

1. Data Preparation

Raw Data Sources

Epidemiological Data

Dengue Cases

Socioeconomic Variables

GDP per capita, social progress, access to information, vaccination coverage, adequate housing, waste collection, sanitation, etc.

Environmental Variables

Monthly temperature, precipitation, elevation, Köppen, etc.

Processing Step

Merge & Clean

Imputation / MinMax

2. Data Structuring

Panel Data

Transformation

Time Sequences

$$X_{t-k} \Rightarrow y_{t+1}$$

3. LSTM Framework

Hyperparameters

Grid Search

Feature Selection

SHAP Values

LSTM Core Mechanism

$$C_t = f_t \odot C_{t-1} + i_t \odot \tilde{C}_t$$

Final Model

Probabilities

4. Spatial & Clustering

Spatial Dependence

Moran's I

Local Hotspots

LISA Maps

Risk Profiles

K-Means