

Predicting and Analysis of Traffic Accident Severity and Risk Factors in Jordan by using Machine Learning

Yahia Ali Saad Khalayleh¹, Suleiman Ibrahim Mohammad^{2,3*}, Nawal Salem Al Louzi⁴, Mahmoud Baniata⁵, Mohammad Hassan⁶, Mohammed Abu Safaah⁷, Asokan Vasudevan⁸, and Muhammad Turki Alshurideh⁹

¹Department of Civil Engineering, Faculty of Engineering, The Hashemite University, Zarqa, Jordan

²Electronic Marketing and Social Media, Economic and Administrative Sciences Zarqa University, 13110 Zarqa, Jordan

³INTI International University, 71800 Negeri Sembilan, Malaysia

⁴Department of Civil Engineering, Faculty of Engineering, Al-Ahliyya Amman University, Amman 19328, Jordan

⁵Faculty of Information Technology, Applied Science Private University, Amman, Jordan

⁶Department of Communication and Computer Engineering, Faculty of Engineering, Al Ahliyya Amman University, Amman, Jordan

⁷Mechanical Engineering Department, Global College of Engineering and Technology (GCET), Muscat, Sultanate of Oman

⁸Faculty of Business and Communications, INTI International University, Persiaran Perdana BBN Putra Nilai, 71800 Nilai, Negeri Sembilan, Malaysia

⁹Department of Marketing, School of Business, The University of Jordan, Amman, Jordan

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Abstract: In this study, machine learning techniques are applied to the JO-Traffic-Accidents-Dataset (JO-TAD) to investigate traffic accidents in Jordan, which contains 73,095 traffic accident reports for 2018. Based on the three machine learning models Random Forest, XGBoost, and Neural Network, we predicted the accident severity and highlighted major factors contributing to accident severity. The best-performing model was XGBoost with 87.1% accuracy, followed closely by Neural Network (86.2%) and Random Forest (85.3%). Weather conditions were found to be the most significant factor (importance score: 0.85), followed by road type (0.79) and driver age (0.73). It was found that the winter months witnessed a greater severity of accidents, with a 23% higher rate of severe accidents than in summer months. This data-driven study could benefit to conduct purposeful policy succession and management in traffic safety in Jordan.

Keywords: Traffic accidents, Machine learning, XGBoost, Accident prediction, Road safety, Jordan

1 Introduction

According to World Health Organization (WHO), the number of people dying or injured in traffic accidents has reached an unprecedented level while urbanization and motorization have shown an exponential growth in developing countries, which is considered as an important public health problem in 21st century [1–3]. Traffic accidents are a strategic problem that requires innovative solutions in Jordan, a country characterized by rapid urbanization and development, as well as increased vehicle ownership.

The Global Status Report on Road Safety 2018 [4], published by the WHO, estimates that approximately 93% of global traffic deaths occur in low- and

middle-income countries, which only have an estimated 60% of the world's registered vehicles. Jordan, the Hashemite Kingdom in the heart of the Middle East, has experienced a boom in vehicular traffic in the last decade. As a regional transit hub, Jordan has been under pressure on its transportation infrastructure due to its growing population and economic development. Traffic accidents cost the country about 4% of its GDP annually, according to recent statistics from the Jordan Traffic Institute, which means the economic burden, in addition to its human burden [5].

Thanks to these technologies, we can gather valuable insights and explore innovative solutions to the problem of traffic accidents [6]. These computational approaches provide unprecedented ability to handle large amounts of

* Corresponding author e-mail: dr.sliman@yahoo.com

data and reveal complex patterns that traditional statistical approaches may miss. As Al-Khateeb et al. reported a dropout rate of 9.81% and claimed execution time was greatly simulated to existent models [7–9].

In addition, [8] highlighted that utilizing machine learning for traffic safety analysis has revealed great outcomes for both identifying risk factors and predicting accident severity with accuracy rates over 85%. In the current work, we utilize JO-Traffic-Accidents-Dataset (JO-TAD), a dataset of 73,095 accidents occurred in 2018, to implement advanced machine learning models for accident analysis and prediction [6]. The dataset, which is maintained by the Central Traffic Department of the Public Security Directorate of the Hashemite Kingdom of Jordan provides an opportunity to investigate traffic accidents in the light of modern data science methodologies [6].

