Practical Assignment

BM40A1500 Data Structures and Algorithms

### 1. Implementing the Hash Table

#### 1.1 Structure of the hash table

Present the structure of the hash table.

#### 1.2 Hash function

What hashing function you used and why?

#### 1.3 Methods

What methods (including the required) your hash table has? Explain briefly how do they work?

### 2. Testing and Analyzing the Hash Table

#### 2.1 Running time analysis of the hash table

* What is the running time of adding a new value in your hash table and why?
* What is the running time of finding a new value in your hash table and why?
* What is the running time of removing a new value in your hash table and why?

Use Θ notation. Consider what factors influence the running time of the methods.

### 3. The Pressure Test

Table 1. Results of the pressure test.

|  |  |
| --- | --- |
| **Step** | **Time (s)** |
| Initializing the hash table |  |
| Adding the words |  |
| Finding the common words |  |
|  |  |

Hash\_3\_1.py runtimes (size 10000) Hash\_3\_2.py runtimes

|  |  |
| --- | --- |
| # | Runtime(s) |
| 1 | 1.66554213 |
| 2 | 1.90644813 |
| 3 | 1.70513701 |
| 4 | 1.71180367 |
| 5 | 1.70722818 |
| 6 | 1.69835520 |
| 7 | 1.72848606 |
| 8 | 1.70621872 |
| 9 | 1.72077060 |
| 10 | 1.85961938 |
| Avg | 1.7409609 |

|  |  |
| --- | --- |
| # | Runtime(s) |
| 1 | 252.58100128 |
| 2 | 251.96795321 |
| 3 | 272.36241317 |
| 4 | 258.65484381 |
| 5 | 254.32136822 |
| 6 | 258.35052371 |
| 7 | 267.83671069 |
| 8 | 268.33103919 |
| 9 | 275.48070908 |
| 10 | 266.20386243 |
| Avg | 262.611986161 |

#### 3.1 Comparison of the data

#### structures

Which data structure was faster in adding the words from the file and why? In which data structure was the search faster and why?

#### 3.2 Further improvements

|  |  |
| --- | --- |
| **Hash table size** | **Average runtime(s)** |
| 100 | 88.741962745 |
| 1k | 8.790079427 |
| 10k | 1.740960908 |
| 100k | 0.909177971 |
| 1M | 1.031345439 |

Are you able to make the program faster?

* Try to change the size of the hash table.
* How well is the data distributed in the hash table?

### List of references

Add here the references and source that you used.