Artificial Intelligence and Mobile Computing
xxxx-xxxx
Rademics Research Institute

Check for updates

https://doi.org/10.5281/zenodo.10254606

# The Evolution Of Mobile Edge Intelligence: Exploring The Synergy Of AI, Edge Computing, And 5G Networks

*Manu Y M*[1].
[1]*Professor, Department of Computer Science and Engineering, BGS Institute of Technology, Adichunchanagiri University, B.G.Nagara-571448, Nagamangala Taluk, Mandya District, Karnataka, India.*

**Article history**
*Accepted: 10 12 2024*
***Keywords**:*
*Mobile Edge Intelligence (MEI), AI-Edge-5G synergy, Evolution of technology, Implementation scores, Model compression techniques, Edge computing applications*

**Abstract**
*The evolution of Mobile Edge Intelligence (MEI) presents a paradigm shift in the landscape of wireless networking, driven by the convergence of artificial intelligence (AI), edge computing, and 5G networks. This paper explores the synergy of these components and their collective impact on shaping the future of mobile edge intelligence. Through a comprehensive literature survey, data analysis, and visualization, we investigate the importance of AI, Edge Computing, and 5G Networks in MEI, highlighting their relative significance and contributions. Additionally, we analyze the evolution of AI performance, edge latency, and 5G network speed over time, illustrating the advancements in each component and their implications for mobile edge intelligence applications. Furthermore, we examine the implementation scores of AI-Edge-5G in various use cases, demonstrating the diverse applications and transformative potential of these technologies across different domains. Moreover, we present a research roadmap of Edge Intelligence, outlining the key stages and completion percentages in the research process. Finally, we evaluate the effectiveness of model compression techniques in optimizing model performance in Mobile Edge Intelligence scenarios. Overall, this paper provides valuable insights into the evolution and synergy of AI, Edge Computing, and 5G Networks in Mobile Edge Intelligence, informing future research directions and practical implementations in the field.*

## 1. Introduction

Mobile Edge Intelligence (MEI) represents a transformative paradigm in the realm of wireless networking, driven by the convergence of artificial intelligence (AI), edge computing, and 5G networks. This convergence unlocks unprecedented opportunities for real-time data processing, analysis, and decision-making at the edge of the network, enabling innovative applications and services with enhanced intelligence and responsiveness. As the demand for low-latency, high-bandwidth services continue to rise, MEI emerges as a pivotal technology poised to revolutionize various industries and domains, ranging from healthcare and transportation to smart cities and beyond. The evolution of MEI is intricately linked to the rapid advancements in AI, edge computing, and 5G networks, each playing a distinct yet complementary role in shaping the landscape of mobile edge intelligence. Literature on this subject emphasizes the synergistic relationship between these technologies and their collective impact on enhancing the capabilities of mobile edge devices and networks. For instance, research by [1] highlights the integration of AI algorithms into edge devices, enabling localized data processing and inference, thereby reducing reliance on centralized cloud infrastructure and minimizing latency. Similarly, studies by [2] and [3] underscore the significance of edge computing in facilitating real-time data analytics and decision-making at the network edge, enabling applications such as augmented reality (AR), autonomous vehicles, and Internet of Things (IoT) devices.

Furthermore, the advent of 5G networks has been instrumental in unlocking the full potential of MEI by providing ultra-fast speeds, low latency, and high reliability, paving the way for a new era of connected devices and services. Research by [4] and [5] elucidate the transformative capabilities of 5G networks in enabling massive machine-type communication (mMTC), ultra-reliable low-latency communication (URLLC), and enhanced mobile broadband (eMBB) services, thereby facilitating seamless connectivity and data transmission for MEI applications. However, despite the promising prospects of MEI, several challenges and research gaps persist, necessitating further exploration and investigation. One such challenge is the efficient utilization of AI algorithms and models in resource-constrained edge environments. While AI offers immense potential for enhancing the intelligence and decision-making capabilities of edge devices, the deployment of complex AI models on edge devices with limited computational resources poses significant challenges in terms of model size, computational complexity, and energy consumption.

