without knowledge, meaningful conversations cannot be had, and insights cannot be gained without conversations. In order to provide meaningful service, voice assistants and chatbots need access to underlying knowledge. Knowledge Graphs or supervised learning refers to the structure and transfer of knowledge between machines and humans. Chatbots are computer programs that simulate human interaction on computer networks. Creating a chatbot is a complex task requiring much thought and creativity. To create a chatbot, the coding expert must code its behavior, speech, and knowledge. Although chatbots are still developing, they're becoming more useful daily. Few papers provide methods for sentiment analysis but do not explicitly address the question of sentiment analysis of ChatGPT users. According to (Guerra ,2011) a transfer learning strategy for real-time sentiment analysis, could be applied to ChatGPT users. Thompson Joseph in 2017 shows that automated tools can be used for sentiment analysis of chat messages in the video game StarCraft. Social-network information can be used to improve user-level sentiment analysis, which could be applied to ChatGPT users (Tan, 2011). Kalamatianos, 2015 presents a method for measuring the intensity of sentiment in tweets, which could be applied to sentiment analysis of ChatGPT messages. Overall, these papers provide methods that could be used for sentiment analysis of ChatGPT users but do not address the sentiment analysis of users. This paper evaluates the public user's attitudes toward ChatGPT and compares it with other online search engines. We have assessed 77,710 ChatGPT users and have used sentiment analysis to highlight the main context of their discussion. Furthermore from the reviews and analysis, the paper highlights the limitations and capabilities the generative AI.

Keywords: ChatGPT, Sentiment Analysis, Generative AI, Ethical issues of ChatGPT



#### تطبیق تصاویر ماهوارهای با استفاده از دسته بندی نقاط کلیدی

فاطمه ناصری زاده، علی جعفری

چکیده: ناظریابی، فرآیند تعیین مطابقت میان دو تصویر از یک منظرهی یکسان بوده و به عنوان یکی از مهم ترین پردازشهای مورد نیاز در بینایی کامپیوتر و سنجش از دور مطرح است. هدف این پژوه تطبیق تصاویر ماهوارهای بزرگ مقیاسی که تصویر جستوجو بخش کوچکی از تصویر مرجع را پوشش میدهد، میباشد. دو روش نوین برای تطبیق تصاویر ماهوارهای با استفاده از دسته بندی نقاط کلیدی ارائه شده است. این روشهای پیشنهادی در دو حالتی که رزولوشن تصویر مشخص باشد یا خیر مطرح شدهاند.

در روش پیشنهادی اول ابتدا ویژگی های محلی تصاویر به وسویلهی الگوریتم SIFT استخراج و توصیف میشوند. در مرحله بعد، توصیفگرهای نقاط کلیدی به وسیله الگوریتم VLAD تجمیع میشوند. سپس بردارهای VLAD هر کدام از قطعات تصویر مرجع با تصویر جست و جو مورد مقایسه قرار میگیرند و قطعه تصویر مشابه با تصویر جست و جو انتخاب میشود و فرایند تناظریابی انجام میگیرد. آزمایشات روش پیشنهادی در حالتی که رزولوشون تصاویر مشخص انتخاب میشود و فرایند تناظریابی انجام میگیرد. آزمایشات روش پیشنهادی در حالتی که رزولوشون تصاویر مشخص انتخاب میشود و فرایند تناظریابی انجام میگیرد. آزمایشات روش پیشنهادی در حالتی که رزولوشون تصاویر مشخص نباشد در چهار نوع تصویر شبیهسازی شده، چند سنسوری، چند زمانه و چند سنسوری /چند زمانه و با مقایسه با سه روش TSTS استاندارد و SIFT و SIFT با پارامترهای تنظیم شده صورت پذیرفت. نتایج نشان داد که روش پیشنهادی در معیار زمان بسیار و با تفاوت از سایر روشها عمل کرد و در معیار دقت نیز توانست بهتر از سایر روشهای مورد مقایسه در معیار زمان بسیار و با تفاوت از سایر روشها عمل کرد و در معیار دقت نیز توانست بهتر از سایر روشهای مورد مقایسه ای در معیار زمان بهتر از مانی روش SIFT استادارد و SIFT و SIFT با پارامترهای تنظیم شده صورت پذیرفت. نتایج نشان داد که روش پیشنهادی در معیار زمان بسیار و با تفاوت از سایر روشها عمل کرد و در معیار دقت نیز توانست بهتر از سایر روشهای مورد مقایسه با سه معمل کند. برای حالتی که رزولوشن تصاویر مشخص باشد آزمایشات بر روی دو تصویر ماهواره ای چند زمانه اجرا و نتاینج به ثبت رسید.