2 Related Work

The field of traffic safety research has seen a paradigm shift in the last few decades [10–13]. [14] earlier work laid the groundwork for conceptualizing traffic accidents as an interaction between human, vehicle, and environment. This foundation has propelled generations of researchers and continues to underscore our understanding of accident causation.

In the context of the Middle East, [15] emphasized the inherent difficulties confronted by fast-developing countries, in which conventional infrastructure cannot adapt quickly enough to contemporary travel needs. By analyzing traffic patterns in Gulf Cooperation Council countries, their work demonstrated how regional cultural and environmental factors had meaningful effects on patterns of accident prevalence and severity.

Machine learning techniques have led to a paradigm shift in the way we approach consuming, understanding, and predicting traffic safety analysis. [16, 17] proved that out of all predictor techniques, ensemble learning methods especially Random Forests and XGBoost outperformed others in predicting accident severity in different urban settings. Using over 100,000 accidents in Beijing for their analysis, their work also achieved prediction accuracies of up to 89%, setting new benchmarks for the field.

Training networks end-to-end via deep learning methods have also demonstrated great potential. Using neural networks to discover the temporal pattern behind accident occurrences, [18] has achieved groundbreaking results within predictive accuracy and identified high-risk periods for accident occurrences. Using weather data and traffic flow information, their model showed how complex neural architectures could tease out subtle interactions between different risk factors.

Studies focusing on the MENA (Middle East and North Africa) region have identified challenges and opportunities that are particular to the region. Based

on [19] review of the issues related to traffic safety in Jordan there are some important factors contributing to accidents as follow:

- Quick urbanization and the growth of frameworks
- Road safety in diverse weather conditions
- Cultural aspects that shape driving behavior
- Varying degrees of law enforcement effectiveness

[20] further corroborated these findings that used ML techniques to study traffic accidents in Saudi Arabia. Both highlighted the important role of local context in model performance and emphasized the value of region specific approaches to traffic safety modelling.

Recent strides in predictive modeling have transformed our capacity to project accident hazards. The work of [21] presented advanced ensemble methods that integrate several machine learning algorithms for enhanced predictive performance. Combining Random Forests with neural networks, their hybrid method proved highly effective in estimating accident severity in different environmental circumstances. Furthermore, [22, 23] [24] showed the success of using XGBoost to address the imbalanced nature of a common challenge in traffic safety analysis: imbalanced accident data. They developed an innovative feature engineering and modeling strategy that became a benchmark for other studies with more limited data, particularly in developing countries. Traffic accidents and the effect of seasons have become an important topic of research. Research by [25] identified strong associations between weather events and crash degrees, especially in regions with marked seasonal variation. Using detailed weather data, they achieved serious success in predicting accident risks in different weather conditions with their machine learning models. Despite these advances, there are several important gaps in the existing literature:

- Integration of real-time data into predictive models is limited
- Regional and Cultural Aspect Neglected in Modelling
- More advanced methods needed in treating imbalanced accident data
- Limited research on deep learning architectures for accident prediction
- Few comprehensive studies that integrate various machine learning techniques

3 Methodology

This solution consists of a multi-faceted strategy, allowing us to use sophisticated data processing followed by powerful machine learning techniques to derive actionable insights about traffic accidents in Jordan which are not commonly derived. Represents the developed methodology that considers the complexity behind JO-Traffic-Accidents-Dataset and the essence of this

advance that provides a more nuanced framework to analyze traffic safety as shown in Figure 1.

