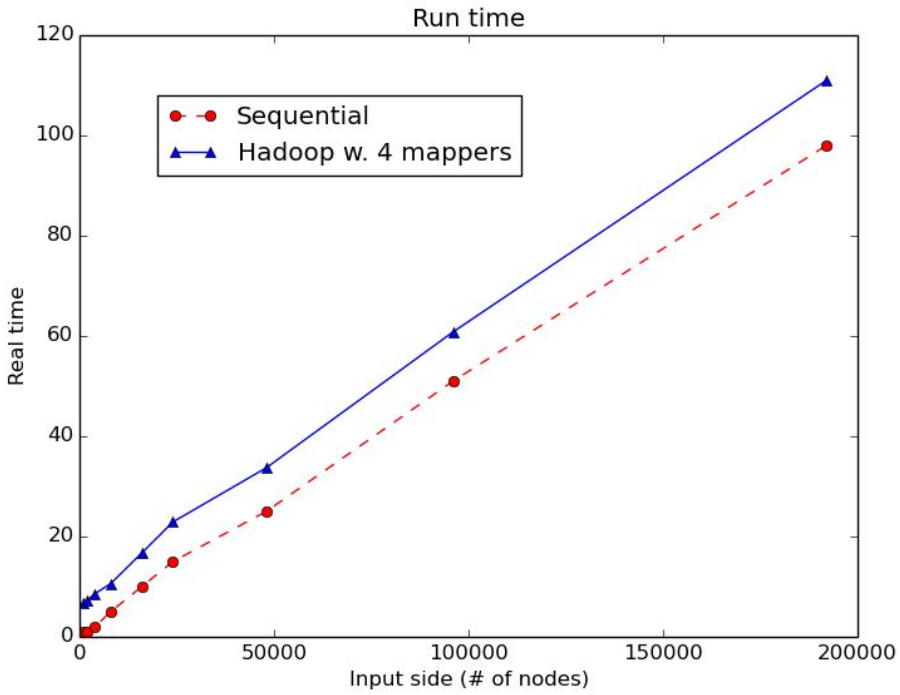
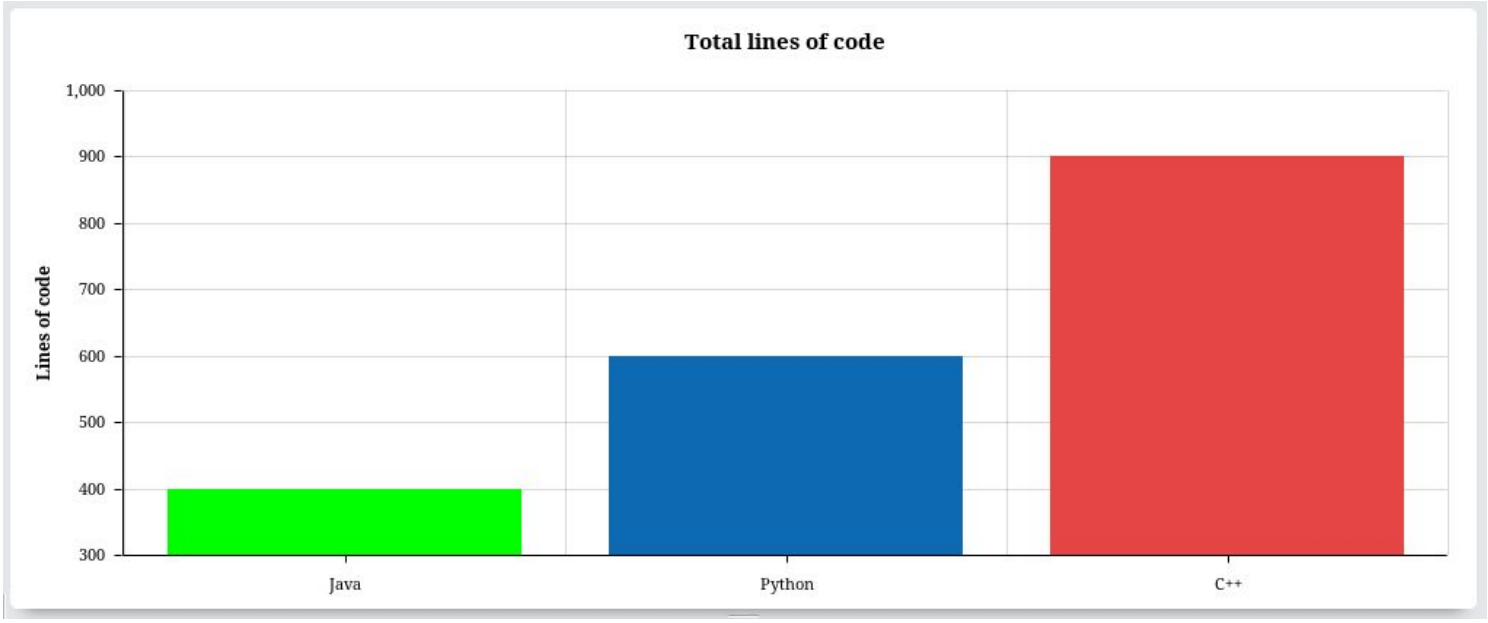
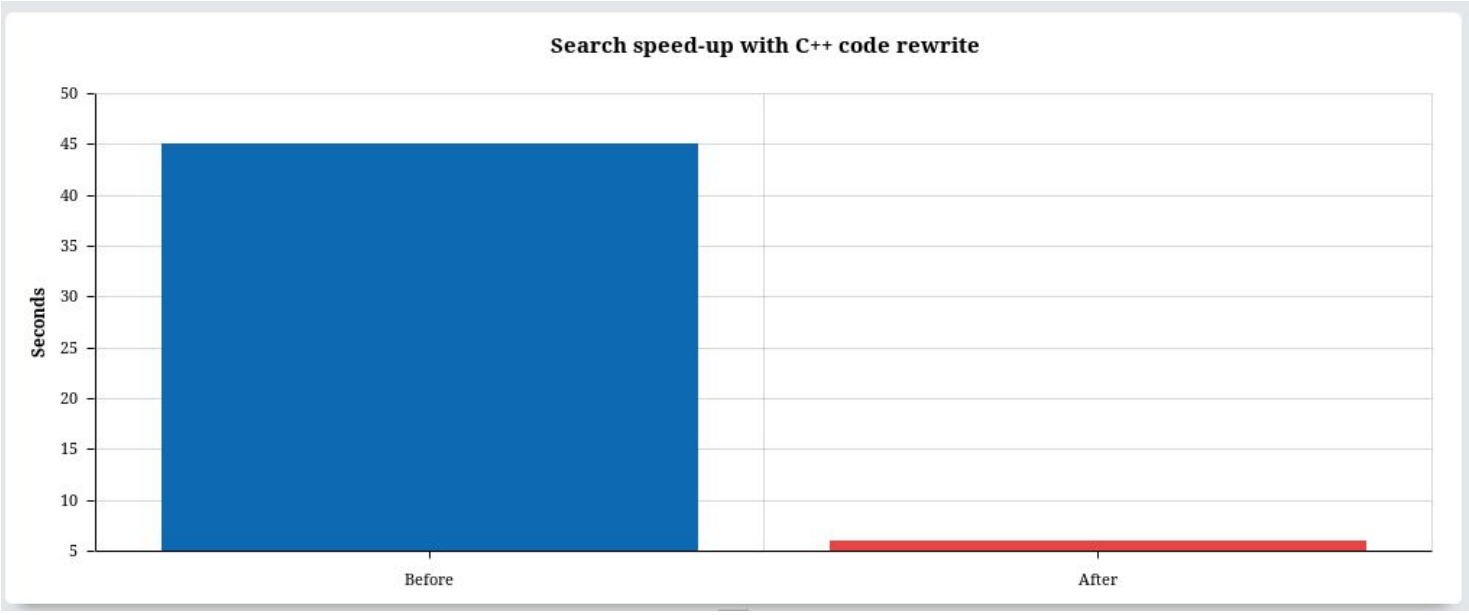
CSC494 Spring 2015