در روش پیشنهادی دوم نحوه استخراج و توصیفگر ویژگی جدیدی معرفی می شود به این ترتیب که ابتدا ویژگیهای گوشه و لبه تصاویر با استفاده از الگوریتم تناسب فاز استخراج شده و تصاویر اصلی به تصاویر PC تبدیل می شوند. سپس از تصاویر به دست آمده نقاط ویژگی KAZE استخراج می شوند. برای نقاط کلیدی به دست آمده توصیفگر KAZE و گابور لگاریتمی با هم ترکیب شده و توصیفگر جدیدی ایجاد می شود. سپس توصیفگر به دست آمده همانند روش اول به الگوریتم VLAD داده میشود و تناظریابی طبق روش اول پیش می رود. روش پیشنهادی دوم بر روی چهار تصویر که تفاوت رادیومتریکی زیادی داشتند و از دو باند مختلف در دو زمان متفاوت اخذ شده بودند اجرا شد. دقت الگوریتم های KAZE و KAZE و SIFT و تصاویر صفر بود، به همین دلیل زمان اجرا و دقت این روش به تنهایی در جدول نتایج ثبت شد.

كليد واژهها: تطبيق تصوير، تصاوير ماهوارهاي، SIFT ،SIFT، تناسب فاز، دستهبندي نقاط كليدي

**زمان ارایه** پنجشنبه، ۴ خرداد ۱۴۰۲ ۱۰:۲۰ – ۱۰:۰۰ (وقت محلی تهران)

سالن ۳۱۳ (دانشکده ریاضی و علوم کامپیوتر)



#### Road Sign Classification using Transfer Learning and Pre-Trained CNN Models

Hosseini, Seyed Hossein, Ghaderi, Foad, Moshiri, Behzad and Norouzi, Mojtaba

Human Computer Interaction Lab. Faculty of Electrical and Computer Engineering, Tarbiat Modares University, Tehran, Iran

School of Electrical and Computer Engineering, University of Tehran, Tehran, Iran

School of ECE, Iran University of Science and Technology, Tehran, Iran

**Abstract:** In this paper, we propose a transfer learning-based approach for road sign classification using pre-trained CNN models. We evaluate the performance of our fine-tuned VGG-16, VGG-19, ResNet50 and EfficientNetB0 models on the German Traffic Sign Recognition Benchmark (GTSRB) test dataset. We introduced a novel contribution by proposing an effective method of data augmentation and class balancing to enhance the performance of the models. We also conduct a comparative analysis of the pre-trained models and demonstrate that the VGG-16 model yields the best performance on the dataset. Our experimental results show that the proposed approach achieves an average accuracy of 99.2% on the GTSRB test dataset, outperforming existing stateof-the-art approaches. The results confirm that transfer learning and pre-trained models can significantly improve the accuracy of road sign classification, even with a relatively small dataset. Our study contributes to the field of intelligent transportation systems by providing an efficient and accurate method for road sign classification. We believe that our approach can be easily extended to other computer vision tasks and applied to real-world scenarios.

**Keywords:** Road sign classification, Transfer learning, Convolutional neural networks, Autonomous Vehicles.



# Applying reinforcement learning in a problem of assigning trucks to origin-destination demands under uncertainty conditions

Zeynab Sadat Tabatabaei Alavi, Hadi Mosadegh

Department of Industrial Engineering and Management Systems, Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran

**Abstract:** Road transportation by truck is very vital and important in Iran. Most of the products produced in the country should to be transported by truck to be transferred to domestic markets. This paper deals with solving the problem of assigning trucks to origin-destination demands under uncertainty in travel times. Trucks are considered as intelligent agents. Then a machine learning algorithm-based on reinforcement learning is used to train the trucks. Due to the nature of the problem, a multi-agent reinforcement learning algorithm is developed and applied to solve a case study including two districts consisting of Iranian provinces. Numerical results show that the proposed approach well recognizes the appropriate allocation in each area and reduces the travel time and costs related to the transportation of trucks, and hence increases the total profitability.

