AI-Enhanced Citizen Profiling System In Local Government of Trece Martires

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INTRODUCTION

The Local Government of Trece Martires faces ongoing challenges in implementing effective systems to understand and address the needs of its growing population. The accuracy, effectiveness, and security of traditional citizen profiling methods often deteriorate as metropolitan populations grow and public service demands increase. Trece Martires is one of several local administrations that continue to rely on outdated data that are unable to manage the vast and complex datasets needed to satisfy these demands. Because of these limitations citizens are left behind since officials are unable to make accurate assessments or successfully predict future demands.

Artificial intelligence (AI) developments provide a revolutionary chance to solve the problems local governments encounter in overseeing citizen profiling and service provision. Local government systems can move from reactive to proactive methods by utilizing technology like AI-based reporting, real-time data processing, and facial recognition. AI-driven technologies that increase operational efficiency, improve data accuracy, and expedite decision-making have been effectively deployed in cities like Seoul and Singapore. Motivated by these instances, Trece Martires wants to investigate how AI may enhance its citizen profile system to better satisfy the population's increasing needs.

Furthermore, by providing individualized services and feedback channels, the system will actively involve residents and enable them to take part in governance to a greater extent. Regular audits, algorithm openness, and citizen monitoring procedures will all help to reduce ethical issues like bias or data exploitation. The method improves efficiency and builds public trust by guaranteeing accountability and justice.

In the end, Trece Martires is in a position to embrace a more proactive, inclusive, and responsive approach to government with the deployment of an AI-driven citizen profile system. This system's scalability and integration capabilities will allow for long-term growth and sustainability by adjusting to the city's changing needs. This project aims to transform municipal governance and foster a more involved, connected community by bridging the gap between citizen expectations and government capacity.

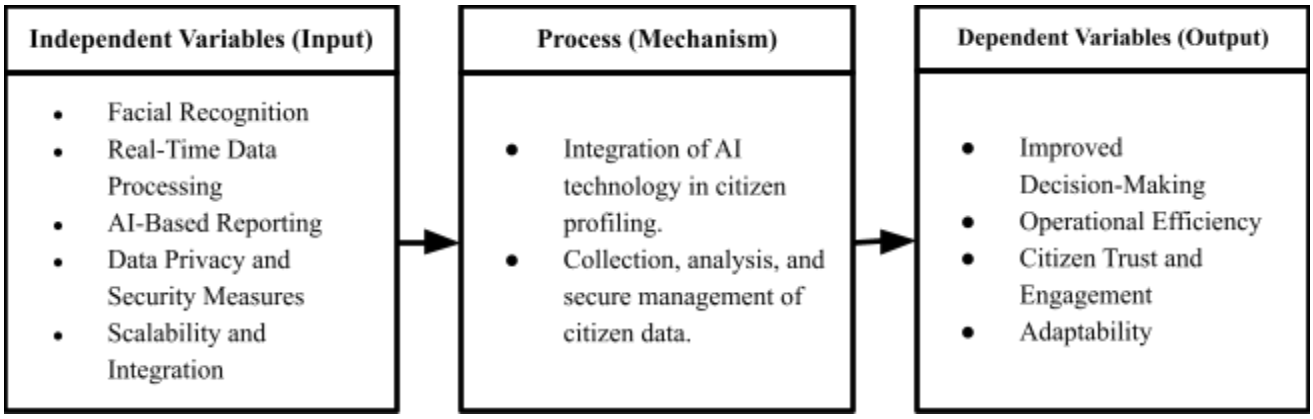
Objectives of the Study

The study titled "AI-Enhanced Citizen Profiling System In Local Government of Trece Martires" aims to explore how artificial intelligence (AI) can enhance and optimize citizen profiling systems to improve public administration in Trece Martires by integrating advanced technologies such as predictive analytics and natural language processing. Specifically, the study aims to:

1. To design and develop an AI-enhanced citizen profiling system for the Local Government of Trece Martires, incorporating facial recognition, real-time data processing, and AI-based reporting.
2. To evaluate the system's effectiveness in improving governance processes, specifically in enhancing data accuracy, decision-making speed, and operational efficiency.
3. To ensure the protection of sensitive citizen data by implementing robust privacy and security protocols, providing trust and transparency within the local community.
4. To assess the scalability and integration capabilities of the system, ensuring adaptability to the city's growing population and changing demands.