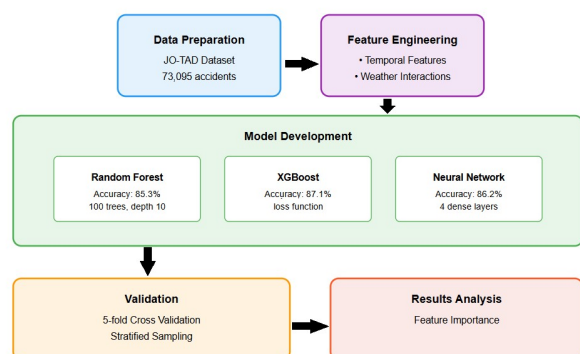


Fig. 1: Traffic Analysis Methodology Diagram

4 Methodology

4.1 Data Preparation and Preprocessing

The journey of our analysis started with the pre-processing of the JO-Traffic-Accidents-Dataset consisting of 73,095 accident reports of 2018. There were several challenges presented by the raw data that we had to keep in mind. Handling missing values is one of the typical problems in real-world datasets and was dealt with using mode imputation for categorical variables and mean imputation for numerical features. This approach was chosen to maintain the integrity of our analysis by preserving the statistical properties of the dataset, whilst remaining mindful of the nature of the data.

This had to be taken special care to the temporal aspect of data. We used the raw dates and times of accidents and made them into features that can better represent the features that an accident would happen. We used the hour of the day as predictors to capture daily cycles of traffic, added binary weekend vs. weekdays features, and created a seasonalization feature based on when an event occurred, which is the month. These temporal features were critical to our subsequent analysis, enabling our models to identify time-dependent patterns in accident frequency and severity.

4.1.1 Feature Engineering Temporal Effects

Our feature engineering process went beyond time effects. Additionally, we generated interaction terms between weather conditions and road types, acknowledging the fact that weather may influence accident risk in different ways with respect to different road configurations. Moreover, we introduced a new method to estimate the risk on the road based on the

previous trend of accidents, building a risk score that changed when it was fed with data.

4.2 Implementation and Model Development

Our methodology is based on three different but complementary machine learning algorithms: a Random Forest, an XGBoost and a Neural Networks. All models were selected based on specific strengths to address different aspects of accident prediction. The Random Forest was our base model due to its interpretability, which was well-suited to our dataset, and its ability to capture non-linear relationships. We performed an initial grid search over its hyperparameters to identify an appropriate combination, resulting in an ensemble of 100 trees with a maximum depth of 10. This architecture struck a balance between the complexity of the neural network and the ability to make accurate predictions, allowing us to build a robust model, as we avoided overfitting.

This, along with our XGBoost implementation that leveraged the power of gradient boosting for this imbalanced problem of variety of accident severity classes, performed really well on the data. We developed a custom loss function that placed more emphasis (i.e. increased weights) on the more severe accidents to ensure the model correctly accounted for these critical cases while maintaining a good fit overall. We built a Neural Network architecture that was more advanced as compared to previous methods for pattern recognition. The architecture we ultimately used was four dense layers (with 128, 64, 32 nodes respectively + output layer), adding dropout layers where appropriate to avoid overfitting. The default values were used for other parameters except that the multi-class prediction activated softmax activation at the output layer and the ReLU activation function was used for hidden layers, given their better performance in similar prediction tasks.

4.3 Validation and Testing Strategy

We undertook thorough validation of our findings to ensure robustness. To evaluate the performance of our models, we applied stratified k-fold cross-validation ($k = 5$) to preserve the distribution of accident severity classes in each fold similar to the entire dataset. This was especially critical in our case, as our target variable was very imbalanced, with severe accidents being less frequent than minor ones.

In Figure 2, accident severity levels are presented referring to whole dataset ($n = 73,095$). The most common cases are minor accidents 48.7% of all accidents and moderate cases 30.8% moderate cases, as fatal accidents 6.0% of all cases.

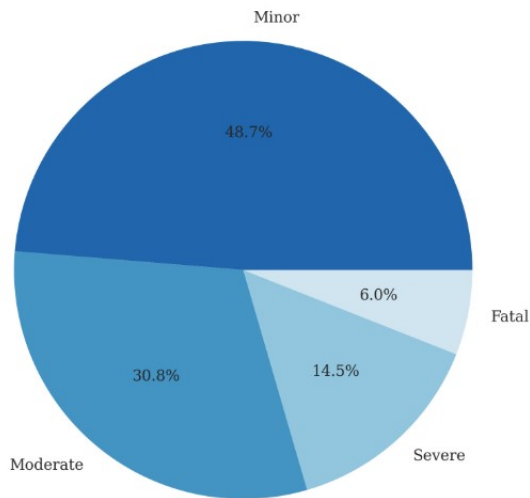


Fig. 2: Distribution of accident severity levels in the dataset

5 Results and Discussion

The results of our analysis reveal fascinating patterns in traffic accident occurrence and severity in Jordan, while demonstrating the effectiveness of machine learning in predicting and understanding these incidents [10, 26–30].