Keywords: Allocation, reinforcement learning, road transportation, truck, intelligent agent, uncertainty



### شناسایی کاربردها، الزامات و راهکارهای توسعه هوش مصنوعی در خدمات نوین خودروسازی با استفاده از تکنیک تحلیل مضمون

محمدجعفری، سیدمحمد محمودی، مهساپیشدار

کارشناسی ارشد مدیریت فناوری اطلاعات گرایش کسب و کار الکترونیک، پردیس فارابی ،دانشگاه تهران ،ایران دانشیار،دکتری مدیریت فناوری اطلاعات،دانشیار دانشکده مدیریت و حسابداری،پردیس فارابی ،دانشگاه تهران،ایران استادیار،دکتری مدیریت تولید و عملیات،استادیار دانشکده مدیریت و حسابداری،پردیس فارابی،دانشگاه تهران،ایران

چکیده: توسعه هوش مصنوعی فرصت های کم نظیری را برای بهبود عملکرد صنایع مختلف از جمله صنعت خودروسازی فراهم میکند.استفاده از هوش مصنوعی در صنعت خودروسازی با هدف غلبه بر چالش هایی همچون افزایش تقاضای سفر ،انتشار دی اکسید کربن ،نگرانی های ایمنی و تخریب محیط زیست است.موفقیت هوش مصنوعی در صنعت خودروسازی تا حد زیادی به در نظر گرفتن مزایا، نگرانی ها و الزامات این فناوری بستگی دارد. تحقیقات پیشین هر کدام از منظر خاصی به فناوری هوش مصنوعی در خودروسازی پرداختهاند و فاقد رویکرد جامع می باشند. هدف اصلی پژوهش حاضر شناسایی کاربرد ها و الزامات هوش مصنوعی در خدمات نوین خودروسازی بود. این پژوهش از نوع کاربردی، و روش گردآوری داده های میدانی مصاحبه های نیمه ساختار یافته بود. جامعه آماری این پژوهش شامل مدیران و کارکنان بخش تحقیق و توسعه شرکت های خودروسازی داخلی (ایران خودرو، سایپا، پارس خودرو، مدیران خودرو، کرمان موتور، گردآوری داده های میدانی مصاحبه های نیمه ساختار یافته بود. جامعه آماری این پژوهش شامل مدیران و کارکنان موه بهمن، جتکو، ایپکو) بود. جهت نمونه برداری با استفاده از روش گلوله برفی بصورت حضوری با افراد مورد نظر به مصاحبه های نیمه ساختار یافته اقدام شد. پس از انجام ۲۸ مصاحبه اشباع نظری حاصل شد. پس از تجزیه و تحلیل مصاحبه ها و کدگذاری آنها به روش تحلیل مضمون، در حوزه الزامات ۲۷ مورد، در حوزه کاربردها ۲۲ مورد، و جهت مصاحبه ها و کدگذاری آنها به روش تحلیل مضمون، در حوزه الزامات ۲۷ مورد، در حوزه کاربردها ۲۷ مورد، و جهت

كلمات كليدى: كاربردها، الزامات، هوش مصنوعى، صنعت خودروسازى، خدمات نوين

سالن ۳۱۳ (دانشکده ریاضی و علوم کامپیوتر)



#### Co-evolving Partial Weights and Architecture of Deep Convolutional Neural Networks for Image Classification

Zaniar.Sharifi, Khabat Soltanian and Ali Amiri

Zanjan University, Zanjan, Iran

Abstract: Neural Architecture Searching (NAS) methods have emerged to find high accuracy architectures without human assistance. NAS method quickly outperforms handcrafted counterparts. However, NAS methods require high computation cost, due to high dimension of search space and the evaluation step which requires to train candidate solutions. In this paper, we propose a Lamarckian genetic algorithm based on CoDeepNEAT, called LCoDeepNEAT which evolves architecture and last layer weights of the network. LCoDeepNEAT evaluates a network via one epoch of SGD and transfers the obtained weights (of last layer) to the weight part of the network's genotype. In addition, it speeds up the process of evolving by limiting architecture search space to discover architectures with at least two fully connected layers as a classifier and increases classification accuracy of solution candidates during evolutionary process. LCoDeepNEAT is evaluated on six widely used image classification datasets and compared with nine state-of-the-art NAS methods. The experimental results demonstrate that LCoDeepNEAT can quickly find competitive CNN architectures. The generated architectures have the least number of parameters, consume less computational resources and provides higher classification accuracy in comparison with other methods.

