

README.md

markdown

The Discontinuity Effect of SI Social Threshold: A New Framewo

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This repository contains the code and data processing scripts fo

📁 Repository Structure

```text

```
.
├── civilization_unbinding_simulation.py # Core Mesa-based agen
├── seshat_data_cleaning.py # Data preprocessing &
├── statistical_analysis_script.R # Panel regression (fi
├── seshat_global_history_raw.csv # [USER PROVIDED] Raw
├── seshat_unbinding_cleaned.csv # [GENERATED] Cleaned
├── unbinding_effect_plot.png # [GENERATED] Regressi
└── README.md # This file
```

## 🚀 Quick Start & Reproduction Guide

### 1. Prerequisites

Ensure you have the following installed:

Python:  $\geq 3.9$

R:  $\geq 4.2.0$

### 2. Install Dependencies

Python Environment:

```
bash
```

```
pip install mesa>=2.0 pandas>=2.1 numpy>=1.24
```

R Packages:

```
r
```

```
install.packages(c("tidyverse", "fixest"))
```

### 3. Data Preparation

Download the raw dataset from the [Seshat Global History Databank](#).  
Rename the file to `seshat_global_history_raw.csv` and place it in this root directory.

Note: Ensure the columns `polity_id`, `year`, `social_tech_level`, `institutional_openness`, and `energy_capture` exist.

4. Run Pipeline

Step 1: Data Cleaning

Generate the cleaned panel dataset and calculate the Civilizational Unbinding Index.

```
bash

python seshat_data_cleaning.py
```

Output: `seshat_unbinding_cleaned.csv`

Step 2: Agent-Based Simulation

Run the evolutionary simulation to generate time-series dynamics.

```
bash

python civilization_unbinding_simulation.py
```

Output: Console logs and optional CSV results.

Step 3: Statistical Analysis

Perform fixed-effects regression and generate visualization plots.

```
bash

Rscript statistical_analysis_script.R
```

Output: `unbinding_effect_plot.png` and console regression summary.

 Key Files Description

表格

| File                                 |   |
|--------------------------------------|---|
| civilization_unbinding_simulation.py | 1 |
| seshat_data_cleaning.py              | 1 |
| statistical_analysis_script.R        | 1 |

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Note: The underlying Seshat Global History Databank data may be subject to its own usage policies. Please consult the official Seshat website for data-specific licensing.



## Citation

If you use this code or data in your research, please cite the corresponding peer-reviewed article and this Zenodo repository:

BibTeX:

`bibtex`

```
@software{author_lastname_2026_civilizational,
 author = {Lastname, Firstname and Co-author, Name},
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 year = {2026},
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 doi = {10.5281/zenodo.XXXXXXX},
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```

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For questions or issues regarding reproducibility, please open an issue on GitHub or contact the corresponding author.