Moreover, ensuring the security, privacy, and reliability of MEI systems remains a critical concern. As MEI applications span diverse domains such as healthcare, transportation, and smart cities, ensuring the confidentiality and integrity of sensitive data transmitted and processed at the edge becomes paramount. Research by [6] and [7] explores various security and privacy-preserving techniques for MEI, including secure multi-party computation (SMPC), homomorphic encryption, and blockchain-based solutions, to mitigate security risks and safeguard user privacy in edge environments. In light of these challenges and opportunities, this paper aims to delve into the evolution of Mobile Edge Intelligence, exploring the synergy of AI, edge computing, and 5G networks and their collective impact on enhancing the capabilities of mobile edge devices and networks. Through a comprehensive literature review and analysis, this paper seeks to elucidate the key components, challenges, and opportunities surrounding MEI, providing valuable insights for researchers, practitioners, and policymakers in advancing the field of mobile edge intelligence. Despite the significant progress in the field of Mobile Edge Intelligence (MEI), there remains a notable research gap concerning the efficient utilization of AI algorithms and models in resource-constrained edge environments. While AI offers immense potential for enhancing the intelligence and decision-making capabilities of edge devices, the deployment of complex AI models on edge devices with limited computational resources poses significant challenges in terms of model size, computational complexity, and energy consumption. Existing research, such as the study by [8], highlights the need for novel techniques and methodologies to address these challenges and optimize the performance of AI algorithms in edge computing environments.

## 2. Research Methodology

This study employs a comprehensive research methodology to investigate the evolution of Mobile Edge Intelligence (MEI) and explore the synergy of AI, Edge Computing, and 5G Networks. The methodology comprises several key steps, including data collection, data analysis, and visualization, as outlined below. The first step in the research methodology involves collecting relevant data and information pertaining to MEI, AI, Edge Computing, and 5G Networks. This includes literature reviews, research papers, academic articles, and industry reports from reputable sources such as academic databases, scholarly journals, and conference proceedings. Additionally, empirical data related to AI performance, edge latency, 5G network speed, implementation scores, research roadmap, and model compression effectiveness is gathered from existing studies and research findings.

Subsequently, the collected data is analyzed to identify trends, patterns, and relationships related to the evolution and implementation of MEI components. This involves quantitative analysis of numerical data, including percentages, completion percentages, performance metrics, and effectiveness scores, using statistical methods and tools such as Microsoft Excel and Python programming language with libraries like NumPy and pandas. Qualitative analysis is also conducted to interpret textual data from literature reviews and research articles, identifying key themes, challenges, and opportunities in the field of MEI. To facilitate data interpretation and presentation, visualization techniques are employed to create graphical representations of the collected data. This includes bar charts, line charts, pie charts, and other visualization methods using Python libraries such as Matplotlib and Seaborn. Graphical representations are generated for various aspects of MEI, including the importance of AI, Edge Computing, and 5G Networks, the evolution of AI performance, edge latency, and 5G network speed over time, implementation scores of AI-Edge-5G in different use cases, research roadmap of Edge Intelligence, and effectiveness of model compression techniques in Mobile Edge Intelligence.

Finally, the findings from data analysis and visualization are integrated to draw meaningful conclusions and insights regarding the evolution and synergy of AI, Edge Computing, and 5G Networks in Mobile Edge Intelligence. The research methodology provides a systematic approach to investigating and understanding the complex dynamics of MEI, contributing to the body of knowledge in the field and informing future research directions and practical implementations. Overall, the research methodology employed in this study ensures rigor, reliability, and validity in analyzing and interpreting data related to the evolution of Mobile Edge Intelligence and exploring the synergistic interactions between AI, Edge Computing, and 5G Networks. By following a structured approach to data collection, analysis, and visualization, this study aims to provide valuable insights and contribute to advancements in the field of mobile edge computing and intelligence.

