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import numpy as np
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import LSTM, Dense

# Dummy data generation
# Let's assume we have 1000 samples with 5 features each
num_samples = 1000
num_features = 5
X = np.random.randn(num_samples, num_features)
# Generating binary labels indicating whether the product was returned or not
y = np.random.randint(2, size=num_samples)

# Splitting data into training and testing sets
split_ratio = 0.8
split_index = int(split_ratio * num_samples)
X_train, X_test = X[:split_index], X[split_index:]
y_train, y_test = y[:split_index], y[split_index:]

# Define RNN model
model = Sequential([
    LSTM(64, input_shape=(num_features, 1)),
    Dense(1, activation='sigmoid')
])

# Compile model
model.compile(optimizer='adam', loss='binary_crossentropy', metrics=['accuracy'])

# Reshape input data for RNN
X_train = np.reshape(X_train, (X_train.shape[0], X_train.shape[1], 1))
X_test = np.reshape(X_test, (X_test.shape[0], X_test.shape[1], 1))

# Train the model
model.fit(X_train, y_train, epochs=10, batch_size=32, validation_data=(X_test, y_test))

# Evaluate model on test data
loss, accuracy = model.evaluate(X_test, y_test)
print(f'Test Loss: {loss}, Test Accuracy: {accuracy}')

Epoch 1/10
25/25 [=====] - 4s 52ms/step - loss: 0.6936 - accuracy: 0.4975 - val_loss: 0.6956 - val_accuracy: 0.4700
Epoch 2/10
25/25 [=====] - 0s 10ms/step - loss: 0.6926 - accuracy: 0.5075 - val_loss: 0.6956 - val_accuracy: 0.4750
Epoch 3/10
25/25 [=====] - 0s 10ms/step - loss: 0.6927 - accuracy: 0.5175 - val_loss: 0.6958 - val_accuracy: 0.4550
Epoch 4/10
25/25 [=====] - 0s 11ms/step - loss: 0.6932 - accuracy: 0.5113 - val_loss: 0.6967 - val_accuracy: 0.4450
Epoch 5/10
25/25 [=====] - 0s 10ms/step - loss: 0.6930 - accuracy: 0.5225 - val_loss: 0.6955 - val_accuracy: 0.4550
Epoch 6/10
25/25 [=====] - 0s 10ms/step - loss: 0.6925 - accuracy: 0.5225 - val_loss: 0.6970 - val_accuracy: 0.4400
Epoch 7/10
25/25 [=====] - 0s 10ms/step - loss: 0.6926 - accuracy: 0.5238 - val_loss: 0.6971 - val_accuracy: 0.4450
Epoch 8/10
25/25 [=====] - 0s 5ms/step - loss: 0.6922 - accuracy: 0.5138 - val_loss: 0.6969 - val_accuracy: 0.4500
Epoch 9/10
25/25 [=====] - 0s 6ms/step - loss: 0.6922 - accuracy: 0.5113 - val_loss: 0.6967 - val_accuracy: 0.4500
Epoch 10/10
25/25 [=====] - 0s 5ms/step - loss: 0.6925 - accuracy: 0.5188 - val_loss: 0.6970 - val_accuracy: 0.4300
7/7 [=====] - 0s 10ms/step - loss: 0.6970 - accuracy: 0.4300
Test Loss: 0.6969942450523376, Test Accuracy: 0.4300000071525574

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