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Disease Outbreak Prediction Using Long Short-Term Memory (LSTM)

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Abstract: ***Disease outbreaks can spread rapidly and pose significant challenges to public health systems. Early prediction of disease outbreaks can help healthcare authorities take preventive measures, allocate medical resources, and reduce the impact on communities. This project, "Disease Outbreak Prediction Using Long Short-Term Memory (LSTM)", proposes a deep learning-based approach for predicting disease trends from historical health and environmental data. LSTM, a type of Recurrent Neural Network (RNN), is particularly suitable for time-series data because it can learn long-term patterns and dependencies from previous observations. The proposed system analyzes factors such as historical case records, environmental conditions, and temporal trends to identify patterns associated with increasing disease cases. The trained LSTM model is then used to forecast future outbreak trends. The system can provide an early indication of potential increases in disease occurrence, supporting healthcare professionals and authorities in making timely decisions. This approach demonstrates how artificial intelligence and deep learning can be applied to healthcare forecasting and contribute to more effective disease outbreak monitoring and prevention.***

Keywords: LSTM, Time series forecasting, Deep learning, dengue. Disease Outbreak Prediction, Machine Learning, Recurrent Neural Network (RNN), Healthcare Analytics, Disease Forecasting

I. INTRODUCTION

Disease outbreaks can have a serious impact on public health and may spread rapidly if they are not identified at an early stage. Traditional methods of monitoring disease outbreaks mainly depend on collecting and analyzing historical data, which can make early prediction difficult. With the development of Artificial Intelligence (AI) and Machine Learning (ML), data-driven techniques can be used to analyze disease patterns and predict future trends.

The proposed system, "Disease Outbreak Prediction Using Long Short-Term Memory (LSTM)", is designed to predict the possibility of an increase in disease cases by analyzing historical time-series data. LSTM is a type of Recurrent Neural Network (RNN) that is capable of learning patterns and long-term dependencies from sequential data. This makes it suitable for forecasting applications where previous observations influence future outcomes.

The system collects and preprocesses historical disease-related data, identifies important patterns, and uses these patterns to train an LSTM model. After training, the model can forecast future disease trends based on previous records. The prediction results can help healthcare organizations and authorities understand possible outbreak patterns and take appropriate preventive measures.

The main objective of the system is to provide an intelligent, data-driven, and early-warning approach for disease outbreak prediction. By using LSTM-based time-series forecasting, the system aims to improve prediction accuracy and support better planning of healthcare resources and outbreak-control strategies

A. Advantages

1) Early Prediction: Helps identify possible disease outbreaks at an early stage.
2) Time-Series Analysis: LSTM can analyze historical data and identify patterns over time.
3) Improved Forecasting: LSTM can learn complex and long-term relationships in sequential health data.
4) Resource Management: Helps in planning medical resources, hospital facilities, medicines, and healthcare staff.
5) Reduced Manual Analysis: Automates the analysis of large amounts of historical disease data.
6) Real-Time Monitoring Potential: With continuously updated data, the system can be extended to provide ongoing outbreak monitoring.
7) Supports Preventive Measures: Forecasted trends can help authorities take timely steps to control the spread of diseases.

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II. PROCEDURE FOR PAPER SUBMISSION

A. *Review Stage*

During the review stage, the research work is planned, developed, and evaluated before final submission. The following activities are carried out:

- Select the research topic: “Advancing real-time infectious disease forecasting using large language models.”
- Conduct a literature survey on dengue outbreak prediction, machine learning, deep learning, and Long Short-Term Memory (LSTM) models.
- Collect historical dengue case data and relevant environmental data such as temperature, rainfall, and humidity.
- Perform data preprocessing, including data cleaning, normalization, and handling of missing values.
- Design and implement the LSTM-based forecasting model.
- Evaluate the model using performance metrics such as Mean Absolute Error (MAE), Root Mean Square Error (RMSE), and Mean Absolute Percentage Error (MAPE).
- Present the preliminary results to the project guide or review committee and incorporate the suggested improvements.

B. *Final Stage*

After completing the review process, the project is finalized by performing the following tasks:

- Improve the forecasting model based on review feedback.
- Conduct final experiments using the complete dataset.
- Compare the predicted dengue cases with the actual reported cases.
- Analyze the performance and discuss the strengths and limitations of the proposed model.
- Prepare the complete project report, including the abstract, introduction, literature review, methodology, results, conclusion, and references.
- Verify formatting, citations, tables, and figures according to the prescribed guidelines.
- Submit the final report and present the project through a demonstration and presentation.

