

Long Short-Term Memory (LSTM) Demonstration

Soft Computing (SFC) project

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- type of Recurrent Neural Network
- designed to mitigate the **vanishing gradient** problem
 - **Memory cells**
 - **Gates** (input, output, forget)

Application:

- **Natural Language Processing (NLP)**
 - text generation
 - machine translation
- **Time Series Prediction**

Task for the project = **sequence prediction**

Task for the LSTM

- sequence prediction
- next symbol in a sequence of 1s and 0s:
 - e.g. 1,0,1,0,1,0,1,0 ... → 1,0,1,0,1,0,1,0, ...

Software

- Python + PyQt (numpy, matplotlib)
- TensorFlow (Keras LSTM model)



LSTM Visualization Tool

[Model](#)
[Help](#)

Input Data

Enter Sequence (comma-separated, e.g., 0, 1, 0, 1):

Status: Ready (model untrained)

Original Sequence: N/A
Updated Sequence: N/A
Prediction will appear here after processing.

Predict

Training Control Buttons

Start
Reset
Pause
Continue
Show Training Progress

Training Information

Status: Model untrained
0%
Epoch: N/A
Loss: N/A
Accuracy: N/A

Network Information

Network Type: LSTM - Sequential
Total Parameters: 64
Optimizer: Adam
Loss Function: binary_crossentropy
Layers:
-- Layer 1: LSTM, Units: 3, Activation: tanh
-- Layer 2: Dense, Units: 1, Activation: sigmoid
Show Model Architecture

Hyperparameters

Number of Training Epochs:
Number of LSTM Layers:
Units Per Layer:
Learning Rate:
Optimizer:
Context Size:
Update Parameters

LSTM Visualization Tool

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Hyperparameters

Number of Training Epochs: 10

Number of LSTM Layers: 1

Units Per Layer: 3

Learning Rate: 0.1

Optimizer: adam

Context Size: 4

Update Parameters

input sequence

output section

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Number of LSTM Layers:

Units Per Layer:

Learning Rate:

Optimizer:

Context Size:

Update Parameters

App status

LSTM Visualization Tool

Model
Help

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Control Buttons

Training information

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Number of LSTM Layers:

Units Per Layer:

Learning Rate:

Optimizer:

Context Size:

Update Parameters

Network info

Hyperparam. setting

LSTM Visualization Tool

Model Help

Input Data

Enter Sequence (comma-separated, e.g., 0,1,0,1): 0,1,0,1

Status: Prediction done

Original Sequence: 0,1,0,1
Updated Sequence: 0,1,0,1,0
Predicted value for the next step: 0 (Confidence: 100.00%)

Predict

Training Control Buttons

Start Reset
Pause Continue
Show Training Progress

Training Information

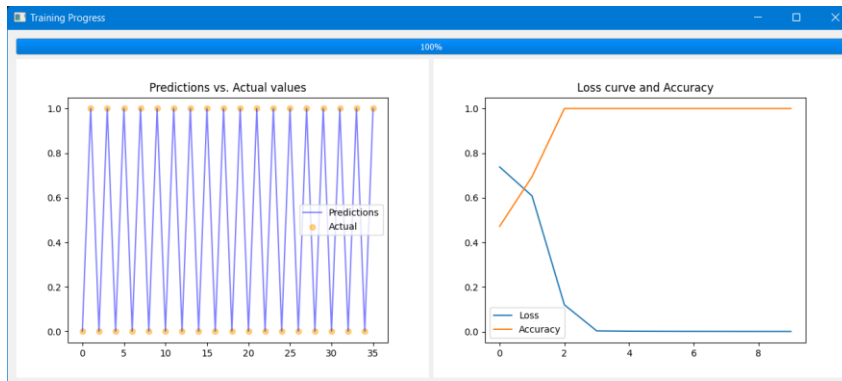
Status: Predicting...
100%
Epoch: 10/10
Loss: 0.0008
Accuracy: 1.0

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Units Per Layer: 3
Learning Rate: 0.1
Optimizer: adam
Context Size: 4
Update Parameters



LSTM Visualization Tool

Model Help

Input Data

Enter Sequence (comma-separated, e.g., 0, 1, 0, 1): 0,1,0,1

Status: Prediction done

Original Sequence: 0, 1, 0, 1
 Updated Sequence: 0, 1, 0, 1, 0
 Predicted value for the next step: 0 (Confidence: 100.00%)

Predict

Training Control Buttons

Start, Reset, Pause, Continue, Show Training Progress

Training Information

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 100%
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