StarClassifierFusion Architecture

Spectral Branch

Processing spectroscopic data

- Input: Spectral data (B, 3647)
 - Linear Projection (B, 2048)
 - Mamba2 Stack 12 layers

Gaia Branch

Processing astrometric data

- Input: Gaia data (B, 18)
- Linear Projection (B, 2048)
- Mamba2_Stack 12 layers

Cross-Attention Mechanism

- Spectra → Gaia attention with 8 heads
- Gaia → Spectra attention with 8 heads
- Mean Pooling: (B, 1, 2048) \rightarrow (B, 2048) for each branch

Feature Fusion

• Concatenation: (B, 2048) + (B, 2048) → (B, 4096)

Classifier Head

- Layer Normalization
- Linear Classifier: (B, 4096) → (B, 55)
- Multi-class output for stellar classification

Model Parameters: 741,407,287 | Model Size: 2828.2 MB