Conceptual Framework

The conceptual framework posits that the AI-enhanced citizen profiling system, built on the core features of facial recognition, real-time data processing, AI-based reporting, and robust security protocols, will significantly impact governance processes. By enhancing decision-making, operational efficiency, and citizen trust, the system addresses the evolving demands of the Local Government of Trece Martires, ensuring scalability and adaptability for future challenges.



Significance of the study

The importance of the study for the proposed system entitled “AI-Enhanced Citizen Profiling System for the Local Government of Trece Martires” is discussed. The researchers strongly believe that the beneficiaries of this study are the following:

Local government officials in Trece Martires are able to make data-driven decisions that are accurate, suitable, and custom to the specific needs of their constituents. By integrating features like facial recognition and real-time data processing, the system allows for efficient citizen profiling, making government processes more responsive and resource allocation more effective. Improved data privacy and security protocols promote trust between citizens and the local government.

Citizens will experience improved service quality through personalized interactions and suitable responses to their needs. The system’s AI features, including facial recognition and real-time data processing, allow individuals to engage seamlessly with government services, build trust and transparency. This encourages citizens to participate more actively in their community, knowing their information is secure and used responsibly.

Researchers will gain insights into applying AI within the public sector, specifically in data analytics and secure citizen profiling. This study contributes to the understanding of AI’s role in governance, inspiring further research and innovations in public sector AI applications, scalability, and ethical practices.

Scope and Limitation

The study focuses on the implementation and development of a web application for citizen profiling systems with Artificial intelligence. The web application is designed to provide facial recognition, real-time data processing, and AI-based reporting. The study and the web application are only focused on a citizen's facial recognition for security. In addition, the citizen's profile only is used in processing the AI-based reporting for enhanced data accuracy, decision-making speed, and operational efficiency, as well as for implementing robust privacy and security protocols, providing trust and transparency within the community. Furthermore, the study emphasizes the integration of the system with the existing infrastructure of the local government while ensuring scalability and performance to adapt to a growing population and increasing data demands.

The study is limited only to the citizens of the local government of Trece Martires. The system only uses the information of the citizens for the data analysis of AI-based reporting. The information of the citizens will strictly be used inside the system and existing systems of the local government of Trece Martires providing privacy and security for the citizens. While the system also provides reliable facial recognition, it is not designed for law enforcement, surveillance, or any functions unrelated to citizen profiling and governance. The accuracy and effectiveness of the system depend on the quality of the data provided by the citizens during the implementation of the system.

Definition of Terms

Artificial Intelligence (AI) is a simulation of human intelligence that runs on computers or machines used in the citizen profiling system to analyze large datasets, provide actionable insights, and automate decision-making processes for efficient governance.

Machine Learning enhances the profiling system by identifying patterns in citizen data and predicting needs or trends, enabling proactive governance.

Facial Recognition is used to identify or verify an individual's identity and can streamline identification processes, ensuring faster and more accurate verification of citizens.

Real-time Data Processing enables timely decision-making and rapid responses to dynamic situations or emerging issues that can help officials ensure up-to-date information to address citizen needs effectively.

Data Integration allows the profiling system to have seamless communication between existing databases and new AI-driven features, enhancing efficiency.

Data Privacy refers to the measures and practices implemented to protect personal information from unauthorized access. Ensuring data privacy in the profiling system builds citizen trust and safeguards sensitive information.

Data Security is the protection of personal information from unauthorized access or exposure. Strong data security measures in the profiling system prevent breaches and maintain the integrity of citizen data.

Citizen Profiling is the core function of the system, enabling tailored services and better governance that can help collect and analyze demographic, behavioral, and social data to understand the needs and characteristics of individuals within a population.

Urban Governance is the management of urban areas by local governments to provide services, ensure order, and promote sustainable development. The profiling system enhances urban governance by improving decision-making and enabling data-driven strategies.

Demographic Data includes statistical information about populations, such as age, gender, income, education level, and employment status. Demographic data is crucial for understanding citizen needs and developing targeted public services.

Behavioral Data refers to information about individual or group behavior, including preferences, habits, or interactions that can help the profiling system identify patterns and prioritize initiatives for different population segments.