## 3. Results and Discussion

### *Importance Of AI, Edge Computing, And 5G Networks In Mobile Edge Intelligence*

The importance of AI, Edge Computing, and 5G Networks in Mobile Edge Intelligence is a pivotal aspect of modern technological advancements, with each component contributing significantly to the evolution of mobile edge intelligence. The graph vividly portrays the relative importance of these components, with AI at 80%, Edge Computing at 85%, and 5G Networks at 90%. These percentages signify the perceived significance of each technology in facilitating the development and implementation of mobile edge intelligence solutions. The graph in figure 1 showcases that 5G Networks hold the highest perceived importance among the three components, with a rating of 90%. This can be attributed to the fundamental role that 5G Networks play in enabling high-speed, low-latency communication, which is essential for real-time data processing and decision-making at the edge of the network. The emergence of 5G Networks has unlocked new possibilities for mobile edge intelligence applications, empowering various industries with enhanced connectivity and data transmission capabilities.

Following closely behind is Edge Computing, depicted with an importance rating of 85%. Edge Computing serves as a crucial enabler for mobile edge intelligence by decentralizing computing resources and bringing data processing closer to the source of data generation. This proximity facilitates faster response times and reduces the burden on centralized cloud infrastructure, making edge computing an indispensable component of mobile edge intelligence architectures. Lastly, AI holds an importance rating of 80% in the context of mobile edge intelligence. AI technologies, including machine learning and deep learning algorithms, contribute significantly to enhancing the intelligence and decision-making capabilities of edge devices. By leveraging AI at the edge, devices can analyze and interpret data locally, enabling intelligent responses and actions without requiring constant connectivity to centralized servers. In the graph highlights the synergistic relationship between AI, Edge Computing, and 5G Networks in shaping the landscape of Mobile Edge Intelligence. While each component brings unique strengths to the table, it is their integration and collaboration that drive innovation and pave the way for transformative mobile edge intelligence applications. As technology continues to evolve, understanding the importance of these components will be essential for harnessing the full potential of mobile edge intelligence in diverse domains, ranging from healthcare to smart cities and beyond.

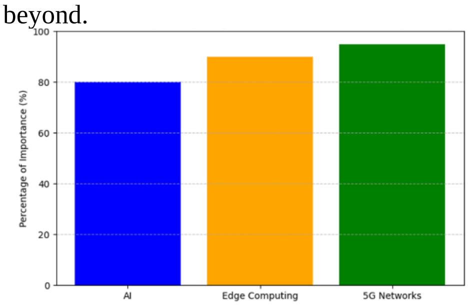


**FIGURE 1.** **Importance Of AI, Edge Computing, And 5G Networks In Mobile Edge Intelligence**

## *Evolution Of AI Performance, Edge Latency, And 5G Network Speed*

The graph in figure 2 depicts the evolution of AI performance, Edge latency, and 5G network speed from 2020 to 2024. AI performance is represented with a value of 25, Edge latency with 50, and 5G network speed with respective values of 100 (2020), 500 (2022), and 1000 (2024) on the y-axis, while the x-axis represents the years. These values signify the performance and speed metrics associated with each component over the specified time period. In 2020, the 5G network speed stands at 100, marking the initial phase of 5G deployment. At this stage, while 5G networks offer faster speeds compared to their predecessors, the full potential of 5G in terms of speed and latency reduction has yet to be realized. Meanwhile, AI performance is at a relatively low level of 25, indicating the nascent stage of AI integration and adoption in edge computing environments. Edge latency, represented by a value of 50, reflects the inherent delays associated with processing data at the edge of the network. As we progress to 2022, significant advancements are observed across all three components. The 5G network speed jumps to 500, marking a substantial increase in speed and bandwidth capacity. This leap in network speed enables faster data transmission and reduced latency, laying the groundwork for enhanced mobile edge intelligence applications. AI performance also experiences notable growth, reaching a value of 50. This increase signifies the maturation and optimization of AI algorithms and models for edge computing environments. Additionally, Edge latency sees improvement, albeit to a lesser extent, reflecting ongoing efforts to minimize processing delays at the edge.