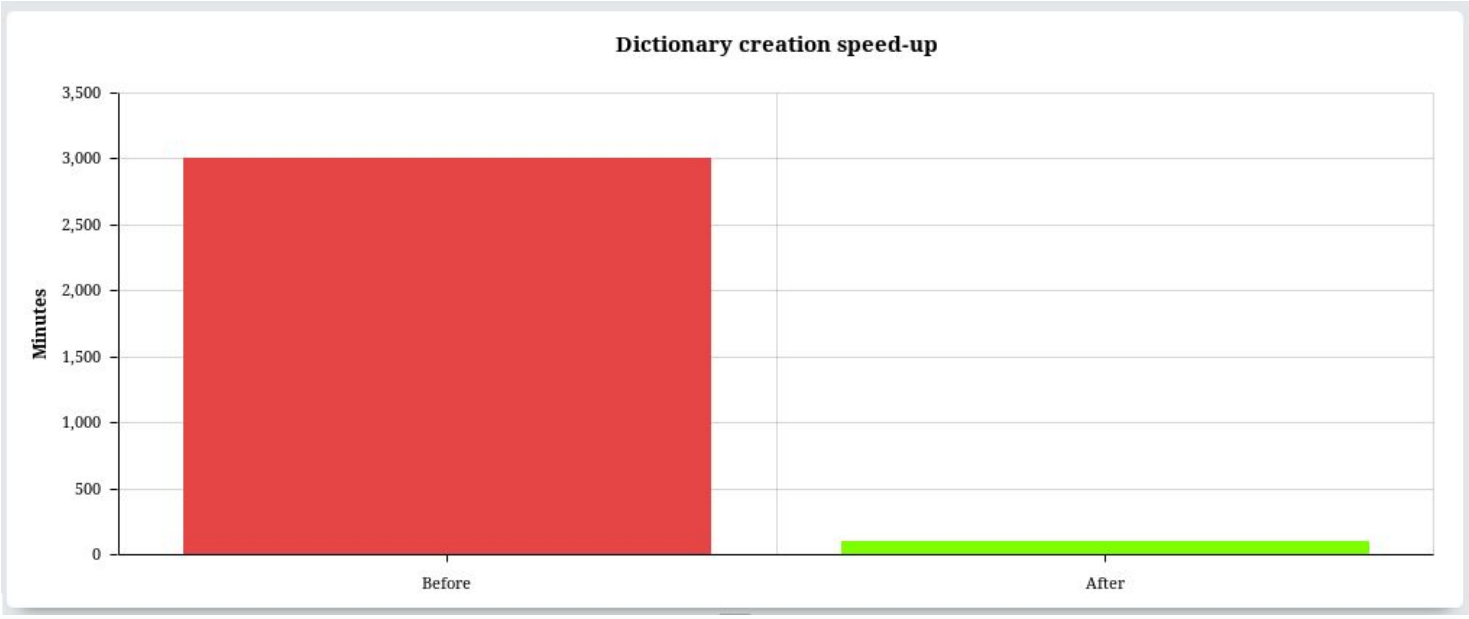
Supervisors: Renée J. Miller, Fatemeh Nargesian
Huy Bui - g8buihuy - 996594421
Mihai Nicolae - g1mihai - 998584367