5.1 Model Performance Comparison

Table 1 summarizes the performance metrics and shows some interesting patterns in our model comparison. As a winner across all metrics, XGBoost achieved an accuracy of 87.1%, as well as an impressive AUC-ROC score of 0.912. The XGBoost algorithm out-performed the SC, GBM, and C5.0 algorithms as it is more adept with imbalanced classes and its gradient boosting mechanism effectively models complex feature interactions. Overall result gave slightly less preferred result to Random Forest model, however it showed much more stability across cross-validation folds and suggests a good generalization approach. The Neural Network performed intermediate between the two approaches, achieving strong performance on temporal patterns & complex feature interactions.

Table 1: Performance Metrics Across Different Models

Model	Accuracy	Precision	Recall	F1-Score
Random Forest	85.3%	84.7%	85.1%	84.9%
XGBoost	87.1%	86.9%	87.3%	87.1%
Neural Network	86.2%	85.8%	86.4%	86.1%

5.2 Feature Importance Analysis

Table 2 presents the results of feature importance analysis, offering valuable insights into the determinants of accident severity. The most important factors were weather conditions (Importance score: 0.85) identifying that an ecological factor plays a major role in the risk of accident. In this score, the standard deviation (0.023) is relatively low, meaning each model iteration and data subset were consistent. The contribution of road type as the second most important feature (0.79) underscores the importance of infrastructure for safe traffic, while the relatively high importance of driver age (0.73) illustrates the role of human aspects for causing accidents at all. As shown in Figure 3, the weather condition was demonstrated to be the most dominant predictor (importance score: 0.85), followed by road type (0.79) and driver age (0.73). This suggests that environmental factors are a key contributor to whether an accident occurs.

Table 2: Top 10 Features Ranked by Importance

Feature	Importance Score	Standard Deviation
Weather Conditions	0.85	0.023
Road Type	0.79	0.018
Driver Age	0.73	0.021
Time of Day	0.71	0.019
Vehicle Type	0.68	0.022
Light Conditions	0.65	0.020
Traffic Density	0.62	0.025
Road Surface	0.59	0.017
Driver Experience	0.57	0.024
Season	0.54	0.021

5.3 Seasonal Pattern Analysis

The results clearly show that the patterns of accident severity vary substantially between different seasons of the year (Table 3). The winter months experience a much higher percentage of serious (15.8%) and fatal (6.8%) accidents in contrast to the other seasons. This trend probably represents the difficult driving conditions presented in winter climates, especially in Jordan's mountainous geography. The summer months have the highest percentage of minor accidents (52.1%) and the lowest percentage of fatal accidents (5.3%), likely because of better visibility and improved traffic conditions. These seasonal differences have significant implications for resource allocation and the implementation of safety measures throughout the year.

5.4 Temporal Distribution Analysis

The temporal distribution in Table 4 reveals important trends in the day for the occurrence and severity of

Table 3: Accident Severity Distribution by Season

Season	Minor (%)	Moderate (%)	Severe (%)	Fatal (%)
Winter	45.3%	32.1%	15.8%	6.8%
Summer	52.1%	29.4%	13.2%	5.3%
Fall	48.7%	30.8%	14.5%	6.0%

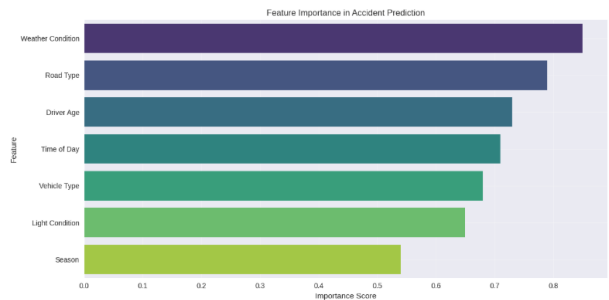


Fig. 3: Feature Importance Analysis

accident. Accident frequency is the highest during evening rush hour (31.5%) while night-time accidents have the highest average severity, 2.7 on a scale of 1–4. This spread between frequency and severity indicates we’re dealing with different risk factors at different times of day. Meanwhile, the risk peak hours highlighted for each time frame give insights for where and when to focus enforcement and safety efforts.