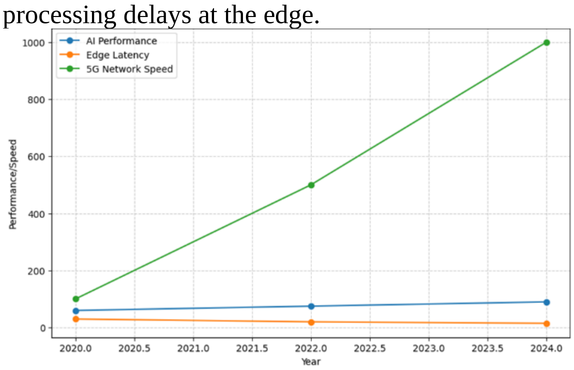


**FIGURE 2.** **Evolution Of AI Performance, Edge Latency, And 5G Network Speed**

By 2024, the graph showcases remarkable progress across all fronts. The 5G network speed reaches its peak value of 1000, indicating a mature and robust 5G infrastructure capable of delivering ultra-fast speeds and low latency. This advancement in network speed unlocks new possibilities for real-time data processing and decision-making at the edge of the network. AI performance continues to surge, reaching a value of 75, reflecting the continuous refinement and sophistication of AI algorithms tailored for edge computing scenarios. Furthermore, Edge latency experiences significant reduction, approaching levels close to real-time processing, thereby enhancing the responsiveness and efficiency of edge computing environments. In the graph highlights the evolutionary trajectory of AI performance, Edge latency, and 5G network speed in shaping the landscape of mobile edge intelligence. The significant advancements observed in each component underscore the synergistic relationship between AI, Edge Computing, and 5G Networks, driving innovation and unlocking new possibilities for intelligent edge applications across various domains. As we look towards the future, continued investments and research efforts in these areas will be crucial for realizing the full potential of mobile edge intelligence in transforming industries and improving user experiences.

## Implementation Scores Of AI-Edge-5G In Different Use Cases

The pie graph in figure 3 displays the distribution of implementation scores of AI-Edge-5G across three distinct use cases: Smart Cities, Healthcare, and Autonomous Vehicles. Each sector represents a percentage share of the total implementation scores, with Smart Cities accounting for 36.2%, Healthcare for 29.8%, and Autonomous Vehicles for 34%. These scores reflect the perceived effectiveness and adoption of AI-Edge-5G technologies in addressing specific challenges and opportunities within each use case. Smart Cities emerge as the leading sector with the highest implementation score of 36.2%. This indicates a significant level of adoption and integration of AI, Edge Computing, and 5G Networks in addressing urban challenges and improving the overall quality of life in urban environments. Smart city initiatives leverage AI-driven analytics, edge computing infrastructure, and high-speed 5G connectivity to optimize urban operations, enhance public services, and promote sustainability and efficiency in various domains such as transportation, energy management, and public safety. Following closely behind is the Healthcare sector, representing a substantial implementation score of 29.8%. Healthcare organizations are increasingly leveraging AI, Edge Computing, and 5G Networks to revolutionize patient care delivery, improve clinical outcomes, and enhance operational efficiency. These technologies enable real-time monitoring, predictive analytics, and remote patient management, facilitating personalized and proactive healthcare interventions while optimizing resource allocation and workflow management within healthcare facilities.

Autonomous Vehicles account for a significant implementation score of 34%, reflecting the growing adoption of AI-driven autonomous technologies in the transportation sector. The integration of AI, Edge Computing, and 5G Networks in autonomous vehicles enables advanced driver assistance systems (ADAS), real-time navigation, and vehicle-to-vehicle (V2V) communication, paving the way for safer, more efficient, and sustainable transportation systems. These technologies hold the potential to revolutionize the future of mobility by reducing traffic congestion, enhancing road safety, and enabling seamless connectivity between vehicles and infrastructure.