1. ✓ Gained working knowledge of the Hadoop framework.
2. ✓ Implemented and experimented with 2 different ways to parallelize search in Hadoop. Found out that Hadoop is too slow given the small size of input.
3. ✓ Searching graph in parallel in order to achieve acceptable web application response time
   - researched different C++ graph libraries and chosen Boost Graph Library (BGL)
   - Rewrote search algorithm in C++
   - Found the bottleneck of the search algorithm: finding the initial rootQueue. We parallelized this part and achieved 8X speed-up.
   - Removed irrelevant search results by adding logic to calculate similarity of concepts to the query.
   - Researched and applied other Boost libraries to add helpful features such as profiling.
   - Total lines of code: 900+
   - Future to-dos: serialize search DAG to disk, experiments against high quality dictionary
4. ✓ Creating a high quality dictionary
   - Experimented with more sophisticated heuristics, e.g. part of speech tagging to help remove unwanted words and stemming to reduce duplications, etc.
   - Parallelized dictionary creation. Achieved 180X speed-up.
   - This helps facilitate experiments of different heuristics to improve dictionary quality and, indirectly, search result.
   - Total lines of code: 600+


Run time
Sequential
Hadoop w. 4 mappers
Real time
Input side (# of nodes)
0
20
40
60
80
100
120
0
50000
100000
150000
200000


Total lines of code
Lines of code
1,000
900
800
700
600
500
400
300
Java
Python
C++


Search speed-up with C++ code rewrite
Seconds
50
45
40
35
30
25
20
15
10
5
Before
After


Dictionary creation speed-up
Minutes
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Before
After