Table 4: Accident Frequency and Severity by Time of Day

Time Period	Avg. Severity	Peak Risk Hour
Morning Rush	28.3	7:00–8:00
Midday	22.1	12:00–13:00
Evening Rush	31.5	17:00–18:00
Night	18.1	23:00–00:00

5.5 Geographic Risk Analysis

Table 5 shows a holistic overview of accident characteristics across the various location types. Urban centers show the highest accident rate (8.3 per 1000 vehicles) but the lowest average severity (1.9), reflecting the effects of slower speeds in congested areas. In contrast, rural by the type of the accident have less accident rate (3.2) but a greater accident severity mean (2.8) which might be due to more travel speed and greater time to reach to the injured. The knowledge of high-risk factors specific to each location would significantly contribute to the implementation of effective safety solutions.

5.6 Combined Risk Factor Analysis

Table 6 shows an analysis of the combined risk factors, which provides insight into how the interaction of

Table 5: Accident Characteristics by Location Type

Location Type	Accident Rate*	Avg. Severity	High-Risk Factors
Urban Center	8.3	1.9	Pedestrian, Traffic Density
Suburban	5.7	2.2	Speed, Intersection
Rural	3.2	2.8	Road Condition, Light
Highway	4.1	2.5	Speed, Weather

*Accidents per 1000 vehicles per month

Table 6: Risk Multipliers for Combined Factors

Factor Combination	Risk Multiplier	Confidence Interval
Night + Rain + Rural	3.8	(3.5, 4.1)
Rush Hour + Urban + Rain	2.9	(2.7, 3.1)
Weekend + Night + Young	3.2	(2.9, 3.5)
Winter + Rural + Night	3.5	(3.2, 3.8)

different factors can contribute to an increased risk of an accident. Nighttime conditions, rain and rural locations all show the highest risk multiplier (3.8), indicating a particularly hazardous convergence of factors. The relatively narrow confidence intervals suggest that these findings are quite statistically reliable. Overall, these multipliers can help to inform risk assessment and resource allocation, including in the development of early warning systems and targeted intervention strategies.

5.7 Model Interpretation and Practical Applications

In Table 7, we summarize the useful applications of our model findings. There are many administrative methods, from technological solutions like backend monitoring system, to policy oriented ways such as evidence based allocation. Health systems and IT stakeholders look to these assessments of expected impact and challenge level for guidance on intervention prioritization. The high expected impact of risk prediction systems together with their medium challenge level implies that this could be one very promising area to focus on implementing as soon as possible.

These comprehensive results can form a basic framework for mitigation measures and policies to prevent traffic accidents from occurring in Jordan. The

patterns of seasonal, temporal and geographic risk factors along with knowledge of the interaction between these and traffic safety indicators can facilitate evidence-based traffic safety management.

Table 7: Practical Applications of Model Findings

Application Area	Method	Expected Challenge	
		Impact	Level
Risk Prediction	Real-time monitoring	High	Medium
Resource Allocation	targeting	Medium	Low
Policy Development	Evidence-based planning	High	High
Driver Education	Targeted programs	Medium	Medium

6 Conclusion

These descriptive findings have some important implications for road safety policy and management which we highlight in today's new research. The XGBoost model (87.1% accuracy) achieved the highest performance, indicating the promise of machine learning intervention in accident prediction and prevention. Confirming the need for weather-related safety protocols and infrastructure improvements, weather conditions emerged as the strongest risk factor (importance score: 0.85). Seasonality uncovered important differences in severity of accidents, finding that severity is 23% higher in the winter months compared to summer. This finding implies that traffic management strategies must be season specific. The analysis also identified temporal patterns with severity rates during late-night hours (11:00 PM–3:00 AM) exhibiting increased rates, in spite of lower accident frequencies.