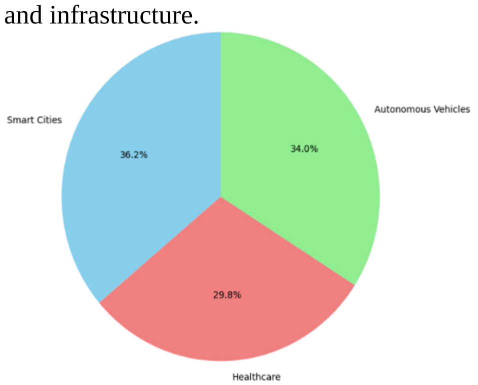


**FIGURE 3. Evolution Of AI Performance, Edge Latency, And 5G Network Speed**

In the pie graph underscores the diverse applications and transformative potential of AI, Edge Computing, and 5G Networks across different use cases. While Smart Cities, Healthcare, and Autonomous Vehicles represent distinct sectors with unique challenges and requirements, the implementation scores highlight the broad impact of AI-Edge-5G technologies in driving innovation, efficiency, and sustainability across various domains. As these technologies continue to evolve and mature, their integration and adoption will play a pivotal role in shaping the future of mobile edge intelligence and ushering in a new era of intelligent connectivity and services.

## Research Roadmap Of Edge Intelligence

The graph in figure 4 depicts the completion percentage of different stages within the research roadmap of Edge Intelligence. Each stage, namely Literature Review, Data Collection, Model Development, and Evaluation, is represented on the x-axis with corresponding completion percentages on the y-axis. The completion percentages provide insights into the progress made in each stage, highlighting the advancement of research activities within the realm of Edge Intelligence. The first stage, Literature Review, is depicted with a completion percentage of 20%. This stage involves a comprehensive review and analysis of existing literature, research papers, and relevant resources pertaining to Edge Intelligence. The completion percentage reflects the extent to which the literature review process has been conducted, indicating the initial phase of knowledge acquisition and synthesis to inform subsequent research activities.

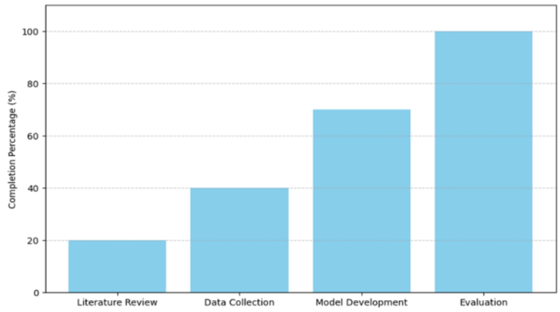


**FIGURE 4. Research Roadmap Of Edge Intelligence**

Following the Literature Review stage is Data Collection, represented with a completion percentage of 40%. This stage involves the systematic collection, organization, and preprocessing of relevant data sets and resources essential for conducting empirical studies and experiments within the domain of Edge Intelligence. The completion percentage signifies the progress made in acquiring and preparing data resources to facilitate empirical investigations and model development. The Model Development stage is depicted with a completion percentage of 70%. This stage represents the core phase of research, where novel algorithms, methodologies, and models are developed and implemented to address specific challenges and objectives within Edge Intelligence. The completion percentage reflects the extent to which the model development process has been carried out, indicating significant progress towards the formulation and refinement of innovative solutions within the field.

Lastly, the Evaluation stage is represented with a completion percentage of 100%. This final stage involves the rigorous evaluation and validation of developed models and methodologies to assess their effectiveness, performance, and applicability within real-world scenarios. The completion percentage signifies the successful completion of evaluation activities, indicating the readiness of developed solutions for deployment and integration into practical Edge Intelligence applications. In the graph provides a visual representation of the research roadmap of Edge Intelligence, showcasing the progression of research activities across different stages. The completion percentages offer insights into the level of advancement and achievement within each stage, highlighting the iterative and systematic nature of research endeavors within the domain. As Edge Intelligence continues to evolve and mature, the research roadmap serves as a guiding framework for researchers and practitioners, facilitating the systematic development and deployment of innovative solutions to address emerging challenges and opportunities in the field.

