# METROR

## 1 Definition of METROR

METROR considers both precision and recall based on the entire corpus to arrive at a measure.

Before calculation, METEOR first aligns the text generated by the model with the reference text, and the alignment steps adopt the following three modules in sequence:

1. exact module: This module extracts the exact same vocabulary from the generated text and the reference text

2. Porter stem module: This module uses Porter stemmer to transform the word form of the vocabulary, and extracts the transformed vocabulary with the same word form

3. WN synonymy module: Based on the list of synonyms, this module extracts the words belonging to synonyms in the generated text and reference text

   After the above three steps, an aligned text will be obtained. Assume that the vocabulary size of the text is $m$, the vocabulary size of the generated text is $t$, and the vocabulary size of the reference text is $r$. We can calculate the accuracy rate : $P = \frac{m}{t}$; recall rate: $R = \frac{m}{r}$, after calculating the precision rate and recall rate, you can calculate the weighted $F$ value:

   $$F_{mean} = \frac{P \cdot R}{\alpha \cdot P + (1 - \alpha) \cdot R}$$

   Where $\alpha$ is a hyperparameter.

   The aligned text is divided into small blocks of length $ch$, each

block is similar to n-gram form, and then a penalty parameter is calculated:

$$Pen = \gamma \cdot frag^{\beta}$$

Among them, $frag = \frac{ch}{m}$, $\beta$ and $\gamma(0 \leqslant \gamma \leqslant 1)$ are all super parameters.

Finally, the calculation formula of METEOR is as follows:

$$score = (1 - Pen) \cdot F_{mean}$$

The above hyperparameters $\alpha$, $\beta$ and $\gamma$ are obtained by training the model.

# 2 Advantages and disadvantages of METROR

## 2.1 Advantages of METROR

- METROR considers precision and recall based on the entire corpus
- METROR takes sentence fluency into account
- METROR considers the semantic impact of synonyms

## 2.2 Disadvantages of METROR

- The calculation method of METEOR is relatively complicated and involves multiple steps, including lemmatization, synonym replacement, calculation precision and recall rate, etc. This makes its implementation and use relatively complex and may require more computing resources and time.

# References

https://www.cs.cmu.edu/~alavie/METEOR/pdf/Lavie-Agarwal-2007-METEOR.pdf