

Data Retrieval Project Report

Students:

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Git Repository: <https://github.com/LevyIfta/DataRetrivelProject>

Bucket: `ir_proj_205888886`

Key experiments:

Indexing experiments:

The first roadblock we had to experiment on was memory issue during indexing. Despite making sure to only load a single file at a time while indexing, we often ran out of memory mid-indexing causing the Kernel to restart (effectively wiping the indexing process). We had to experiment with different clusters settings and locations to hand-delete unnecessary arguments until we managed to find a working solution

Word models:

We checked a few different ML models in order to find words with similar meanings to ones in a given query.

First we checked PyDictionary. We checked its capabilities to give us synonyms, hyponyms and hypernyms. While its operation was smooth and easy, it showed us how complex word's meanings can get. Many are the words that have many different meanings depending on connotation, so it was near impossible to reasonably identify the correct synonym. (for example the word "word" had 11 different meanings each with different synonyms {such as "intelligence", "news", "the Bible" })

Afterwards, we experimented with google's Word2Vec. At first we attempted training a model based on a small corpus, but that gave us mixed results (the closest words to "water" were "soil" followed by "groundwater").

Realising that perhaps we used too small of a corpus, we looked for pretrained models, and encountered Google's pretrained Word2Vec model, which was trained on the entire Wikipedia corpus (2015). While it definitely gave much better results, it would also be somewhat inconsistent. The model would suggest very similar words alongside weird phrases. "Sea" is very similar to "ocean" but no so much to "Creamsicle_orange"

Runtime:

Sadly, as we worked breath-wide with scrutiny, by the first time we ran a fully functionally search engine we already had satisfactory results (even on the very first query run times were <1 sec)

Good result:

Query: "Football"

```
[
  [
    "5708067",
    "GrassMaster"
  ],
  [
    "1662349",
    "Football (disambiguation)"
  ],
  [
    "23594875",
    "List of Football Associations by date of foundation"
  ],
  [
    "2493729",
    "Football association"
  ],
  [
    "23555338",
    "List of Australian rules football clubs in Western Australia"
  ],
  [
    "23555289",
    "List of Australian rules football clubs in South Australia"
  ],
  [
    "37491210",
    "North American football"
  ],
  [
    "33247878",
    "West Australian Country Football League"
  ],
  [
    "26187398",
    "Professional football"
  ]
]
```

Bad result:

Query: Tom yam soup

```

L
[
  "49248790",
  "Nsala soup"
],
[
  "56866",
  "Yam"
],
[
  "47770304",
  "Tom yum"
],
[
  "32104663",
  "Yam production in Nigeria"
],
[
  "65811438",
  "Bing-yee Yam"
],
[
  "23444539",
  "On Yam Estate"
],
[
  "3152275",
  "Yam (vegetable)"
],
[
  "45400645",
  "Asogli Te Za (Yam Festival)"
],
[
  "53699466",
  "List of vegetable soups"
]
]

```

It seems the engine managed to easily find documents related to a single word query. Even on a multi word query it managed to return decent results per word.

On the other hand, it is very clear our engine struggle with multi word terms. In the case of “Tom yam soup” it struggled to understand that “tom yam” is a name of a soup. It gave multiple results related solely to “soup” or “yam”(a vegetable) but almost none related to the particular eastern dish.