CHAPTER I
INTRODUCTION

1.1 Background

A face recognition system for a MySQL face database requires a deep understanding of computer vision, machine learning, and database management. The system integrates algorithms for face detection, feature extraction, and recognition, considering efficiency, accuracy, and scalability. It addresses challenges like lighting conditions, pose, and facial expressions, ensuring robust performance across diverse environments. A well-structured MySQL database schema is used for storage and retrieval of facial data, facilitating seamless integration with the system architecture. The system includes database connectivity, image preprocessing, and user interface design, ensuring accurate identification while adhering to ethical principles and data privacy regulations.

Furthermore, the background design of such a system involves a comprehensive review of existing literature and methodologies in the field of facial recognition, surveying recent advancements in algorithm development, database management techniques, and ethical considerations to inform the research framework and design decisions. Additionally, considerations for the deployment environment, including hardware constraints, network connectivity, and user requirements, guide the system architecture design and implementation strategy, ensuring compatibility and usability across different platforms and devices. Ethical considerations, including data privacy, consent, and potential biases in face recognition algorithms, are integrated into the design process, reflecting a commitment to responsible innovation and the protection of individual rights. Through a comprehensive background design approach, the facial recognition system is poised to address practical challenges, leverage technological advancements, and uphold ethical principles in its implementation.

Weather forecasting is the application of science and technology to predict atmospheric conditions at specific places and times. People have tried to predict the weather officially for thousands of years since the 19th century[1]. Weather prediction can be used by traditional fishermen. Machine learning is a data science technique that creates a model from a training data set. The model is essentially a formula that generates a target value based on individual weights and values for each training variable. In each record, the corresponding weight (sometimes between 0 and 1) for each variable tells the model how that variable relates to the target value[2][3]. The traditional fishing communities in the city and district of Probolinggo, Indonesia, face increasing challenges due to environmental uncertainties and resource depletion. In recent years, advancements in technology, particularly the Internet of Things (IoT) and Artificial Intelligence (AI), offer promising solutions to enhance environmental monitoring and prediction capabilities. By leveraging IoT sensors and AI algorithms, traditional fishermen can gain access to real-time data and predictive analytics, empowering them to make informed decisions and adapt their fishing practices in response to changing environmental conditions.

This thesis aims to explore the potential of integrating IoT and AI technologies to improve environmental monitoring and prediction for traditional fishermen in Probolinggo. By deploying IoT sensor networks along coastal areas and incorporating AI algorithms for data analysis, this research aims to provide fishermen with timely and accurate information on important environmental parameters such as ambient temperature, ambient humidity, weather forecast, and wind speed.

The significance of this research lies in its ability to address the unique challenges faced by traditional fishing communities in Probolinggo while promoting sustainable fishing practices and resilience-building measures. By harnessing the power of IoT and AI, fishermen can optimize their fishing efforts, reduce operational risks, and minimize the impact on marine ecosystems.

Moreover, by developing user-friendly interfaces and mobile applications, this research aims to facilitate knowledge sharing and empower fishermen to actively participate in the monitoring process. Through interactive platforms and decision support systems, fishermen can access personalized recommendations and adaptive management strategies tailored to their specific needs and preferences.

To achieve these objectives, this thesis will draw upon a multidisciplinary approach, combining expertise from fields such as environmental science, engineering, computer science, and social sciences. By synthesizing insights from academic research, technical innovations, and local knowledge systems, this study aims to provide practical recommendations for designing and implementing IoT-enabled environmental monitoring and prediction systems that are culturally sensitive, inclusive, and sustainable.

1.2 Literature survey

Rapid growth in the fields of software application, communication technology, and hardware, as we all know. This will make it simpler for Internet-connected sensory devices to emerge. This will include real-world information measurements and observations. The overall number of internet-connected devices in use by 2020 is expected to be between 25 and 50 billion. In comparison to the past, it is expected that internet-connected gadgets will increase and technologies will grow. The quantity of data that is published will grow.

Internet of Things (IoT) technology, which is utilized in Internet-connected devices, continues to broaden the existing Internet by permitting interactions and interaction in between the physical and cyber worlds [4]. In addition, as the web of things (IoT) ends up being more easily offered due to less pricey sensing units and enhanced interaction, the range of gizmos and pieces of devices that can provide valuable real-time weather condition details will likely grow considerably [5]. Internet-connected devices will rice and technology will mature. The amount of published data will grow with internet connections and the reach of data will be on the

one-click and easy reach of data will make calculations easy. In contrast to Weather condition Forecasting using Maker Knowing Algorithms, which is mainly focused on simulation-based upon Physics and Differential Equations, Artificial Intelligence is typically used for anticipating weather condition, and involves models such as Neural Networks, Bayesian Networks, and Vector Machines. Since of its ability to catch non-linear reliance of previous weather condition patterns and future weather, this algorithm is the only one used. And, in the coming years, more progress will be made in using these technologies to reliably forecast the weather in order to avoid disasters such as hurricanes, tornadoes, and thunder storms[6].

1.3 Main content of research

This As of the latest updates, developments in both domestic and international realms regarding the Internet of Things (IoT) weather monitoring and prediction systems have been marked by significant advancements, driven primarily by artificial intelligence (AI) integration. Domestically, various research institutions and companies have been focusing on enhancing the accuracy and efficiency of weather monitoring through IoT devices equipped with AI algorithms. These systems utilize a network of sensors to collect real-time data on atmospheric conditions, such as temperature, humidity, air pressure, and wind speed, among others. By employing AI techniques like machine learning and deep learning, these systems can analyze vast amounts of data to identify patterns, correlations, and anomalies, thus enabling more precise weather forecasts and early warning systems for extreme weather events. Internationally, collaborative efforts among countries and organizations have been fostering the exchange of knowledge and resources to further advance IoT-based weather monitoring and prediction systems.

Projects such as the European Commission's Horizon 2020 initiative and collaborations between research institutions in the United States, Europe, and Asia have been instrumental in pushing the boundaries of innovation in this field. A notable journal source providing insights into these developments is the "IEEE Transactions

on Industrial Informatics," which frequently publishes research articles on IoT-enabled weather monitoring systems and their applications of AI for predictive analysis and decision-making. Additionally, publications like "Weather and Forecasting" and "Journal of Atmospheric and Oceanic Technology" offer valuable research on the integration of AI into weather prediction models, contributing to the ongoing progress in this critical area of study.

Furthermore, advancements in domestic and international IoT weather monitoring and prediction systems have been facilitated by interdisciplinary collaborations bridging the gap between meteorology, computer science, and engineering fields. Institutions such as the National Oceanic and Atmospheric Administration (NOAA) in the United States, the European Centre for Medium-Range Weather Forecasts (ECMWF), and the Japan Meteorological Agency (JMA) have been at the forefront of integrating IoT technologies with AI for weather forecasting. These collaborations often result in joint research projects, data-sharing initiatives, and the development of standardized protocols and frameworks for IoT sensor networks and AI algorithms. Additionally, industry partnerships between technology companies and meteorological agencies play a crucial role in driving innovation and commercialization of IoT weather monitoring solutions. Companies like IBM, Microsoft, and AWS offer cloud-based platforms and AI services tailored for analyzing weather data collected from IoT devices, empowering businesses and governments to make data-driven decisions and mitigate the impact of adverse weather conditions. Overall, the synergy between domestic and international efforts, coupled with advancements in AI and IoT technologies, continues to shape the landscape of weather monitoring and prediction systems, ultimately contributing to enhanced preparedness and resilience in the face of changing climate patterns.