# Increasing the Efficiency of Text Analysis Programs Using a Multi-Tiered Approach

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## Abstract

Natural Language Processing is an increasingly researched field that has a few major barricades holding back its progress. One of these barricades is the intensive computational costs used by its processes. The goal for this project is to explore potential efficiencies that can be gained by implementing a multi-tiered filter based analysis system. A text-analysis script was written and designed in order to prove this hypothesis. The resulting data indicates that a multi-tier approach can be successfully implemented for an increase in efficiency.

## Technologies Used

- Python
  Programming Language
- Jupyter Notebook
  Integrated Development Environment
- Github
  Source Code Management
- Doc2Vec
  Natural Language Processing Python package
- Pandas
  Data manipulation Python package
- Nltk
  Natural Language Tokenizer Python package
- Sklearn
  Vector Analysis Python package
- BeautifulSoup
  Web scraper python package

## Corpora

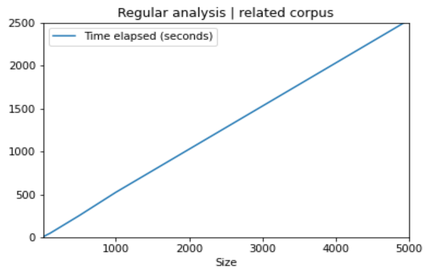
- Related
  Corpus is filled with articles related to given seed. Worst case scenario
- Fifty Fifty
  Corpus is half filled with related articles, half filled with random articles. Average case scenario.
- Random
  Corpus is filled with entirely random articles. Best case scenario.

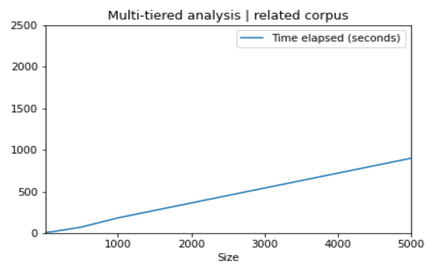
## Real World Applications

- Patent Enforcement
  Patents can be compared to product descriptions quickly and efficiently allowing companies to sift through large volumes of potential infringements.
- Credit Transfers
  Enable universities to efficiently compare the course descriptions and make a guided decision as to whether or not the credits should transfer.

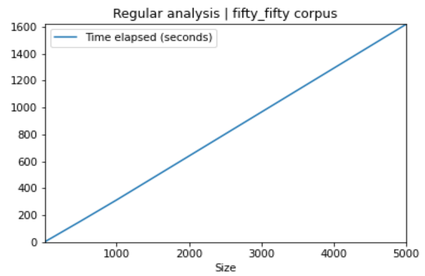
## Results

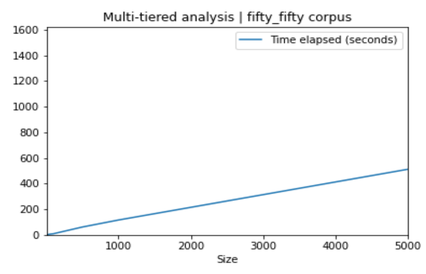
Related



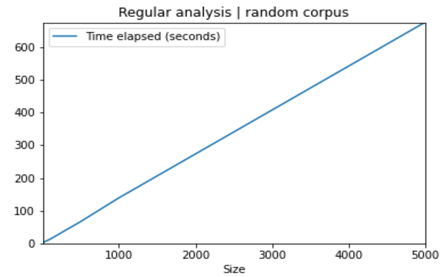



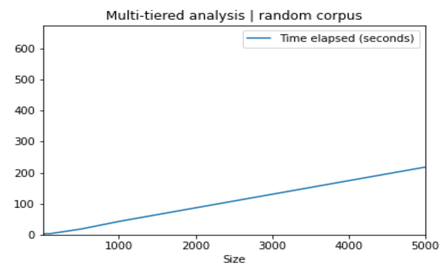

Fifty Fifty




Random




## Conclusion

This data shows that it is possible to boost efficiency in natural language processing applications using a multi-tiered approach. It also shows that this approach works on broad sets of documents that span multiple different topics. The multi-tiered process proves to be effective in the best, average, and worst case scenarios, with an efficiency boost ranging 2.8x to 3.1x faster than the regular analysis process. This means that the approach has a wide range of potential applications in the Data Science Industry. Considerations should be made to implement a similar system in any application involved in natural language processing and text similarity analysis.