Deep Lab Assignment -10
Dead Line: 04/04/25

1- **Task:** Given a sequence of alphabets (with some missing values), use an RNN and a Bidirectional RNN model to predict the missing values in the sequence.

Steps:

1. **Create the dataset** consisting of a sequence of alphabets.
2. **Preprocess the data** by encoding the alphabet characters and handling missing values.
3. **Build and train an RNN model** for sequence prediction.
4. **Build and train a Bidirectional RNN model** for comparison.
5. **Predict the missing values** using both models.

E.g. : M A C H I N __ predict E And using Bidirectional RNN - A C H I N E.

2- Predict the next word in a sentence using an RNN. Consider the following sentence dataset:

The cat sat on the mat.
The dog sat on the rug.
The bird flew in the sky.
The cat jumped over the fence.
And predict ***"The cat sat on __-"***

Follow the following steps:

1- **Text Preprocessing:** tokenize the sentences and convert the words into numerical representations (i.e., using integer encoding).
2- **Model Building:** build a simple **RNN** model using Keras/TensorFlow.
3- **Training the Model:** train the RNN to predict the next word given the previous words in the sentence.
4- **Prediction:** use the trained model to predict the next word in a sentence.

3- Develop a sequence generator for Indian Classical Music Raga using an RNN to predict the next note in a series. The notes involved are Sa, Re, Ga, Ma, Pa, Dha, Ni, and Sha.

Dataset Preparation: Create sequences of notes from the given raga scale (Sa, Re, Ga, Ma, Pa, Dha, Ni, Sha).
Preprocess Data: Convert the notes to numerical representations.
Model Building: Build an RNN model to predict the next note in the sequence.
Training: Train the model to learn the relationships between the notes.
Generation: Use the trained model to generate sequences of notes.

As an extension, generate note sequences for Raga Bhairav, Raga Bhopali, Raga Bageshree, and other ragas using the RNN model.