n gram and Patricia Trie – Great Match
In Natural Language Processing In Big Data at Scale
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Introduction

Although n gram was not invented by Google, n gram might have been introduced to general public by Google n gram viewer. N gram is an essential tool for Natural Language Processing such as Machine Translation, Speech Recognition, Word Prediction etc. However only generating n gram is not enough. Only generating it can be done efficiently and easily with existing tools such as Python NLTK, Natural Language Tool Kit. It must be stored in an efficient data structure so that further analysis can be as optimal as possible. Especially a project like Google n gram viewer must be at scale. To deal with huge data, generating and storing n gram must be efficient.

The key of generating n gram is to generate as many word/character patterns as possible out of data.

On this poster, the author introduces n gram backed by a data structure called “Patricia Trie” at scale taking advantage of multicore CPUs to challenge Google n gram viewer.

Aim

a) To challenge Google n gram viewer in terms of number of generated n gram words
b) To take advantage of multicore CPUs for huge data set.
c) To be as efficient as possible from generating n gram to further analysis with n gram.

Method

a) Implement n gram using multicores from scratch.
b) Implement Patricia Trie from scratch.
c) Use Patricia Trie as a storage for n gram.
d) Gather data for n gram crawling on the Internet.
e) Run n gram on a 36 cores with 64 GB mem machine, Two Intel(R) Xeon(R) CPU E5-2630 v3 @ 2.40GHz.
f) Measure the performance as follows:
   a) # of generated n gram words per second.
   b) Total # of generated n gram words.
   c) Total # of unique words used to generate n gram words.

Result

Table

| Total # of web pages processed | 12,905 |
| # of generated n gram words per second | 3,151 |
| Total # of generated n gram words | 45,608,314 |
| # of generated n gram characters | 27,357,970 |
| # of generated n gram words | 18,250,344 |
| # of Unique words | 611,593 |

Conclusion

There are positive and still challenging, findings on this project. Good findings are as follows:

a) It didn’t break during the experiment.
b) It generated a great number of n gram per Second.
c) Total # of generated n gram words/characters was huge.

Still challenging findings are as follows:

a) Data set was not as huge as Google n gram viewer deals with.
b) Total # of generated n gram words was not as huge as Google n gram viewer generates.

Although, with these negative findings, the Author feels confident about this project to be as good as Google n gram viewer in the near future.