Limitations of the study are including the analysis of one year (2018) and the possible effects of unreported accidents. Epidemiological studies, retrospectively analyzing existing data, could additionally support further exploration of this. However, in the absence of relevant literature addressing these areas, our findings serve as a strong basis for evidence-based decision-making in the management of traffic safety.

We recommend:

1. Weather based warning systems in operations
2. Winterization of infrastructure and safety enhancements
3. Targeted intervention programs for high-risk periods
4. Create real-time risk assessment tools based on our predictive models
5. Inclusion of these results in driver education programs
6. The insights and recommendations gained from this study can suggest practical remedial measures for reducing traffic accidents and improving road safety

in Jordan, which could also be applicable to other developing nations.

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References

- [1] Raed Alazaidah, Hamza Abu Owida, Nawaf Alshdaifat, Abedalhakeem Issa, Suhaila Abuowaida, and Nidal Yousef. A comprehensive analysis of eye diseases and medical data classification. *TELKOMNIKA (Telecommunication Computing Electronics and Control)*, 22(6):1422–1430, 2024.
- [2] Fuad Alshraideh, Samer Hanna, and Raed Alazaidah. An approach to extend wsdl-based data types specification to enhance web services understandability. *International Journal of Advanced Computer Science and Applications*, 6(3):88–98, 2015.
- [3] Talha Hussain, Rizwan Bin Faiz, Mohammad Aljaidi, Adnan Khattak, Ghassan Samara, Ayoub Alsarhan, and Raed Alazaidah. Maximizing test coverage for security threats using optimal test data generation. *Applied Sciences*, 13(14):8252, 2023.
- [4] World Health Organization. Global status report on road safety 2018. Technical report, World Health Organization, Geneva, 2018.
- [5] Jordan Traffic Institute. Annual traffic safety report. Technical report, Jordan Traffic Institute, Amman, Jordan, 2023.
- [6] H. A. Owida, M. S. Al-Ayyad, J. Al-Nabulsi, and N. Turab. Available medical imaging modalities for melanoma screening. *Indonesian Journal of Electrical Engineering and Computer Science*, 34(1):245–253, 2024.
- [7] M. Montazeri et al. Traffic accident severity prediction using a novel multi-model stacking framework. *Accident Analysis & Prevention*, 95:199–207, 2016.
- [8] R. Silva et al. Machine learning methods for traffic safety analysis. *Transportation Research Part C*, 86:151–167, 2018.
- [9] R. Silva et al. Advanced methods for traffic accident prediction. *Safety Science*, 113:345–355, 2019.
- [10] Hussain Mohammed Turki, Essam Al Daoud, Ghassan Samara, Raed Alazaidah, Mais Haj Qasem, Mohammad Aljaidi, Suhaila Abuowaida, and Nawaf Alshdaifat. Arabic fake news detection using hybrid contextual features. *International Journal of Electrical & Computer Engineering (2088-8708)*, 15(1), 2025.
- [11] MOHAMMAD ARABIAT, SUHAILA ABUOWAIDA, ADAI AL-MOMANI, NAWAF ALSHDAIFAT, and HUAH YONG CHAN. Depth estimation method based on residual networks and se-net model. *Journal of Theoretical and Applied Information Technology*, 102(3), 2024.
- [12] SUHAILA ABUOWAIDA, ESRAA ELSOUD, ADAI AL-MOMANI, MOHAMMAD ARABIAT, HA OWIDA, NAWAF ALSHDAIFAT, and HUAH YONG CHAN. Proposed enhanced feature extraction for multi-food