C. *Figures*

The following figures are recommended to illustrate the proposed system:

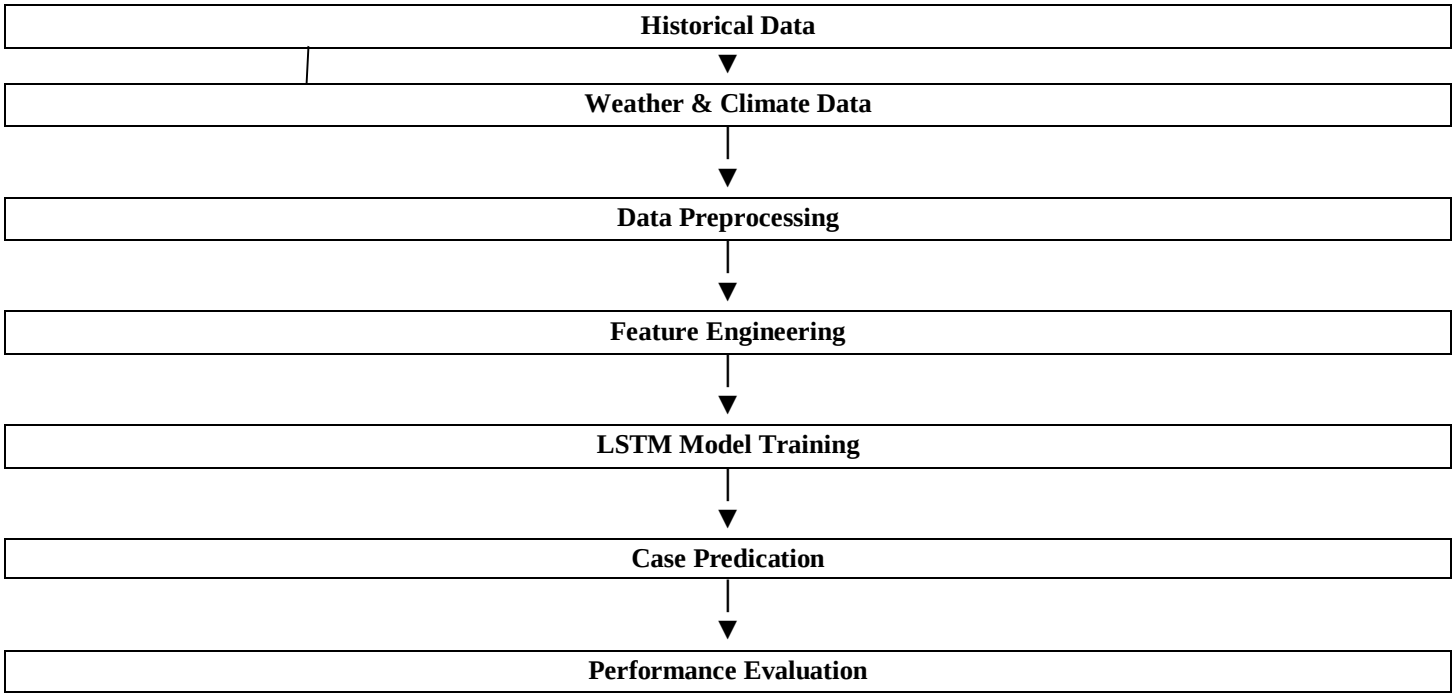


Fig. Overall System Architecture

III. CONCLUSION

The Disease Outbreak Prediction Using Long Short-Term Memory (LSTM) system provides an effective approach for analyzing historical disease data and forecasting future outbreak trends. By using LSTM, the system can identify patterns and long-term dependencies in time-series data that may be difficult to detect through traditional methods.

Overall, the system demonstrates how Artificial Intelligence, Machine Learning, and LSTM-based time-series forecasting can be applied to healthcare to develop intelligent and data-driven outbreak monitoring solutions. In the future, the system can be improved by incorporating real-time data, environmental factors, geographical information, and other advanced deep learning techniques to achieve more accurate and reliable predictions.

