YOUR TITLE HERE

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APPROVAL

of a writing project submitted by

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This writing project has been read by the writing project advisor and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the Statistics Faculty.

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Abstract

Long Short-Term Memory (LSTM) networks are a special case of Recurrent Neural Networks (RNN) that allow for effective time-series forecasting by making use of cell states and memory cells to incorporate past time point's information when predicting future values. These methods provide several benefits over traditional methods such as ARIMA models. This presentation explores the introductory results obtained from training and predicting on hydrology data collected within the Everglades National Park.

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1 Introduction

1.1 This is a Subsection

2 Literature Review

Time-series data have become a large component of data science and data analysis.

3 Methods

4 Conclusion

References

- Aghabozorgi, S., Shirkhorshidi, A. S., and Wah, T. Y. (2015). Time-series clustering—a decade review. *Information systems*, 53:16–38.
- Akusok, A., Björk, K.-M., Miche, Y., and Lendasse, A. (2015). High-performance extreme learning machines: a complete toolbox for big data applications. *IEEE Access*, 3:1011–1025.
- colah (2015). Understanding lstm networks.
- Everitt, B. and Hothorn, T. (2011). An introduction to applied multivariate analysis with R. Springer Science & Business Media.
- Hebbar, N. (2021). Time series forecasting with rnn(lstm)— complete python tutorial—.
- James, G., Witten, D., Hastie, T., Tibshirani, R., et al. (2013). An introduction to statistical learning, volume 112. Springer.
- Lim, B. and Zohren, S. (2021). Time-series forecasting with deep learning: a survey. Philosophical Transactions of the Royal Society A, 379(2194):20200209.
- Maharaj, E. A., D'Urso, P., and Caiado, J. (2019). Time series clustering and classification. CRC Press.
- Medsker, L. and Jain, L. C. (1999). Recurrent neural networks: design and applications. CRC press.
- Milligan, G. W. and Cooper, M. C. (1985). An examination of procedures for determining the number of clusters in a data set. *Psychometrika*, 50:159–179.
- Prakaisak, I. and Wongchaisuwat, P. (2022). Hydrological time series clustering: A case study of telemetry stations in thailand. *Water*, 14(13):2095.

Rani, S. and Sikka, G. (2012). Recent techniques of clustering of time series data: a survey. *International Journal of Computer Applications*, 52(15).

Ruiz, P. (2019). Ml approached for time seires. Medium.

Snoek, J., Larochelle, H., and Adams, R. P. (2012). Practical bayesian optimization of machine learning algorithms. In Pereira, F., Burges, C., Bottou, L., and Weinberger, K., editors, *Advances in Neural Information Processing Systems*, volume 25. Curran Associates, Inc.

Warren Liao, T. (2005). Clustering of time series data—a survey. *Pattern Recognition*, 38(11):1857–1874.