Review of Related Literature

This chapter presents related literature and studies from local and international sources, thoroughly reviewed by the researchers. It examines approaches, strategies, and methods used in similar studies, providing a foundation for understanding and guiding the development of the AI-enhanced citizen profiling system in Trece Martires.

FOREIGN LITERATURE

Artificial Intelligence

Artificial Intelligence (AI) technology enables computers and machines to emulate human intelligence and perform tasks that involve problem-solving (Stryker & Kavlakoglu, 2024). A defining characteristic of AI is its capacity to reason and undertake actions aimed at achieving specific objectives. According to a study conducted in April 2024 by The Investopedia Team, AI has significantly evolved since its inception in the 1950s, gaining practical application in the 1960s when the United States Department of Defense utilized AI to train computers to replicate human reasoning processes.

AI, or Artificial Intelligence, is an interdisciplinary field of computer science that focuses on the development of intelligent machines. Machines can execute difficult jobs, including some that require human intelligence. AI offers a variety of technologies, including machine learning and deep learning, to make the task easier (Koch, 2023). According to Truog et al. (2024) from Harvard Medical School, AI serves as a "force multiplier" by reducing data overload and enhancing data-driven decision-making. Artificial intelligence (AI) solutions, including citizen profiling systems, can guarantee correct record-keeping and expedite services in local government contexts by utilizing machine learning algorithms for real-time data processing.

AI and Public Administration

According to Vogl et al. (2020), algorithmic bureaucracy is the transformation of public administration through the introduction of smart technologies, which do not replace human workers but enhance their decision-making capabilities. In local governance, this transformation can be seen in the development of AI-driven citizen profiling systems that automate data analysis and help public administrators make more informed decisions. Making it more efficient and providing assistance for workers it processes the data into better results making it easy, and understandable and providing workers help to provide more critical and important in decision making.

In line with the increasing use of AI in public administration, it stresses the importance of establishing clear accountability frameworks for AI systems. These systems, especially in citizen profiling and service delivery, must be transparent and subject to oversight to ensure they serve the public interest and avoid exacerbating biases. The integration of AI accountability mechanisms is crucial for maintaining trust and equity in AI-driven governance. The data in AI is transparent and does not provide any biases among the data given by the workers, and will only focus on the given data (Bignami, 2022).

Haesevoets et al. (2021) examine citizen perceptions of artificial intelligence (AI) in public sector decision-making. The study finds that while AI can improve efficiency, public trust varies based on concerns over transparency and accountability. The authors suggest that addressing these concerns is important for fostering citizen acceptance of AI-driven public services. Artificial intelligence (AI) impacts public values such as transparency, accountability, and equity within the public sector. The study emphasizes the need for governance frameworks to align AI applications with public values, ensuring ethical AI use that supports trust and fairness in public administration (Chen, Y-C. et al., 2022).

Pislaru (2024) emphasizes the role of artificial intelligence (AI) in improving the communication between citizens and public administration, which in turn enhances the overall relationship and engagement between government and citizens. The study outlines several factors critical for the successful implementation of AI tools in governance. First, digital access between urban and rural areas needs to be addressed to ensure equitable use of AI technology and improve access to technology, especially in rural areas where infrastructure and economic challenges may limit digital adoption. Secondly, the education of citizens is affected by willingness to adopt AI-driven tools, suggesting that people should have training and information programs to increase public knowledge and acceptance. Ensuring that AI systems are used responsibly and transparently fosters trust. These are crucial challenges to provide enhanced AI-driven systems for citizens and for them to accept technological changes

Pedro (2021) examines the legal considerations surrounding AI use in Portugal's public sector, focusing on regulatory frameworks needed to address ethical concerns, data privacy, and accountability, and stressing the importance of clear legal guidelines for responsible AI deployment. Maragno et al. (2022) explore factors influencing AI implementation in public sector organizations, identifying enablers such as organizational readiness and challenges like resource limitations and regulatory issues that affect the effectiveness of AI integration in government services. Zuiderwijk et al. (2021) conduct a systematic literature review on AI's implications in public governance, identifying benefits such as enhanced decision-making and efficiency, as well as challenges like ethical concerns and transparency, and propose a research agenda for responsible AI integration in governance. Atabekov (2020) reviews the legal status,

definition, and implementation of AI in the public sector across different countries, highlighting challenges and opportunities in addressing regulatory frameworks and the importance of clear policies for effective AI governance. Misra et al. (2022) propose a person-environment fit framework for AI implementation in the public sector, emphasizing the alignment of AI technology with organizational culture, values, and employee needs to enhance adoption and effectiveness in government settings.