IV. ACKNOWLEDGMENT

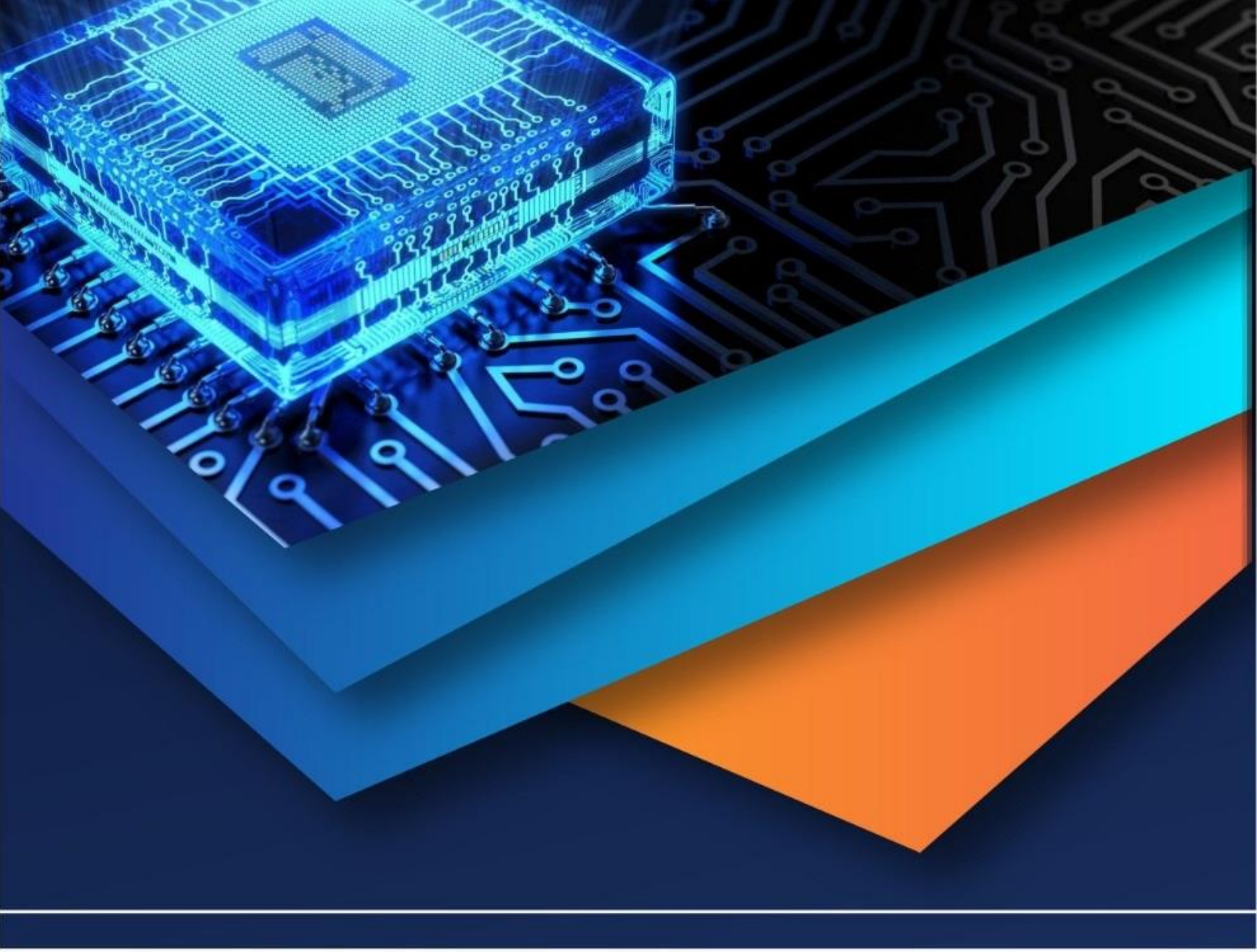
We express our sincere gratitude to our project guide for providing valuable guidance, continuous encouragement, and constructive suggestions throughout the development of this project titled " Disease Outbreak Prediction Using Long Short-Term Memory (LSTM)". Their technical expertise and timely feedback played a significant role in the successful completion of this work.

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REFERENCES

[1] F. Chollet, Deep Learning with Python, 2nd ed. Shelter Island, NY, USA: Manning Publications, 2021.
[2] O. Mudele, A. C. Frery, L. Zanandrez, A. Eiras, et al., "Dengue Vector Population Forecasting Using Multisource Earth Observation Products and Recurrent Neural Networks," IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, vol. 14, pp. 6015-6028, 2021.
[3] F. A. Rodrigues and K. Roster, "Neural Networks for Dengue Prediction: A Systematic Review," Artificial Intelligence in Medicine, 2021.
[4] M. A. Majeed, H. Z. M. Shafri, A. Wayayok, and Z. Zulkafli, "Prediction of Dengue Cases Using the Attention-Based Long Short-Term Memory (LSTM) Approach," Geospatial Health, vol. 18, no. 1, 2023.
[5] Aung, N. N., Pang, J., Chua, M. C. H., et al. (2023). A novel bidirectional LSTM deep learning approach for COVID-19 forecasting. Scientific Reports, 13, 17953. This research applies Bi-LSTM to forecast future disease cases using temporal and epidemiological factors.
[6] Sánchez-García et al. (2024). Deep learning infused SIRVD model for COVID-19 prediction: XGBoost-SIRVD-LSTM approach. Frontiers in Medicine. The proposed approach combines XGBoost, an epidemiological SIRVD model, and LSTM for disease-case prediction.
[7] Chen, W., Luo, H., Li, J., et al. (2024). Long-term trend prediction of pandemic combining the compartmental and deep learning models. Scientific Reports, 14, 21068. The study combines epidemiological models with deep learning to improve pandemic trend prediction.
[8] I. G. N. M. Jaya, Y. Andriyana, B. Tantular, S. S. Pangastuti, and F. Kristiani, "Spatiotemporal Dengue Forecasting for Sustainable Public Health: A Comparative Study of Classical, Machine Learning, and Bayesian Models," Sustainability, vol. 17, no. 15, 2025.
[9] World Health Organization, Dengue and Severe Dengue, Geneva, Switzerland: WHO, 2025.
[10] Du, H., Zhao, Y., Zhao, J., Xu, S., Lin, X., Chen, Y., Gardner, L. M., et al. (2025). Advancing real-time infectious disease forecasting using large language models. Nature Computational Science, 5, 467–480. This work explores real-time infectious-disease forecasting using multimodal data and AI-based time-series representation learning



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