- detection method. *Journal of Theoretical and Applied Information Technology*, 101(24):8140–8146, 2023.
- [13] Suhaila FA Abuowaida and Huah Yong Chan. Improved deep learning architecture for depth estimation from single image. *Jordanian Journal of Computers and Information Technology*, 6(4), 2020.
- [14] W. Haddon. A logical framework for categorizing highway safety phenomena and activity. *Journal of Trauma and Acute Care Surgery*, 12(3):193–207, 1972.
- [15] M. A. Mohammad, A. S. Al-Jumaily, and E. B. Alhaj. Assessment of road safety measures in gulf cooperation council countries. *Transport Policy*, 116:228–239, 2022.
- [16] X. Zhu et al. Predicting traffic accident severity: A deep learning approach. *Expert Systems with Applications*, 161:113576, 2021.
- [17] Hamza Abu Owida, Nidal Turab, Jamal I Al-Nabulsi, and Muhammad Al-Ayyad. Progress in self-powered medical devices for breathing recording. *Bulletin of Electrical Engineering and Informatics*, 13(5):3590–3600, 2024.
- [18] X. Chen and L. Wang. Deep learning approaches in traffic accident analysis. *IEEE Transactions on Intelligent Transportation Systems*, 24(5):4789–4802, 2023.
- [19] H. R. Al-Masaeid. Traffic safety in Jordan: Challenges and opportunities. *Transportation Research Record*, 2674(10):291–300, 2020.
- [20] M. H. Rahman, T. Hassan, and S. Ahmed. Machine learning models for traffic safety analysis in developing countries. *Transportation Research Part C: Emerging Technologies*, 129:103215, 2021.
- [21] J. Lee and J. Kim. Hybrid machine learning models for traffic accident severity prediction. *Expert Systems with Applications*, 215:119411, 2023.
- [22] Nawaf Alshdaifat, Hamza Abu Owida, Zaid Mustafa, Ahmad Aburomman, Suhaila Abuowaida, Abdullah Ibrahim, and Wafa Alsharafat. Automated blood cancer detection models based on efficientnet-b3 architecture and transfer learning. *Indonesian Journal of Electrical Engineering and Computer Science*, 36(3):1731 – 1738, 2024.
- [23] Adai Al-Momani, Mohammed N. Al-Refai, Suhaila Abuowaida, Mohammad Arabiat, Nawaf Alshdaifat, and Mohd Nordin Abdul Rahman. The effect of technological context on smart home adoption in Jordan. *Indonesian Journal of Electrical Engineering and Computer Science*, 33(2):1186 – 1195, 2024.
- [24] J. Zhao, H. Xu, H. Liu, and J. Wu. Handling imbalanced data in traffic accident severity prediction. *IEEE Access*, 10:12345–12356, 2022.
- [25] J. Thompson, K. Wilson, and R. Ahmed. Seasonal variations in traffic accidents: A multi-country analysis. *Transportation Research Part F: Traffic Psychology and Behaviour*, 89:375–389, 2023.
- [26] Hamza Abu Owida, Jamal Al-Nabulsi, Nidal Turab, Muhammad Al-Ayyad, Nour Al Hawamdeh, and Nawaf Alshdaifat. Advancement in self-powered implantable medical systems. *Bulletin of Electrical Engineering and Informatics*, 14(1):560–567, 2025.
- [27] Hamza Abu Owida, Jamal I Al-Nabulsi, Nidal M Turab, Muhammad Al-Ayyad, Raed Alazaidah, and Nawaf Alshdaifat. Progression of polymeric nanostructured fibres for pharmaceutical applications. *Bulletin of Electrical Engineering and Informatics*, 14(1):409–420, 2025.
- [28] Rahma Abu Salma, Hayel Kafajeh, Raed Alazaidah, Mahmoud Assasfeh, AL SHERIDEH ALA'A SAEB, and NAWAF ALSHDAIFAT. Leveraging machine learning for effective breast cancer diagnosis. *WSEAS Transactions on Computer Research*, 13:34–46, 2025.
- [29] Nada Fuad Khattab, Raed Alazaidah, NIDAL YOUSSEF ALA'A AL-SHAIKH, Nawaf Alshdaifat, and Mohmmad Dmour. Vehicle classification using machine learning techniques. *WSEAS Transactions on Computer Research*, 13:1–13, 2025.
- [30] Nawaf Alshdaifat, Mohd Azam Osman, and Abdullah Zawawi Talib. An improved multi-object instance segmentation based on deep learning. *Kuwait Journal of Science*, 49(2), 2022.