**Keywords:** convolutional neural network, evolutionary computation, evolving deep neural networks, neural architecture search.

زمان ارایه پنجشنبه، ۴ خرداد ۱۴۰۲ ۱۱:۰۰ – ۱۰:۰۰ (وقت محلی تهران)



#### Safety and Reliability Assessment of Systems in Autonomous and Non-Autonomous Vehicles Industry: Two Classical and Fuzzy Approaches of Fault Tree Analysis

Amini Moghaddam

Graduated with a master's degree in statistics from Shahrood University of Technology

**Abstract:** In this research, we examine the challenges of ensuring the safety of selfdriving car software by presenting two real examples using the classic fault tree (FTA) approach. Process integration, insufficient data, and system complexity in the automotive manufacturing sector are the main uncertainty factors that are used to predict the probability of failure (FP) and are very influential in achieving improved system design and a reliable maintenance program. To deal with such uncertainties, by presenting a case study, we pay to fault tree analysis with a fuzzy approach to evaluate system reliability in a situation where only qualitative data such as experts' opinions or decisions are available and described in terms of language. This research proposes a preventive knowledge-based technique for FP estimation towards an optimal design with system optimization and appropriate maintenance program in the automotive industry.

**Keywords:** Autonomous Systems Safety Assurance of Artificial Intelligence Fault Tree Analysis Fuzzy Set Theory Fuzzy Fault Tree Analysis

International C		Conference on Artificial Intelligence and Smart Vehicle (ICAISV-2023) Department of Mathematics and Computer Science Amirkabir University of Technology Tehran, Iran https://aismartvehicle.aut.ac.ir/				AUT AUT AUT NORC	
Wednesday (May, 24)							
	Bahman Hall (Central Amphitheater of Amirkabir University of Technology) https://meetings2.aut.ac.ir/smart1/						
Time	Topic Presenter						
8:00-9:00	Reception (Physical)						
9:00-11:00	Welcome Session 1 (Physical) with Industry and Academic Invited Speakers			Academic & Indutrial Talks			
11:00-11:30			Break-1		Г		
	Bahman Hall (Central Amphitheater of Amirkabir University of Technology) https://meetings2.aut.ac.ir/smart1/		Fajr Hall (Central Amphitheater of Amirkabir University of Technology) https://meetings2.aut.ac.ir/smart2/		Room 313 (Department of Mathematics and Computer Science) https://meetings2.aut.ac.ir/smart3/		
11:30-12:30	Session 2 Hybrid		Session 3 Hybrid		Session 4 Hybrid		
Time	Торіс	Presenter(s)	Торіс	Presenter(s)	Торіс	Presenter(s)	
11:30-11:50	Clustering of Urban Traffic Patterns by K-Means and Dynamic Time Warping: Case Study	Sadegh Etemad Raziyeh Mosayebi Tadeh Alexani, et al.	A novel MEC-enabled blockchain- based system architecture for smart vehicles data privacy:	Komeil Moghaddasi Shakiba Rajabi	Vehicle Insurance Fraud Detection using Supervised Neural Network Model	Isha Agarwal H.C Taneja Anjana Gupta	
11:50-12:10	A Saturation Modification Image Enhancement Method for Low Light Color Images	Sepideh Khormaeipour Fatemeh Shakeri	Design and Implementation of the algorithm based on Convoloutional Neural Network and Long Short Term Memory on Inerial Measurment Unit sensors for Gait Phase Detection	Mohammad ali Ghiasi Mohsen Bahrami AliKamali Egoli et al.	Using Deep Learning Techniques for Quality Control in Automotive Industry	Morteza Moradi	
12:10-12:30	Driver Cellphone Usage Detection Using Wavelet Scattering and Convolutional Neural Networks	Ali Besharati Ali Nahvi Serajeddin Ebrahimian	Online vehicle detection using gated recurrent units	Arezoo Sedghi Esmat Rashedi Maryam Amoozegar Fatemeh Afsari	How do drivers react after receiving forward collision warnings?	Amir Kamyab Moghaddam Amirmasoud Hamedi Hamed Emami	
12:30-13:00							