Kim et al. (2024) examine the outcomes of the AI Seoul Summit, which emphasized the role of artificial intelligence in governance. The summit resulted in the Seoul Declaration, which outlines strategies for integrating AI into public administration to improve decision-making processes and operational efficiency. This initiative highlights Seoul's proactive approach to using AI for enhancing governance frameworks, reflecting its commitment to smart city principles.

Teo (2024) discusses Singapore's approach to leveraging AI in public administration, focusing on balancing technological innovation with ethical considerations. At the Financial Times' Future of AI Summit, Singapore highlighted its success in employing AI to transform governance by enhancing data accuracy and decision-making speed. The study underscores the importance of scalable AI systems in supporting both economic growth and public service delivery.

Citizen Engagement and Profiling

The integration of citizenship education into climate adaptation strategies has emerged as a pivotal approach to fostering civic engagement among young people (Pinheiro et al., 2024). By utilizing community profiling techniques, educators and policymakers aim to cross curricular boundaries and involve youth in identifying local vulnerabilities and solutions related to climate change. This method not only enhances participatory learning but also empowers young citizens to contribute actively to environmental decision-making processes. The study emphasizes that community profiling serves as a bridge between theoretical education and practical action, encouraging collaboration among schools, communities, and local governments to address climate adaptation challenges effectively. As these initiatives gain traction, they underscore the critical role of informed and engaged citizens in advancing climate resilience and sustainable development.

Citizen engagement has become a cornerstone of effective governance, fostering transparency, accountability, and trust in public institutions (World Bank Group, 2016). The adoption of innovative tools and frameworks for engaging citizens has revolutionized the way governments collect feedback, disseminate information, and involve communities in decision-making.

Data Privacy and Security

The study conducted at the Harvard Ash Center, highlights AI's applications in automating service requests and personalizing citizen interactions, emphasizing the need for strong data privacy to maintain public trust in AI-driven services. Al Mutawa, M., & Rashid, H. (2022) provide a comprehensive review of challenges affecting AI applications in the public sector. The study identifies key obstacles, including data privacy concerns, lack of technical expertise, and resource constraints, which hinder effective AI implementation. The authors suggest that addressing these challenges is essential for leveraging AI to improve public services. Florea, D., & Florea, S. (2021) discuss the ethical implications of data privacy in higher education research, focusing on the challenges posed by big data usage. The study highlights the importance of safeguarding personal data while utilizing large-scale data for academic research, emphasizing the need for clear ethical guidelines to protect participants' privacy.

Thapa & Camtepe (2021) examine the challenges and techniques involved in ensuring data security and privacy in precision health, highlighting the complexities of managing sensitive health data and stressing the need for secure practices to maintain privacy while enabling the use of health information for personalized medicine. Wiltshire and Alvanides (2021) explore the ethical implications of big data usage, focusing on secure data access and identifying key lessons for ensuring data privacy and security, particularly the importance of ethical frameworks and policies that protect individuals' rights. In addition, Raab (2021) addresses the intersection of information privacy, impact assessment, and ethics, arguing that data collection and usage should align with privacy rights and societal values. Mikalef et al. (2020) investigate the challenges and opportunities of implementing AI in Norwegian municipalities, identifying data privacy concerns and resource limitations while highlighting AI's potential to enhance municipal operations and improve citizen services through automation and data-driven decision-making.

