CHATBOT USING RNN

Final Problem Statement

Mentors-
Aryan Maurya
Shrey Mehta
Deadline - 20th January

1 Overview

In this project, we aim to implement a chatbot capable of answering questions based on a given "story." The foundation for our work is the BaBi dataset, a resource released by Facebook Research, which provides a set of tasks designed to evaluate the reasoning abilities of machine learning models.

1.1 Problem Statement

The primary objective is to develop a chatbot that can comprehend and respond to questions related to a provided narrative. The BaBi dataset consists of various tasks, each formulated as a "story" followed by associated questions. Our challenge is to train a model that can effectively understand these stories and generate accurate responses to the corresponding queries.

1.2 Dataset - BaBi

https://research.fb.com/downloads/babi/
The BaBi dataset serves as the cornerstone of our project. It contains a diverse set of tasks, each designed to evaluate specific aspects of a model's reasoning abilities. The dataset encompasses a range of story types, making it a comprehensive resource for training and evaluating our chatbot.

1.3 Methodology

Our approach involves leveraging natural language processing (NLP) techniques and machine learning models to build a chatbot capable of contextual understanding. We will employ techniques such as recurrent neural networks (RNNs) or transformers to capture the sequential nature of the stories and questions.

1.4 Significance

The successful implementation of this chatbot has potential applications in various domains, including customer support, information retrieval, and educational assistance. Improving the ability of machines to comprehend and respond to natural language queries is a fundamental step towards enhancing human-computer interactions.

1.5 Scope and Limitations

While we strive for a robust chatbot, it's important to acknowledge potential limitations. The performance of the model may vary based on the complexity of the stories, and certain nuances of language understanding might pose challenges.

This project represents an exciting exploration into the intersection of natural language processing and machine learning, with the ultimate goal of advancing the capabilities of conversational AI systems.

2 How the Bot Shall Look?

2.1

Model takes a discrete set of **inputs x1, ..., xn** that are to be stored in the memory, a **query q**, and outputs an answer a Each of the x , q, and a contains symbols coming from a **dictionary with V words.** The model writes all x to the memory up to a fixed buffer size, and then finds a continuous representation for the x and q.

2.2

End to End Network:
Input Memory Representation
Output Memory Representation
Generating Final Prediction
Create a full model with RNN and Multiple Layers

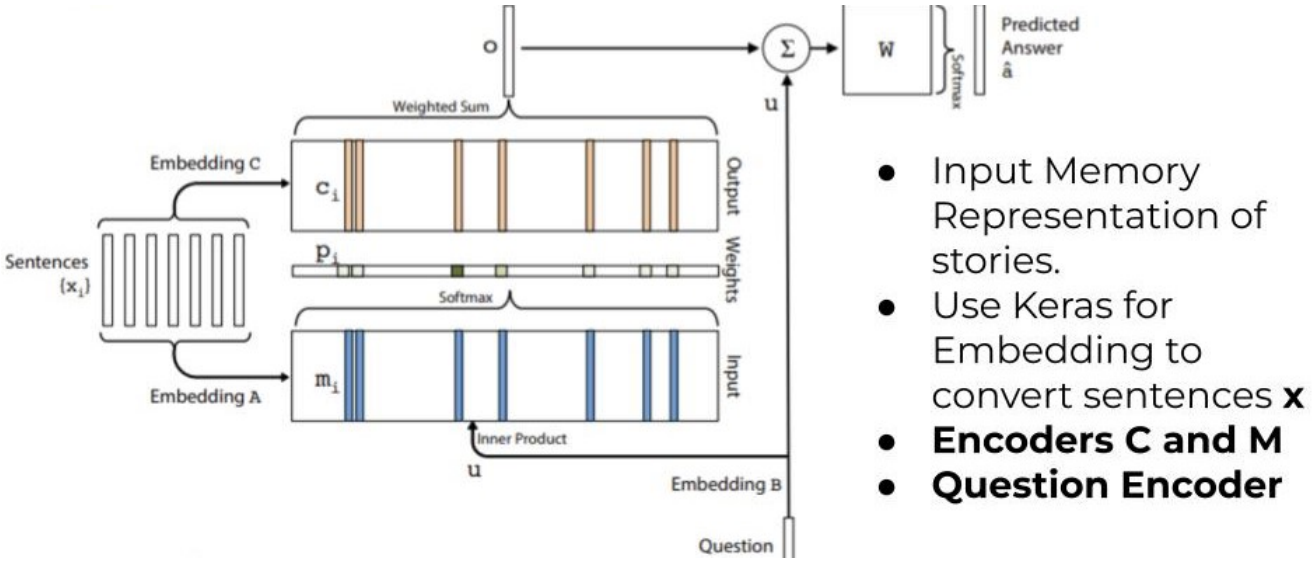

Figure 1: End to End Memory Network

2.3 Input Representation

- Input Memory Representation of stories.

$$p_i = \text{Softmax}(u^T m_i).$$

where $\text{Softmax}(z_i) = e^{z_i} / \sum_j e^{z_j}$.

2.4 Output Representation

Output Memory Representation
Each **x** has a corresponding output vector **c**
$o = \sum_i p_i \cdot c_i$
In the single layer case, the sum of the output vector **o** and the input embedding u is then passed through a final weight matrix W (of size V × d) and a softmax to produce the predicted label:
$a_{\text{cap}} = \text{Softmax}(W(o + u))$.

3 Steps

3.1

Understand the steps on how to Vectorize the Data
Create a function that can vectorize data.

3.2 Read the paper present in the zip

3.3

Build the Neural Network
Input Encoder M
Input Encoder C
Question Encoder
Complete the Network

4 Loading the Dataset

1) Download **Pickle** library.
2) You will find train and test set.Load them using **pickle.load()** in rb format.