Wednesday (May, 24)							
	Bahman Hall (Central Amphitheater of Amirkabir University of Technology)						
Time	Tonic				Presenter		
Time	Session 5				resenter		
13:00-14:00		Keynote Spee	ch (Physical):		Dr. Hamzeh Zakeri		
		Smart					
	Session 6						
14:00-15:00		Keynote Spee	ech (Remote):		Dr. Mahdi Rezaei		
	Local and Global Contextual Features Fusion for Pedestrian Intention Prediction						
15:00-15:30			Break-2				
45-20 46-20		Sess Kouranta Seasa	ion 7		Dr. Nime Mehsierin		
15:30-16:30	Keynote Speech (Remote):				Dr. Nima Mohajerin		
		Long-Tail Learning and Out-of-Distribution Detection in Autonomous Driving					
16:30-17:30		Keynote Spee	Dr. Mohammad Pirani				
	Resilienc	e of connected vehicle					
17:30-17:50	Break-3						
	Bahman Hall (Central Amphitheater of Amirkabir Fajr Hall (Central Amphitheater of Amirkabir			ater of Amirkabir	Room 313 (Department of Mathematics and		
	University of Technology)		University of Technology)		Computer Science)		
	https://meetings2.aut.	ac.ir/smart1/	https://meetings2.aut.ac.ir/smart2/		https://meetings2.aut.ac.ir/smart3/		
17:50-18:50	Session 9		Session 10		Session 11		
	Hybrid		Hybrid		Hybrid		
Time	Торіс	Presenter(s)	Торіс	Presenter(s)	Торіс	Presenter(s)	
	Improving Safe Driving with Diabetic Retinopathy Detection	Niusha Sangsefidi Saeed Sharifian	Real-time mobile mixed-character	Gholamreza Karimi Zahra Alimohammadi Amirhossein Najafi	Deep learning-based SOH		
17:50-18:10			license plate recognition via deep		estimation of Li-ion batteries	Leila Amani Amir Sheikhahmadi	
			network		achievement and progress		
	Stacking Ensemble Learning For Traffic Accident Severity	Hazhir Salari Seved Amin Hosseini	Evaluation of Drivers' Hazard	Mohammad Pashaee	State-Of-The-Art Analysis of the		
18:10-18:30			Perception in Simultaneous		Performance of the Sensors	Amir Meydani	
	, Prediction	, Seno	Longitudinal and Lateral Control	Ali Nahvi	Utilized in Autonomous Vehicles	,	
			or vehicle using				
		Erfan Sabzalian					
10.20 10.50	Roll stability enhancement of a 3-	Mahyar Naraghi	Driver Identification by An	Rouhollah Ahmadian	Semantic Segmentation using	Mehdi Ghasemzadeh	
18:30-18:50	and AFS control	Maryam Ghassabzadeh Saryazdi	Majority-Voting Model Selection	ority-Voting Model Selection Johan Wahlstrom	and Frames Saeed Bagheri Sho	Saeed Bagheri Shouraki	
			indjointy formy model detection				