The study conducted by Xu et al. (2021) discusses information security in big data, focusing on privacy concerns and data mining techniques, exploring methods for protecting sensitive data while facilitating effective data mining in large-scale environments. The strategies for enhancing data security and privacy in smart cities through compliance with regulations, emphasizing the importance of adhering to legal frameworks to protect citizens' data while promoting smart city development (Aslam et al., 2021). According to Sun et al. (2021), they explore data security and privacy challenges in cloud computing, discussing encryption techniques, access control mechanisms, and compliance with privacy regulations to protect sensitive data stored and processed in the cloud. Soria & Domingo (2021) analyze the limitations of traditional privacy models in the era of big data, proposing new approaches to safeguard privacy while enabling the use of large datasets. Focusing on improving data privacy and security in educational

technology, emphasizing the role of locally implemented technologies in safeguarding sensitive data while ensuring compliance with privacy laws in educational systems (Amo et al., 2021).

Gesk and Leyer (2021) explore factors influencing citizen acceptance of AI in public services, identifying conditions like transparency and perceived usefulness that increase acceptance, and emphasizing the need for trust-building measures to gain public support for AI-driven services.

Real Time Data Processing

Ariyaluran, R. A. H., et al. (2020) conducted a survey on real-time big data processing for anomaly detection, highlighting the importance of quickly identifying irregularities in large datasets. Their research emphasizes how real-time processing can improve anomaly detection accuracy, which is critical for AI-based systems in governance, where prompt identification of issues can lead to more effective decision-making and service delivery.

Real-time data processing has become a cornerstone in modern data-driven applications, enabling systems to handle high-velocity data streams and make instantaneous decisions. GeeksforGeeks (2024) highlighted the critical challenges associated with real-time data processing, such as managing the speed and volume of data streams while ensuring data accuracy and consistency. They emphasized that overcoming these challenges is essential for industries leveraging real-time analytics for decision-making.

The architecture and tools for real-time data processing have evolved significantly to address growing demands across industries. Airbyte (2024) explored the key components of real-time data systems, including event-driven architectures and stream-processing frameworks like Apache Kafka and Flink. Their research demonstrated how real-time processing enables seamless data integration and enhances operational efficiency, particularly in sectors like governance and public service delivery.

Kim, A. et al. (2020) introduced adaptive collaborative signal augmentation for real-time data processing, enhancing accuracy and efficiency by integrating signals from multiple sources. Similarly, Kelly, B. (2021) highlighted the impact of edge computing in real-time data processing, reducing latency and improving processing speeds by bringing computation closer to data sources. Together, these approaches are crucial for optimizing AI-based systems in local government services, ensuring fast and accurate data analysis for effective decision-making.

Facial Recognition Technology

Facial recognition technology offers a non-invasive and cost-effective method for identifying individuals, which has contributed to its rapid growth in demand (Praveen & Dakala, 2020). According to Joshi (2019), the process involves several steps: Firstly, it captures images or videos of the face. Secondly, it analyzes the geometric features of the face. Thirdly, it computes a mathematical formula based on the captured facial data. Lastly, it compares this data with stored images in a database to identify the individual. These steps collectively allow facial recognition systems to efficiently and accurately identify people across various applications.

Facial recognition technology powered by artificial intelligence, is employed to detect human faces and subsequently identify individuals (Rouse, 2020). This technology is being increasingly implemented in various sectors, including access control, marketing, customer service, healthcare, and security, helping to enhance public safety and efficiency (World Economic Forum, 2020; Praveen & Dakala, 2020). According to a study, facial recognition technology is being used to streamline various processes such as passport control, gate access, and entry to departure lounges at Schiphol Airport in Amsterdam. This initiative, launched by Schiphol in 2019, aims to make the boarding process smoother and more efficient (Schiphol, 2019). However, privacy concerns have emerged particularly regarding surveillance and the potential for data breaches, which could lead to greater harm than benefit. As noted in an article by Forbes, these concerns are a significant drawback of the widespread use of facial recognition, especially in border control settings (Martin, 2019). Additionally, the National Police of the Netherlands has adopted facial recognition systems to expedite the identification of suspects (Safran, 2017).

Tang, Z. et al. (2018) developed a fast facial recognition method using fractal theory, which improves both speed and accuracy by focusing on patterns in facial features. This is vital for real-time applications, such as AI-powered citizen profiling in local governments. Similarly, Ding, C., & Tao, D. (2019) investigated robust facial recognition through multimodal deep learning models, which enhance accuracy and reliability, even in challenging conditions like changing lighting and facial expressions, thus reinforcing the effectiveness of AI-based citizen profiling systems in practical settings.