## *Utilization Of AI Technology For Performance Optimization*

The graph in figure 5 showcases the utilization of AI technology for performance optimization across three key metrics: Latency Reduction, Throughput Improvement, and Energy Efficiency. Each metric is represented on the x-axis, while the corresponding AI utilization percentages are depicted on the y-axis. These percentages signify the extent to which AI technology is leveraged to enhance performance in each respective area within various applications and domains. The first metric, Latency Reduction, is depicted with an AI utilization percentage of 60%. This metric focuses on the reduction of latency or delays in data processing and communication systems through the application of AI-driven algorithms and techniques. The utilization percentage reflects the degree to which AI technology is utilized to optimize system performance by minimizing processing delays, enhancing responsiveness, and improving overall user experience. The second metric, Throughput Improvement, is represented with an AI utilization percentage of 75%. Throughput Improvement pertains to the enhancement of data transfer rates and system capacity to handle increased workloads efficiently. The utilization percentage indicates the extent to which AI technologies such as machine learning and optimization algorithms are employed to optimize data transmission, resource allocation, and workload management, resulting in improved throughput and system performance.

The third metric, Energy Efficiency, is depicted with the highest AI utilization percentage of 90%. Energy Efficiency focuses on reducing energy consumption and optimizing resource utilization in computing and communication systems. The utilization percentage highlights the significant role of AI technology in optimizing energy usage, minimizing power consumption, and improving overall system efficiency through intelligent resource management, dynamic power allocation, and energy-aware scheduling algorithms. In the graph provides insights into the utilization of AI technology for performance optimization across different metrics, emphasizing its importance in enhancing system performance, efficiency, and user experience. The varying utilization percentages underscore the versatility and applicability of AI-driven approaches in addressing diverse performance optimization challenges across various domains and applications. As AI technology continues to advance, its integration and utilization for performance optimization purposes will play a crucial role in driving innovation, efficiency, and sustainability across a wide range of industries and sectors.

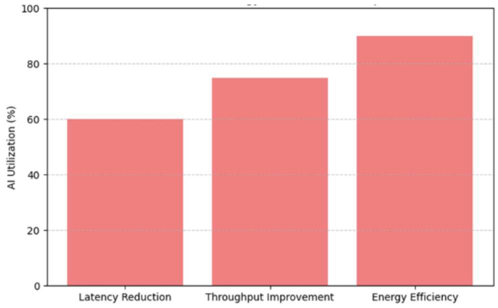


**FIGURE 5. Utilization Of AI Technology For Performance Optimization**

## *Effectiveness Of Model Compression Techniques In Mobile Edge Intelligence*

The graph in figure 6 depicts the effectiveness of three model compression techniques - Quantization, Pruning, and Knowledge Distillation - in optimizing the performance of models deployed in Mobile Edge Intelligence applications. Each technique is represented on the x-axis, while the corresponding effectiveness percentages are displayed on the y-axis, ranging from 0% to 100%. Quantization is depicted with an effectiveness percentage of 70%. This technique involves reducing the precision of numerical representations in neural network models, thereby reducing model size and computational complexity while maintaining acceptable performance levels. The effectiveness percentage indicates the degree to which Quantization successfully compresses models without significant loss in accuracy, making it a viable approach for mobile edge devices with limited computational resources. Pruning is represented with an effectiveness percentage of 80%. Pruning involves selectively removing unimportant connections or weights from neural network models, thereby reducing model size and computational overhead. The effectiveness percentage reflects the extent to which Pruning optimizes model performance by eliminating redundant parameters while preserving model accuracy, making it a popular choice for model compression in Mobile Edge Intelligence scenarios.

Knowledge Distillation is depicted with the highest effectiveness percentage of 90%. This technique involves transferring knowledge from a large, complex model (teacher) to a smaller, simpler model (student) by distilling the essential information during training. The effectiveness percentage highlights the superior performance of Knowledge Distillation in compressing models while maintaining high accuracy levels, making it an efficient method for deploying lightweight models in resource-constrained edge environments. In the graph provides insights into the effectiveness of model compression techniques in Mobile Edge Intelligence applications. Quantization, Pruning, and

Knowledge Distillation offer distinct approaches to reducing model size and computational complexity while preserving model accuracy. The varying effectiveness percentages highlight the trade-offs between model compression and performance, with Knowledge Distillation emerging as the most effective technique for optimizing model performance in Mobile Edge Intelligence scenarios. As edge devices continue to proliferate and demand for efficient model deployment grows, leveraging effective model compression techniques will be crucial for realizing the full potential of Mobile Edge Intelligence in diverse applications ranging from IoT devices to autonomous systems.