Thursday (May, 25)							
	Bahman Hall (Central Amphitheater of Amirkabir		Fajr Hall (Central Amphitheater of Amirkabir		Room 313 (Department of Mathematics and		
	University of Tech	inology)	University of Technology)		Computer Science)		
	https://meetings2.aut.	ac.ir/smart1/	https://meetings2.aut.ac.ir/smart2/		https://meetings2.aut.ac.ir/smart3/		
8.00-11.00	Session 12		Session 13		Session 14		
0.00-11.00	Hybrid		Hybrid		Hybrid		
Time	Торіс	Presenter(s)	Торіс	Presenter(s)	Торіс	Presenter(s)	
8:00-8:20	Driver Identification Using Face Liveness Detection	Seyed Ali Mousavi Fard Seyed Saeed Hayati	A Bibliometric Analysis On Artificial Intelligence and Smart Vehicles	Durga Prasad Singh Samanta B.C.M Patnaik Ipseeta Satpathy Jahanzeb Akbar	Improving speech emotion recognition using audio transformer and features fusion	Mehdi Ezoji Fateme Mehrpouyan	
8:20-8:40	A survey on usage of smartphone accelerometer sensor in intelligent transportation systems	Hamid Reza Eftekhari	A Survey on Fraud Detection in Car Insurance	Behnam Yousefimehr Mehdi Ghatee	An Overview of Blockchain-based V2X System	Shabnam Bohlooli Seyyed Amir Asghari Mohammadreza, et al.	
8:40-9:00	Deep learning-based concrete crack detection using YOLO architecture	Elham Nabizadeh Anant Parghi	Deep Parallel Self-Organizing Maps for Visual Classification	Habib Izadkhah Mahsa Famil	Evaluating Influential Parameters on Camera Calibration in Close	Mehrtash Manafifard Fatemeh Hosseini	
9:00-9:20	Generating Control Command for an Autonomous Vehicle Based on Environmental Information	Fatemeh Azizabadi Farahani Saeed Bagheri Shouraki	An ILP Model and Optimal Placement Strategy for Electric Vehicle Charging Stations; Case Study of Tehran's P	Alireza Rajabi Ranjbar Morteza Mollajafari Pooriya Sanaie	Modeling and Understanding the Surrounding of an Autonomous Vehicle	Zahra Dastjerdi Saeed Bagheri Shouraki Fateme Azizabadi	
9:20-9:40	Fractal-Based Spatiotemporal Predictive Model for Car Crash Risk Assessment	Behzad Zakeri Pouya Adineh	Combining SVM with an efficient feature selection mechanism to predict the stock-market trend	Masoomeh Pardakhti Farnaz Hooshmand	Cross-modal Image-Text Retrieval Using Support Vector Machine	Ali Goudarzi Fatemeh Taheri Kambiz Rahbar	
9:40-10:00	Learning-based One-bit DoA Estimation with Single Snapshot	Yasin Azhdari Mahmoud Farhang	Exploring the Use of Efficient Deep Learning Algorithms for Lower Grade Gliomas Cancer Image Segmentation: 	Amirreza Babaahmadi Farzaneh Fallahpour	Forecasting the price of cryptocurrencies in the market using chaotic particle swarm algorithm and neural network	Parisa Tayeb Naeini Jamal Gholami Ahangaran	
10:00-10:20	Routes analysis and dependency detection based on traffic volume:	Maryam Esmaeili Ehsan Nazerfard	User Sentiments of ChatGPT Natural Language Processing Al	Aftab Ara Affreen Ara	Matching satellite images using key point classification	Fatemeh Naserizadeh Ali Jafari	
10:20-10:40	Road Sign Classification using Transfer Learning and Pre-Trained CNN Models	Seyed Hossein Hosseini Foad Ghaderi Behzad Moshiri Mojtaba Norouzi	Applying reinforcement learning in a problem of assigning trucks to origin- destination demands under uncertainty conditions	Zeynab Sadat Tabatabaee Alavi Hadi Mosadegh	Identifying the applications, requirements and solutions for the development of artificial intelligence in modern automotive services	Mohammad Jafari Seyed Mohammad Mahmoudi Mahsa Pishdar	
10:40-11:00	Co-evolving Partial Weights and Architecture of Deep Convolutional Neural Networks for Image Classification	Zaniar Sharifi Khabat Soltanian Ali Amiri	Safety and Reliability Assessment of Systems in Autonomous and Non- Autonomous Vehicles Industry:	M Amini Moghaddam			
11:00-11:30	Break-4						

Thursday (May, 25)							
	Bahman Hall (Central Amphitheater of Amirkabir University of Technology) https://meetings2.aut.ac.ir/smart1/						
Time	Topic Presenter						
11:30-12:30	Closing Session (Physical) with Industry and Academic Invited Speakers Academic & Indutrial Talks					rial Talks	
Workshops							
	Bahman Hall (Central Amphitheater of Amirkabir University of Technology) https://meetings2.aut.ac.ir/smart1/						
Time	Торіс	Presenter	Торіс	Presenter	Торіс	Presenter	
13:30-18:30	Workshop CODE: WDD (Designing an intelligent system for detecting driver drowsiness based on brain electrical signals analysis)	Dr. Golnaz Baghdadi	-		-	-	