PROJECT 2

English to French Neural Language Translator Using LSTM

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Project Report: English to French Neural Language Translator

1. Project Overview

This project presents a deep learning approach to language translation using a Long Short-Term Memory (LSTM) neural network. The goal is to convert English sentences into French by learning sequence mappings through a supervised neural network model.

2. Objectives

- To develop a neural language translator that converts English text to French.
- To preprocess and tokenize bilingual text data for neural sequence training.
- To build and train an LSTM-based encoder-decoder model.
- To evaluate and visualize the performance of the translation model.

3. Tools and Technologies Used

Programming Language:

- Python

Libraries and Frameworks:

- TensorFlow & Keras
- NLTK
- Gensim
- Matplotlib, Seaborn, Plotly
- Pandas & NumPy

4. Dataset and Preprocessing

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Data Source: Two small parallel corpora (`small_vocab_en.csv` and `small_vocab_fr.csv`) for English and French.

Cleaning Steps:

- Lowercasing and punctuation removal
- Stopword filtering
- Tokenization using NLTK

Tokenization & Padding:

- Keras Tokenizer and pad_sequences are used.

5. Model Architecture

The model is built using a sequence-to-sequence (seq2seq) architecture:

- Embedding Layer
- Encoder (LSTM)
- RepeatVector
- Decoder (LSTM)
- TimeDistributed(Dense with Softmax)

This architecture captures the mapping between English and French sequences.

6. Training & Evaluation

Loss Function: Categorical Crossentropy

Optimizer: Adam

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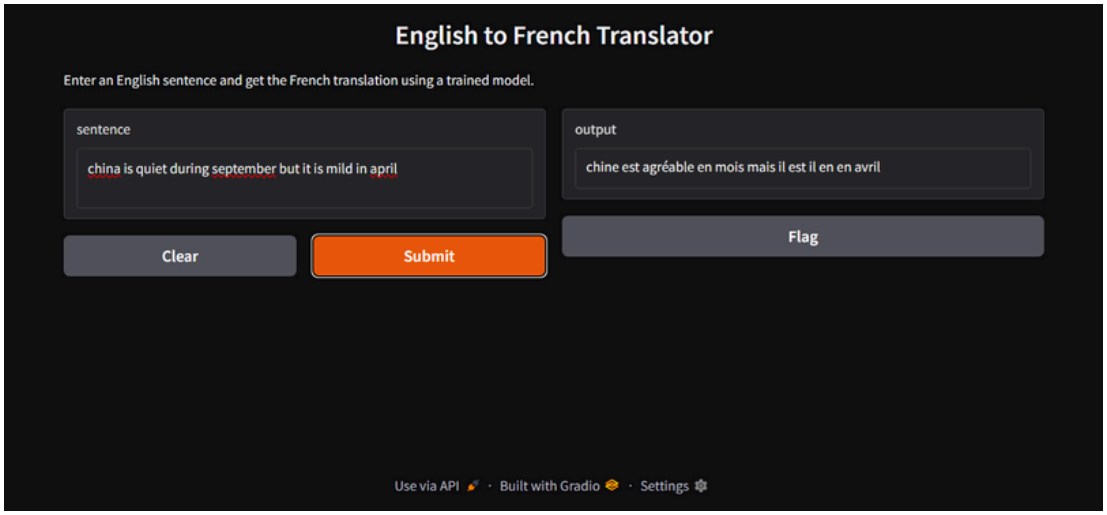
Metrics: Accuracy

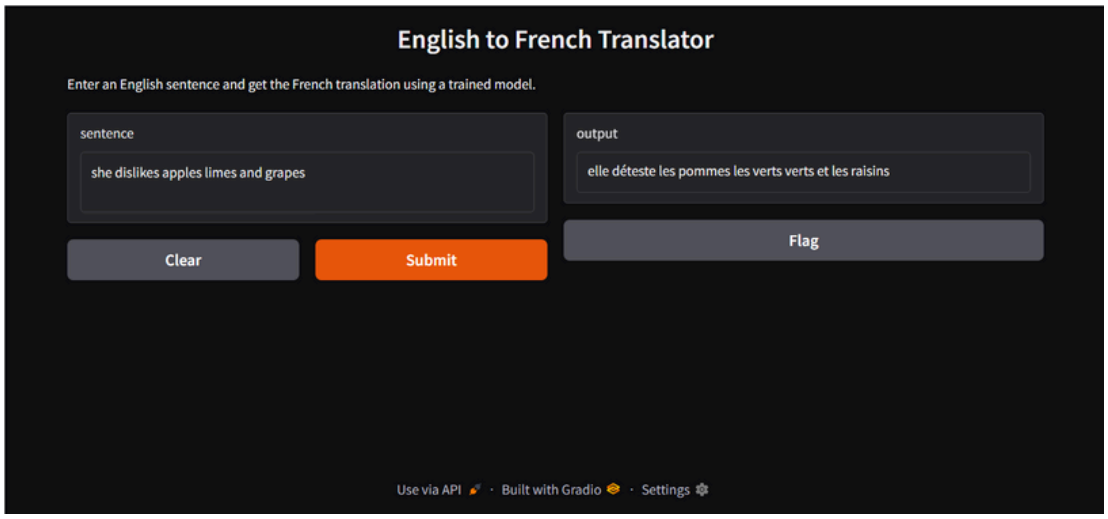
Epochs: Based on convergence

7. Sample Translations

Sample 1: EN -> FR Translation



Sample 2: EN -> FR Translation



8. Sample Deployment Link

Access a working demo or notebook for testing the translator:

https://aed75960c6590ef289.gradio.live

(Valid only for 1 week)