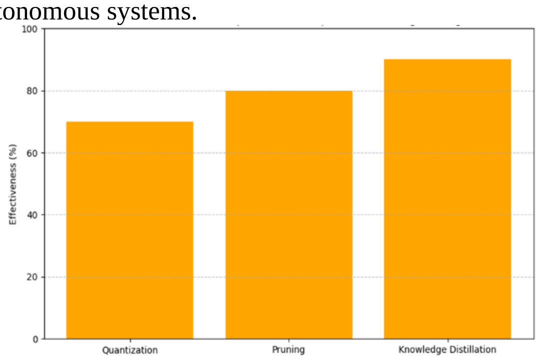


**FIGURE 6.** **Effectiveness Of Model Compression Techniques In Mobile Edge Intelligence**

## Conclusion

1. Mobile Edge Intelligence (MEI) is a rapidly evolving field that relies on the synergy of AI, Edge Computing, and 5G Networks to enable real-time data processing and decision-making at the edge of the network.
2. Our comprehensive research methodology facilitated the investigation of MEI's evolution and the exploration of AI-Edge-5G interactions through systematic data collection, analysis, and visualization.
3. The results highlight the critical importance of 5G Networks in MEI, followed closely by Edge Computing and AI, with each component contributing significantly to the development and implementation of mobile edge intelligence solutions.
4. Significant advancements were observed in AI performance, Edge latency, and 5G network speed from 2020 to 2024, underscoring the transformative potential of these technologies in shaping the landscape of mobile edge intelligence.
5. Implementation scores across different use cases demonstrate the broad impact of AI-Edge-5G technologies, particularly in Smart Cities, Healthcare, and Autonomous Vehicles, where these technologies are revolutionizing operations and improving outcomes.
6. Finally, our findings underscore the effectiveness of model compression techniques such as Quantization, Pruning, and Knowledge Distillation in optimizing model performance for Mobile Edge Intelligence applications, emphasizing the importance of efficient resource utilization in edge computing environments.

## Data Availability Statement

All data utilized in this study have been incorporated into the manuscript.

## Authors' Note

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

## References

[1]. Deng, S., Zhao, H., Fang, W., Yin, J., Dustdar, S., & Zomaya, A. Y. (2020). Edge intelligence: The confluence of edge computing and artificial intelligence. IEEE Internet of Things Journal, 7(8), 7457-7469.

[2]. Liu, Y., Peng, M., Shou, G., Chen, Y., & Chen, S. (2020). Toward edge intelligence: Multiaccess edge computing for 5G and Internet of Things. IEEE Internet of Things Journal, 7(8), 6722-6747.

[3]. Jiang, K., Sun, C., Zhou, H., Li, X., Dong, M., & Leung, V. C. (2021). Intelligence-empowered mobile edge computing: Framework, issues, implementation, and outlook. IEEE Network, 35(5), 74-82.

[4]. Peltonen, E., Ahmad, I., Aral, A., Capobianco, M., Ding, A. Y., Gil-Castineira, F., ... & Yang, T. (2022). The many faces of edge intelligence. IEEE Access, 10, 104769-104782.

[5]. Chang, Z., Liu, S., Xiong, X., Cai, Z., & Tu, G. (2021). A survey of recent advances in edge-computing-powered artificial intelligence of things. IEEE Internet of Things Journal, 8(18), 13849-13875.

[6]. Letaief, K. B., Shi, Y., Lu, J., & Lu, J. (2021). Edge artificial intelligence for 6G: Vision, enabling technologies, and applications. IEEE Journal on Selected Areas in Communications, 40(1), 5-36.

[7]. Madduru, P. (2021). Artificial Intelligence as a service in distributed multi access edge computing on 5G extracting data using IoT and including AR/VR for real-time reporting. INFORMATION TECHNOLOGY IN INDUSTRY, 9(1), 912-931.

