Algorithm Performance Improvement for Hotspot Prediction Using SBi-LSTM-XGBoost and SBi-GRU-XGBoost

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| ARTICLE INFO |  | ABSTRACT |  |
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| **Keywords**  ENSO  GRU-NN  Hotspot  LSTM-RNN  XGBoost |  |

# Introduction

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# Research Method

## Data Collections

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## Exploration Data Analysis

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## Data Preprocessing

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## Time Series Analysis

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## Data Splitting

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## Model Prediction Hotspot

**Stacked Neural Network adalah** Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.

**Bidirectional Neural Network adalah** Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.

**LSTM adalah** Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.

Rumus – Rumus LSTM:

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Rumus – Rumus GRU:

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Rumus – Rumus XGBoost:

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| **Algorithm 1: SBi-LSTM-XGBoost** | |
| **Input :** x\_true, y\_true, ypred | |
| **Output :** predictions | |
| 1 | # calculate residuals residuals = ytrue - ypred[:, 0] |
| 2 | # xgboost model on residuals xgb\_model = XGBRegressor(objective='reg:squarederror­­') |
| 3 | # fitting models xgb\_model.fit(np.vstack(xtrue), residuals) |
| 4 | # predict models predictions = xgb\_model.predict(np.vstack(xtrue)) |
| 5 | # combine LSTM and XGBoost predictions predictions = ypred[:, 0] + predictions |

## Model Evaluations

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# Results and Discussion

## Data Collections

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| Fig 1. Example of a figure caption. *(figure caption)* | |

## Data Preprocessing

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## Model Prediction Hotspot

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## Model Evaluations

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Tabel 1. Hasil prediksi tanpa memperhatikan ENSO.

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| Experiment | SBi-LSTM Algorithm | | | |  | SBi-GRU Algorithms | | | |
| Model Evaluation | | | |  | Model Evaluation | | | |
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| Table column subhead | Subhead | Subhead |
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# Conclusion

Provide a statement that what is expected, as stated in the "Introduction" chapter can ultimately result in "Results and Discussion" chapter, so there is compatibility. Moreover, the prospect of the development of research results and application prospects of further studies can also be added into the next (based on result and discussion).

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