Data Accuracy

Data accuracy is a critical factor in ensuring reliable AI-driven systems and decision-making processes. In 2024, Airbyte emphasized the importance of accurate data for businesses, highlighting how inaccuracies can lead to flawed insights and poor operational outcomes (Airbyte, 2024). Maintaining data

accuracy requires robust strategies such as automated error detection, real-time validation, and frequent updates to data repositories. Accurate data ensures that AI models perform optimally and generate meaningful results, especially in dynamic sectors like governance and healthcare.

As data-driven systems evolve, understanding the dimensions of data quality, such as accuracy, reliability, and consistency, is crucial. The Big Data Framework explored these dimensions, emphasizing their interdependence in creating effective data pipelines for AI and analytics platforms (Big Data Framework, 2024). They noted that data accuracy is often the foundation of trust in AI predictions, underscoring its relevance in applications like citizen profiling and public service optimization.

Defining data accuracy and its application in organizational contexts has gained prominence in recent years. Innovature BPO described data accuracy as the alignment of collected information with its intended purpose, highlighting its role in operational success and decision-making (Innovature BPO, 2024). Their research showed that adopting AI systems with high data accuracy has led to significant efficiency gains, especially in local government functions like service delivery and resource allocation.

AI Adaptability

The application of Artificial Intelligence (AI) technology in different categories of local government service delivery has increased significantly in recent years (Mikhaylov & Esteve, 2018). The adoption of AI in local government services is extensive, spanning a broad range of functions, including public information dissemination, community feedback collection, complaint management, tax collection, transportation management, water and sewage management, waste collection, and the upkeep of public amenities (David et al, 2023). As more local governments integrate AI technologies, often in line with smart city agendas it becomes essential to understand these technologies and their impacts (Buchelt et al, 2024).

Recognizing the nuances of AI technologies is a critical process according to the study of Regona et al, (2024), as different AI systems are designed to address specific tasks or challenges. Determining the most suitable technology for each purpose enables organizations to streamline workflows, processes, and systems, enhancing efficiency and productivity (Lins et al, 2021). As AI evolves and extends across various fields, this understanding becomes increasingly important for local governments navigating complex technological landscapes to achieve their goals (Habbal et al, 2024). Notably, examining the potential of AI technologies to meet service delivery objectives and improve public welfare is crucial.

Mahusin et al. (2021) explore the challenges faced by Malaysia's public sector in adopting artificial intelligence (AI), highlighting issues such as limited funding, lack of skilled personnel, and concerns about data privacy, which hinder the effective use of AI to improve public services. The authors emphasize the need for strategic planning and investment to overcome these obstacles. Nagitta et al. (2023) examine the role of public procurement professionals in implementing human-centered AI in the public sector, highlighting how procurement experts balance technological benefits with ethical considerations, data privacy, and public trust to ensure responsible AI adoption.

LOCAL LITERATURE

Citizen Profiling Systems in the Philippines

Jacobe et al. (2021) developed a system that automates the profiling of all residents in the barangay and stores data electronically, with organized records. According to Lacasandile et al. (2020) Barangay Information Profiling System (BIPS) uses technology for budget allocation, decision making, and helps Barangay officials utilize data from household profiling.

AI Applications in Loc al Government

According to Distor et al. (2023), AI is a transformative technology offering various opportunities for governments to enhance public services and optimize internal operations. Georgiadou et al. (2020) demonstrates that artificial intelligence for anticipatory action operates within a broader socio-technical framework involving various stakeholders, platforms, and outcomes. To offset the negative effects of artificial Intelligence adoption in the Philippines, it is important that everyone have awareness of the positive advantages of technology Rosales et al. (2020). The advancement of artificial intelligence enhances the potential of both industry and society, serving as a gateway to more efficient, faster, and highly productive processes Concepcion et al. (2019).

Data Privacy and Security in Local Government

The increasing adoption of Artificial Intelligence (AI) technologies in local government operations has brought about significant discussions on data privacy and consumer protection (Naga, 2024). As AI systems collect and process vast amounts of data, ensuring the privacy and protection of citizens' personal information has become a critical concern (Hilario, 2024). Governments are actively working towards compliance with data privacy laws, emphasizing the importance of balancing technological advancements with public trust (Privacy Commission, 2024).

