Text summarization

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Outline:

- Introduction
- Tools
- Overview of system
- Adv & Dis
- Limitations
- Evaluation

Introduction

Problem:

World Wide Web has increased and so the problem of information overload also has increased. Hence there is a need of a system that automatically retrieves, categorize and summarize the document as per users need.

Solution: Document summarization

Summarization serves as a tool which helps the user to efficiently find useful information from immense amount of information

Tools :

- Rnn
- LSTM
- Encoder-Decoder

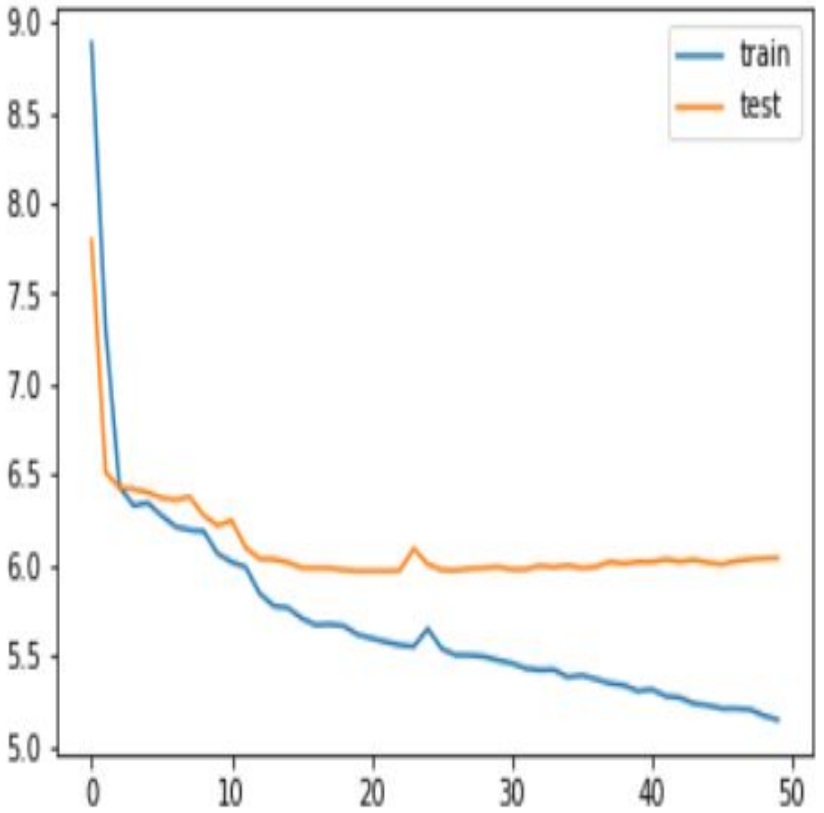
Overview :

- Read data.
- Split abstract from text.
- Preprocess and clean data.
- Split data to train and test data
- Build model.
- Attention layer: is used to selectively choose the relevant information while discarding the non-useful information by cognitively mapping the generated sentences with the inputs of encoder layer.
- Encoder & decoder model.
- Convert an integer sequence to a word sequence.
- Prediction.

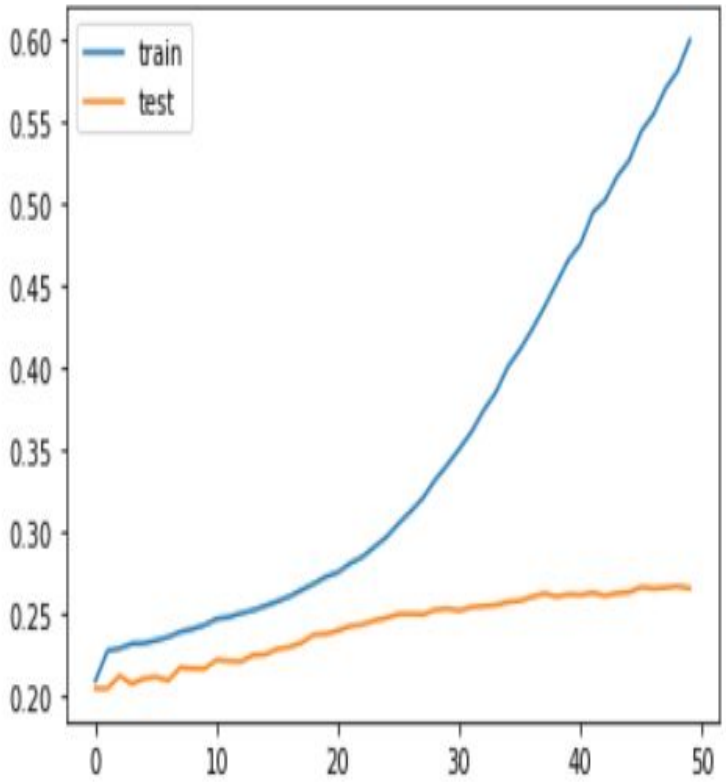
Loss

$loss_t = -log\ p(y_t \mid x, y_c)$

$CE(p, q) = -\sum_w q(w)\ log\ p(w) = -\log p(w)$



Accuracy



Original Summary

Vs

Predicted Summary

Original summary: self neural failed text mkn ltering effectively headlines groups proceedings text goal sim algorithm di rectly composition strategy computational percentage references development also proposed unique recsys cally cross swer following self neural failed text mse loss intuitive neural failed layer international sentence product experiments data results table network case two without

Predicted summary: pieces shaped ulms tried justi justi evaluation hindi tively huge advanced advanced tackling influenc ers influencers begun pletely late thirteenth dependency integrat schlafen supplied supplied forcement dehdari perceive r aise interaction framework locuslab ups imple imple descent bytenet path voices forces implies fuses nprf sults poetry po etry lari inadequate comparatively comparatively

Adv & Dis:

Advantages

1. Generates more human like summary.
2. Accuracy increases with the data size.

Disadvantages

1. Complex model
2. Repetition of word and phases is not checked.
3. Abstractive summarizers are comparatively slower.

Limitations:

Huge data so need high resources and computational power (cpu and ram)

Evaluation:

1. ROUGE (Recall Oriented Understudy for Gisting Evaluation)

a set of metrics used for the evaluation of automatic text summarization and machine translations. The metrics basically compare automatically generated summary with reference summary or multiple reference summaries.

Evaluation:

$$R = \frac{Nnumber\ of\ overlaping\ words}{Total\ words\ in\ reference\ summary}$$

$$P = \frac{Nnumber\ of\ overlaping\ words}{Total\ words\ in\ candidate\ summary}$$

$$F - measure = \frac{(1+\beta^2)\,R*P}{R+\beta^2*P}$$

Types of rouge:

- **ROUGE-1:** Measures overlap of unigram in reference summary and candidate (Machine generated) summary.
- **ROUGE-2:** Measures content overlap of bi-grams.
- **ROUGE-L** : Compute the Longest common subsequence between reference summary and candidate (Machine generated) summary. Each sentence in a summary is considered as a sequence of words. Two summaries which have longer common sequence of words are more similar to each other.

Evaluation:

2. BLEU (Bilingual Evaluation Understudy) :

a metric widely used for models having a word sequence as output.The range of BLEU scores is between 0 and 1, where 0 signifies no match between the expected output and the predicted output and 1 means a perfect match. BLEU can be considered as a modification to precision to handle sequence outputs. it clips the number of times a word is seen in the candidate or predicted output to the maximum times it appears in the reference or expected output.it also considers n-grams(bigrams, trigrams 4-grams).