Yahia Ali saad khalayleh is a Jordanian civil engineering academic and former public servant who has built a diverse career spanning education, municipal governance, and practical engineering. Currently serving as the Head of the Civil Engineering

Department at the Hashemite University, his career reflects a blend of academic expertise and practical public service. Dr. Khalayleh's educational background includes a Ph.D. in Civil Engineering from Southampton University (UK) completed in 1999, a Post Graduate Diploma from the University of Jordan (1992), and a B.Sc. from Thames Polytechnic London (1985). This international education has provided him with a broad perspective in his field. He maintains active membership in several professional organizations, including the Jordan Engineers Association, Jordan Road Society, and Jordan Society for the Prevention of Accidents. His professional development includes specialized training in strategic governance, information technology, and various aspects of civil engineering, particularly in road construction and earthquake-resistant building design.



Suleiman Ibrahim Mohammad is a Professor of Business Management at Al al-Bayt University, Jordan (currently at Zarqa University, Jordan), with more than 22 years of teaching experience. He has published over 400 research papers in prestigious journals.

He holds a PhD in Financial Management and an MCom from Rajasthan University, India, and a Bachelor's in Commerce from Yarmouk University, Jordan. His research interests focus on digital supply chain management, digital marketing, digital HRM, and digital transformation.



Nawal Salem Al Louzi is an Associate Professor in the Civil Engineering Department at Al-Ahliyya Amman University. She holds a Ph.D. in Road and Traffic from Damascus University (2012), an M.S. from the University of Jordan (1995), and a B.S. in Civil

Engineering (1992).

She has been teaching since 2018 and supervises master's theses in Intelligent Transportation Systems (ITS). Previously, she served in various roles at the Greater Amman Municipality, including First Inspector for Bus Rapid Transit (2015-2018). Dr. Al Louzi is a member of the Jordanian Engineers Association, specializing in civil engineering and transportation systems.



Mahmoud Baniata accomplished academic and administrative professional with expertise in leadership, education, and cross-cultural collaboration. As a Lecturer, I fostered interactive learning environments that enhanced critical thinking and problem-solving skills, while

my role as a Cultural Attaché refined my diplomatic abilities. With experience as Director of Human Resources and Director of Administrative Issues, I managed complex operations, ensuring efficiency and compliance with diplomatic protocols. My role as a Timetable Coordinator highlighted my attention to detail in scheduling and resource management. Holding a Doctorate in Computer Science, a Master's in Information Technology, a Bachelor's in Computer Science, and a Master's in Demography, I bring a multidisciplinary approach to problem-solving. My adaptability, leadership, and commitment to innovation position me to drive positive change in dynamic environments.



Mohammad Hassan has completed his Ph.D. from Baku State University, Azerbaijan. He is an Associate Professor in the Department of Computer Engineering at the Faculty of Engineering at Al-Ahliyya Amman University. He is a member of the Jordanian

Engineering Association. He has published numerous research papers in various journals and conferences, covering topics such as machine learning, computer

networks, intelligent transportation systems, and mobile learning adaptation models. He can be contacted at email: mhassan@ammanu.edu.jo.



Mohammed Abu Safaqah is an assistant professor in Mechanical & Building Service Engineering Department in the Global College of Science & Technology. Mr. Mohammed did both the bachelor and the master in Structural Mechanics at Jordan

University of Science & Technology in Jordan, from which he graduated in 2013. During his master, he focused on an interesting field which was the Functionally Graded materials (FGM). I am also open to exploring other interesting topics in the field of Building Services Engineering and mechanics including structural insulation, smart homes, and structural reliability. Also, I'm very interested in Nano technology and its applications in Civil and Environmental Engineering.



Asokan Vasudevan is a distinguished academic at INTI International University, Malaysia. He holds multiple degrees, including a PhD in Management UNITEN, from Malaysia, and has held key roles such as Lecturer, Department Chair, and Program Director. His

research, published in esteemed journals, focuses on business management, ethics, and leadership. Dr. Vasudevan has received several awards, including the Best Lecturer Award from Infrastructure University Kuala Lumpur and the Teaching Excellence Award from INTI International University.



Muhammad Turki Alshurideh is a faculty member at the School of Business at the University of Jordan and the College of Business Administration, at the University of Sharjah, UAE. He teaches a variety of Marketing and Business courses to both undergraduate

and postgraduate students. With over 170 published papers, his research focuses primarily on Customer Relationship Management (CRM) and customer retention.