In the Philippines, local governments have been commended for their ongoing efforts to align with data privacy standards, demonstrating a commitment to safeguarding citizens' rights in an increasingly digitized environment (Privacy Commission, 2024). However, challenges remain, particularly with local government employees' awareness and understanding of the Data Privacy Act (Barlaan, 2024). A study by Fabito et al. (2018) also explores how Philippine government agencies, despite legal frameworks, face difficulties in fully implementing data privacy practices, underscoring the need for greater compliance and education.

The role of cybersecurity in supporting data privacy is also crucial, especially as AI technologies become more integrated into government systems. Strengthening cybersecurity protocols is vital for protecting government data and rebuilding public trust (Ligot, 2024). Moreover, the Theory of Planned Behavior offers insights into how local government employees' attitudes and behavioral intentions toward data privacy influence the implementation of the Data Privacy Act (Barlaan, 2024).

AI Adaptability in Philippines

The adoption of Artificial Intelligence (AI) in local governments has been an area of growing interest, as officials recognize its potential to improve service delivery and governance. A study by Distor et al. (2023) explores the attitudes and perceptions of municipal government officials in the Philippines, revealing a positive outlook toward AI adoption despite concerns regarding the readiness of local governments to implement such technologies. The study emphasizes that understanding officials' perspectives is crucial for crafting effective AI strategies in public administration.

The legal and regulatory landscape of AI in the Philippines is also a key consideration, as highlighted by Amil (2024). The integration of AI into public administration faces legal hurdles, including the need for updated laws and regulations that address AI-related issues such as accountability, transparency, and fairness. Amil's work outlines various strategies to overcome these barriers, emphasizing the importance of regulatory frameworks that support both innovation and ethical considerations in AI implementation.

An industry report by TrueLogic (2024) further discusses the broader landscape of AI adoption in the Philippines, noting the significant strides made in sectors such as healthcare, transportation, and local government services. The report highlights the increasing awareness of AI's potential but also underscores the challenges of infrastructure limitations and data privacy concerns that local governments must address to fully harness AI's capabilities.

METHODOLOGY

This chapter outlines the research design, methodology, and techniques utilized in the study titled *"AI-Enhanced Citizen Profiling System in Local Government of Trece Martires."* It explains the approach used to design, develop, and evaluate the proposed system, ensuring it aligns with the study's objectives.

Research Design

The study adopts a developmental descriptive research design, incorporating both qualitative and quantitative methods to address its objectives.

The developmental component emphasizes the design, development, and implementation of the AI-enhanced citizen profiling system for Trece Martires. This involves system prototyping, iterative development, and usability testing to ensure that the system effectively addresses the identified challenges and aligns with the needs of the local government and its citizens.

The descriptive component focuses on understanding the existing citizen profiling processes, identifying inefficiencies, and determining areas for improvement. Data is gathered through interviews and focus group discussions with stakeholders, such as local government officials and IT experts, as well as through surveys and document reviews.

The quantitative aspect evaluates the system's performance using measurable indicators, including improvements in data accuracy, decision-making speed, and operational efficiency. Surveys are conducted to assess user satisfaction, trust, and usability, while performance metrics are analyzed to measure technical aspects such as processing speed and facial recognition accuracy.

The qualitative aspect involves thematic analysis of stakeholder interviews and focus group discussions to gain deeper insights into system usability, governance implications, and privacy concerns.

By integrating developmental and descriptive approaches, the study ensures a comprehensive analysis that guides system creation, evaluates its effectiveness, and enhances governance processes in Trece Martires.

Research Locale

The research is conducted in Trece Martires City, focusing on its local government offices where citizen profiling and related processes are carried out. This locale was chosen due to the city's growing population and the increasing demand for efficient public administration systems.

Research Participants

The research participants are drawn from two primary groups, each contributing critical perspectives to the evaluation of the AI-enhanced citizen profiling system. Local government officials, selected through purposive sampling, play a key role in providing insights into the current citizen profiling processes and the anticipated impact of the AI-based system. Their feedback focuses on the system's alignment with governance objectives, its effectiveness in enhancing decision-making, and its scalability to meet the needs of Trece Martires. Similarly, IT experts, also chosen using purposive sampling, are included for their technical expertise and direct involvement in the system's development, testing, and evaluation. Their input is essential for assessing the system's technical performance, including facial recognition accuracy, real-time data processing, and integration capabilities. The sample size is determined by the accessibility and availability of participants from these groups within the study's time and resource constraints, ensuring a robust representation of perspectives necessary for achieving the research objectives.

