**I-GUIDE MODEL CARD**

The I-GUIDE Model Card is an easy-to-use tool that will allow you to create documentation for each model that you create or use in a project.

Using this tool will help facilitate transparency and reproducibility about your project. It will also help you comply with relevant policies of journals, funding agencies, and universities.

The Model Card applies to:

* Pre-existing models acquired from other sources, e.g., produced by other researchers;
* Models you and your collaborators produced yourselves;
* Models you and your collaborators produced by integrating two or more other models (e.g., coupling).

**Model Card Attribution**

This Model Card template is an adapted version of the I-GUIDE Data Card template, which itself is based on Google’s *Data Cards Playbook* (https://pair-code.github.io/datacardsplaybook/).  
It has been restructured to address key considerations for geospatial model transparency, performance evaluation, and ethical deployment, in alignment with the I-GUIDE research lifecycle.

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A logo with text on it

AI-generated content may be incorrect.

* + 1. **BASIC INFORMATION**

| Model Card ID Number | *MC-02* |
| --- | --- |
| Model Name | *ResConvLSTM* |
| Model Version | *08242024-V0.1* |
| Persistent Identifier | *10.5281/zenodo.16937263* |
| Outputs Supported | *Not yet* |
| Model Card Author | *Jiyeon Kim, Ph.D. student from the university at Buffalo,* [*jiyeonki@buffalo.edu*](mailto:jiyeonki@buffalo.edu) |

* + 1. **MODEL OVERVIEW**

| Model Type | 🇻AI model: *Deep learning*  ☐ Statistical model: *(Specify type)*  ☐ Other: *(Specify)* | |
| --- | --- | --- |
| Purposes | 🇻 Classification  ☐ Decision support  ☐ Forecasting  ☐ Regression  ☐ Simulation  ☐ Spatial analysis  ☐ Other: *(Specify)* | |
| Domains of Application | ☐ Climate science  ☐ Economics  ☐ Environmental impact modeling  🇻 Geospatial analysis  ☐ Hydrology  ☐ Population modeling  ☐ Other social systems modeling: *(Specify)*  🇻 Other: *Wildfire progression* | |
| Model Authors and Developers | *Jiyeon Kim, Ph.D. student from the university at Buffalo,* [*jiyeonki@buffalo.edu*](mailto:jiyeonki@buffalo.edu)  *Manzhu Yu, Associate professor, Penn State University,*  [*mqy5198@psu.edu*](mailto:mqy5198@psu.edu)  *Fatemeh Kordi, Ph.D. candidate from Clark University*  [*fkordi@clarku.edu*](mailto:fkordi@clarku.edu) | |
| Source and Acquisition Method | ☐ Acquired (from external source)  🇻 Developed internally  ☐ Integrated from multiple models (e.g., coupled) | |
| User Licensing | 🇻 Open source: This model is released under the MIT License.  ☐ Proprietary: *(Specify owner)*  ☐ Other restrictions on use: *(Specify restrictions)* | |
| Storage Location | 🇻Repository: *https://zenodo.org/records/16937264*  ☐ Project-specific storage: *(Describe location)* |
| Access Control Policies | 🇻Open  ☐ Embargoed: *(Describe release timeline)*  ☐ Restricted: *(Describe access criteria)* |
| Use Case | *This model’s original use case is to predict wildfire progression. Input is n by n grid and each pixel has features like weather and topography. Once it is feeded, the model will make binary classification about whether the center of each grid have fire or not.* | |

* + 1. **MODEL INPUTS AND TRAINING DATA**

| Model Inputs | *Reanalysis weather data (ERA-5 Land)*  *Topography (DEM)*  *Burn history (burned area product from MODIS)*  *Land cover* |
| --- | --- |
| Input Data Types | 🇻 Raster  ☐ Tabular  🇻 Time Series  ☐ Vector  ☐ Other: *(Specify)* |
| Training Data Used | *Total dataset can be accessed by reaching out to* [*jiyeonki@buffalo.edu*](mailto:jiyeonki@buffalo.edu) |
| Training Dataset Representativeness | *The temporal extent of this data is highly limited (from May to July in 2024).* |

* + 1. **MODEL STRUCTURES**

| Feature Selection | *Temperature, Dewpoint temperature, Wind speed (U10, V10), Total precipitation, Surface pressure, Volume of water in soil, DEM, Land cover, and Burn history* |
| --- | --- |
| Hyperparameters and Tuning | *Number of ConvLSTM cell, Alpha and gamma values in loss function* |
| Software and Dependencies | *torch>=2.2*  *torchvision>=0.17* |

* + 1. **MODEL PERFORMANCE AND EVALUATION**

| Validation Approach | ☐ Cross-validation  🇻Holdout set  ☐ Time series split  ☐ Other: *(Specify)* |
| --- | --- |
| Evaluation Results | Accuracy: 0.9905869733013304  Precision: 0.008333002658624657  Recall: 0.2629931120851597  F1 Score: 0.0161541568107079 |
| Testing or Validation Data Used | *Total testset can be accessed by reaching out to* [*jiyeonki@buffalo.edu*](mailto:jiyeonki@buffalo.edu) |
| *(If model is integrated from multiple other models)*  Contribution of Constituent Models | *N/A* |

* + 1. **MODEL ADAPTATION AND CUSTOMIZATION (for acquired or integrated models only)**

| Source Models | *N/A* |
| --- | --- |
| Availability of Source Model Code | *N/A* |
| Modifications | *N/A* |
| Training Data Adjustments | *N/A* |

* + 1. **MODEL DEPLOYMENT AND USAGE**

| Computational Requirements | *The model is trained on Google colab pro and the selected resource is A100.* |
| --- | --- |
| Geospatial Considerations | *The model is trained and tested on data collected from the Pantanal Wetlands* |

* + 1. **TRANSPARENCY, EXPLAINABILITY, AND INTERPRETABILITY**

| Model Transparency | ☐ Fully transparent (rule-based, interpretable ML)  ☐ Partially transparent (some explainability features)  🇻Black box (deep learning, complex ML models) |
| --- | --- |
| Explainability Features | ☐ Feature importance analysis  ☐ LIME  ☐ Sensitivity analysis  ☐ SHAP values  🇻Other: *Captum can be used* |
| Interpretability Challenges | *This model is based on spatiotemporal dataset so it makes it hard to figure out which pixel in specific timestep contribute to prediction results* |
| Communication of Model Limitations | *This model is trained and tested on very limited temporal extent so if you want to improve model performance, you should collect additional data.* |

* + 1. **OTHER ETHICAL CONSIDERATIONS**

| Ethical Risks (Other Than Transparency, Explainability and Interpretability) | 🇻Bias in training data: This model was trained using data collected exclusively from the Pantanal wetland region in South America.  ☐ Intentional misuse risks: *(Specify)*  ☐ Privacy risks and surveillance: *(Specify)*  ☐ Security risks: *(Specify)*  ☐ Stigmatization of individuals or communities: *(Specify)*  ☐ Other: *(Specify)* |
| --- | --- |
| Measures Taken to Address Ethical Risks | *You can mitigate bias issue by collecting additional data from another region.* |
| Suitable Uses | *This model can be helpful research or project focusing on the Pantanal wetland from May to July in 2024.* |
| Unsuitable Uses | *Tested in another area excluding the Pantanal wetland. Even in the Pantanal wetland, there might be loss of accuracy when tested in other temporal extent excluding May to July in 2024.* |