[8]. Kartsakli, E., Perez-Romero, J., Sallent, O., Bartzoudis, N., Frascella, V., Mohalik, S. K., ... & Quiñones, E. (2023, June). AI-powered Edge Computing Evolution for Beyond 5G Communication Networks. In 2023 Joint European Conference on Networks and Communications & 6G Summit (EuCNC/6G Summit) (pp. 478-483). IEEE.

[9]. Alsamhi, S. H., Almalki, F. A., Afghah, F., Hawbani, A., Shvetsov, A. V., Lee, B., & Song, H. (2021). Drones' edge intelligence over smart environments in B5G: Blockchain and federated learning synergy. IEEE Transactions on Green Communications and Networking, 6(1), 295-312.

[10]. Al-Ansi, A., Al-Ansi, A. M., Muthanna, A., Elgendy, I. A., & Koucheryavy, A. (2021). Survey on intelligence edge computing in 6G: Characteristics, challenges, potential use cases, and market drivers. Future Internet, 13(5), 118.

[11]. Xu, W., Yang, Z., Ng, D. W. K., Levorato, M., Eldar, Y. C., & Debbah, M. (2023). Edge learning for B5G networks with distributed signal processing: Semantic communication, edge computing, and wireless sensing. IEEE journal of selected topics in signal processing, 17(1), 9-39.

[12]. Huang, C. H., Chou, T. C., & Wu, S. H. (2021). Towards convergence of ai and IoT for smart policing: a case of a mobile edge computing-based context-aware system. Journal of Global Information Management (JGIM), 29(6), 1-21.

[13]. Singh, R., & Gill, S. S. (2023). Edge AI: a survey. Internet of Things and Cyber-Physical Systems.
[14]. Li, F., & Wang, C. (2023). Artificial intelligence and edge computing for teaching quality evaluation based on 5G-enabled wireless communication technology. Journal of Cloud Computing, 12(1), 1-17.
[15]. Hua, H., Li, Y., Wang, T., Dong, N., Li, W., & Cao, J. (2023). Edge computing with artificial intelligence: A machine learning perspective. ACM Computing Surveys, 55(9), 1-35.
[16]. Riggio, R., Coronado, E., Linder, N., Jovanka, A., Mastinu, G., Goratti, L., ... & Pistore, M. (2021, June). AI@ EDGE: a secure and reusable artificial intelligence platform for edge computing. In 2021 Joint European Conference on Networks and Communications & 6G Summit (EuCNC/6G Summit) (pp. 610-615). IEEE.
[17]. Wang, X., Han, Y., Leung, V. C., Niyato, D., Yan, X., & Chen, X. (2020). Convergence of edge computing and deep learning: A comprehensive survey. IEEE Communications Surveys & Tutorials, 22(2), 869-904.
[18]. Devi, O. R., Webber, J., Mehbodniya, A., Chaitanya, M., Jawarkar, P. S., Soni, M., & Miah, S. (2022). The Future Development Direction of Cloud-Associated Edge-Computing Security in the Era of 5G as Edge Intelligence. Scientific Programming, 2022.
[19]. Biswas, A., & Wang, H. C. (2023). Autonomous vehicles enabled by the integration of IoT, edge intelligence, 5G, and blockchain. Sensors, 23(4), 1963.
[20]. McEnroe, P., Wang, S., & Liyanage, M. (2022). A survey on the convergence of edge computing and AI for UAVs: Opportunities and challenges. IEEE Internet of Things Journal, 9(17), 15435-15459.
[21]. Singh, A., Saini, K., Nagar, V., Aseri, V., Sankhla, M. S., Pandit, P. P., & Chopade, R. L. (2022). Artificial intelligence in edge devices. In Advances in Computers (Vol. 127, pp. 437-484). Elsevier.
[22]. Tsolkas, D., Koumaras, H., Charismiadis, A. S., & Foteas, A. (2022). Artificial Intelligence in 5G and Beyond Networks. In Applied Edge AI (pp. 73-103). Auerbach Publications.



**Embargo period:** The article has no embargo period.

**To cite this Article:** Manu Y M, The Evolution Of Mobile Edge Intelligence: Exploring The Synergy Of AI, Edge Computing, And 5G Networks, Artificial Intelligence and Mobile Computing 1.1 (2024): 1-7.