Sampling Technique

This study utilizes purposive sampling to select participants based on their specialized knowledge and direct involvement in the citizen profiling system. The participants include local government officials, who serve as key decision-makers and provide critical insights into the current profiling processes and the anticipated impact of the AI-enhanced system on governance. Additionally, IT experts are chosen for their technical expertise and active role in the system's development, testing, and evaluation. By focusing on these specific groups, the study ensures that the collected data is relevant and aligned with the research objectives. The sample size is determined by the availability of participants with the necessary expertise within the study's time and resource constraints, ensuring a robust representation of perspectives essential for evaluating the system.

Data Gathering Procedure

The data collection process begins with obtaining informed consent from all respondents, ensuring they fully understand the study's purpose, how their data will be used, and that their participation is voluntary. Once consent is granted, semi-structured interviews will be conducted with local government officials and IT experts. These interviews aim to gather qualitative data on their perspectives regarding the current citizen profiling processes, challenges faced, and expectations for the proposed AI-enhanced system. Following the interviews, participants will engage in hands-on testing of the AI-enhanced citizen profiling system. During this phase, they will interact with its key features, including facial recognition, real-time data processing, and AI-based reporting. Data collected during the testing phase will include performance metrics, such as facial recognition accuracy, processing speed, and system scalability. Finally, structured questionnaires will be distributed to gather quantitative feedback on system usability, functionality, and effectiveness. These questionnaires will assess satisfaction levels, trust in the system, and its perceived contribution to improving governance processes. This multi-step process ensures that

both qualitative and quantitative data are collected from participants with specialized knowledge and involvement, providing a comprehensive evaluation of the system's impact and effectiveness.

Research Instruments

This study employs a variety of research instruments to ensure a thorough investigation of the AI-enhanced citizen profiling system. The primary instruments used are survey questionnaires, interview guides, and the system prototype.

1. Survey Questionnaires: These will be used to gather quantitative data on user satisfaction, trust, and feedback on system usability. The questionnaires are designed to capture participants' experiences with the AI-enhanced system, assessing aspects such as ease of use, reliability, and trust in the system's functionality. The data collected will allow for measurable insights into how the system is perceived by users.
2. Interview Guides: The study will use semi-structured interview guides to explore the perspectives of local government officials and IT experts. These interviews will gather qualitative data, providing in-depth insights into the challenges and opportunities presented by the AI system. The interview questions will focus on topics such as the limitations of existing citizen profiling systems, the anticipated benefits of AI features (e.g., facial recognition, real-time data processing), and concerns regarding privacy, security, and system integration with existing infrastructure. This structured approach ensures comprehensive understanding from both a technical and operational perspective.
3. System Prototype: The system prototype will be employed during the testing phases to collect performance metrics such as accuracy, speed, and scalability. This will allow the researchers to gather objective data on the system's technical performance and usability. Metrics such as the success rate of facial recognition, processing times for real-time data, and feedback on AI-based reporting features will be measured to assess the system's functionality in real-world scenarios.

Data Analysis

The collected data is analyzed using several methods to address the study's objectives:

1. Descriptive Statistics:
   To evaluate Objective 2 (Effectiveness of the System), descriptive statistics will be used to summarize survey responses regarding system usability, efficiency, and trust. This will provide insights into how well the system meets user expectations in terms of ease of use, reliability, and trustworthiness.
2. Performance Metrics:
   To assess Objective 1 (Design and Development of the AI System), performance metrics will be analyzed, focusing on key aspects such as processing speed, facial recognition accuracy, and scalability. These metrics will help determine whether the system meets its technical requirements and can handle real-world demands.

3. Thematic Analysis:
   To address Objective 3 (Data Privacy and Security), the thematic analysis will be applied to the interview responses from IT experts and government officials. This will help identify patterns and recurring themes related to privacy, security concerns, and trust in the system. It will also capture feedback on the system's operational and governance implications.