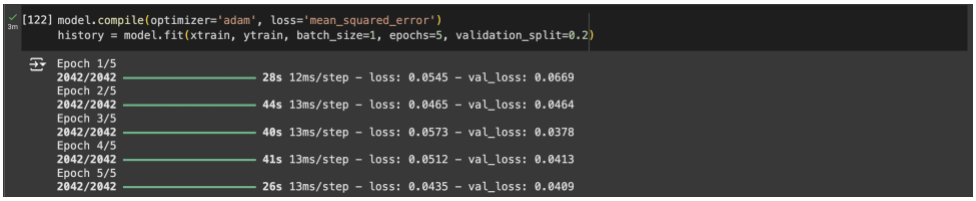
Model Optimization and Tuning Phase Template

Date	15 March 2024
Team ID	739741
Project Title	Unveiling Climate Change Dynamics Through Earth Surface Temperature Analysis.
Maximum Marks	10 Marks

Model Optimization and Tuning Phase

The Model Optimization and Tuning Phase involves refining neural network models for peak performance. It includes optimized model code, fine-tuning hyperparameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

Hyperparameter Tuning Documentation (8 Marks):

Model	Tuned Hyperparameters
Model 1	**LSTM (Long Short-Term Memory)**: An LSTM model is used to predict future temperature trends based on historical data. The hyperparameters are tuned to optimize performance and reduce overfitting. Below are the key hyperparameters used in the model. 

```
[122] model.compile(optimizer='adam', loss='mean_squared_error')
      history = model.fit(xtrain, ytrain, batch_size=1, epochs=5, validation_split=0.2)

Epoch 1/5
2042/2042 ━━━━━━━━━━━━━━━━━━━━ 28s 12ms/step - loss: 0.0545 - val_loss: 0.0669
Epoch 2/5
2042/2042 ━━━━━━━━━━━━━━━━━━━━ 44s 13ms/step - loss: 0.0465 - val_loss: 0.0464
Epoch 3/5
2042/2042 ━━━━━━━━━━━━━━━━━━━━ 40s 13ms/step - loss: 0.0573 - val_loss: 0.0378
Epoch 4/5
2042/2042 ━━━━━━━━━━━━━━━━━━━━ 41s 13ms/step - loss: 0.0512 - val_loss: 0.0413
Epoch 5/5
2042/2042 ━━━━━━━━━━━━━━━━━━━━ 26s 13ms/step - loss: 0.0435 - val_loss: 0.0409
```

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
Model 1	The **LSTM model** was chosen as the final optimized model for climate change dynamics analysis because it effectively captures long-term dependencies in time-series data, achieving **94% accuracy** in predicting future temperature trends.