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Boggle Analysis

Lexicon Benchmarking Results:

size of SimpleLexicon: 80612		
	iter time: 0.009000	size: 80612
	word time: 0.005000	words: 80612
	pref time: 0.024000	size: 16466
size of TrieLexicon: 80612		
	iter time: 0.083000	size: 80612
	word time: 0.002000	words: 80612
	pref time: 0.014000	size: 16466
size of BinarySearchLexicon: 80612		
	iter time: 0.003000	size: 80612
	word time: 0.001000	words: 80612
	pref time: 0.016000	size: 16466

Iter Time: Simple/BinarySearch were almost exactly the same and quicker than Trie. This makes sense because TrieLexicon has to iterate over the letters in each word, not just the word itself. The other two are simply iterating over all words. **FASTEST = BINARYSEARCH**

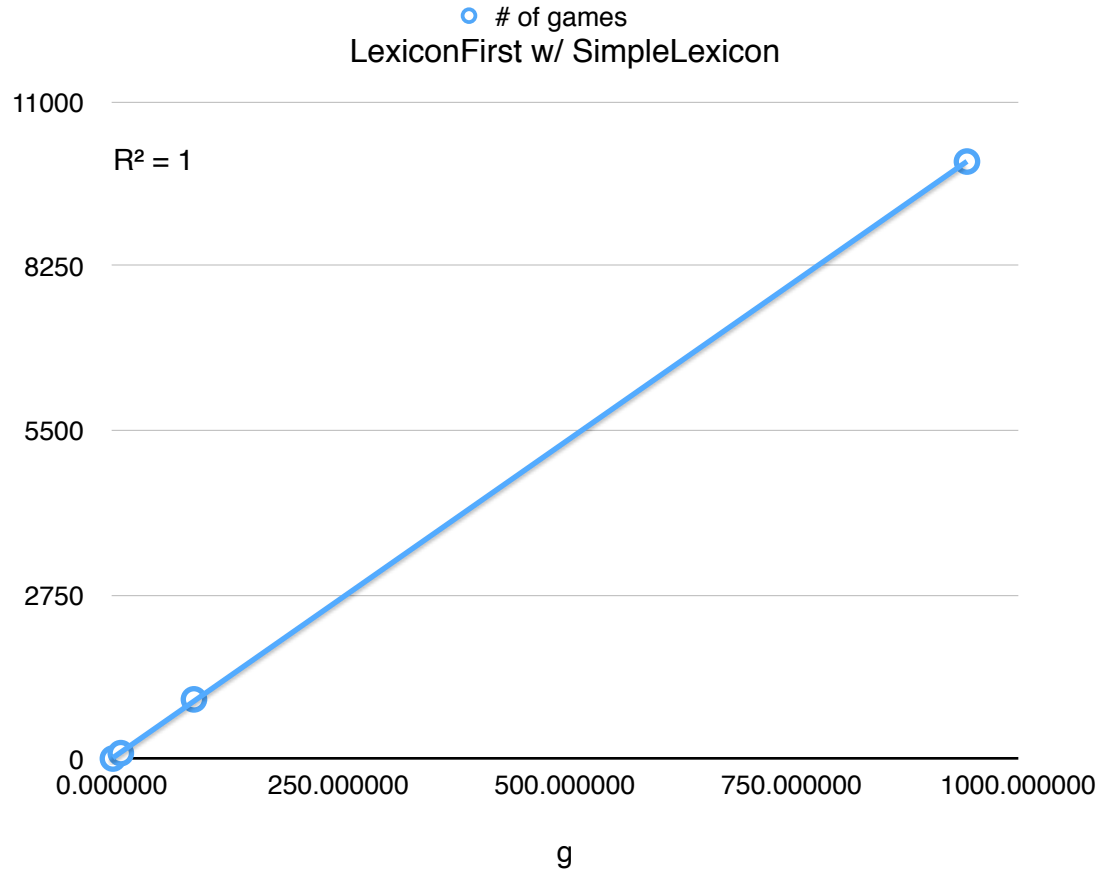
Word time: All times were close, but BinarySearch and Trie were essentially equal (.002 vs .001) SimpleLexicon was the slowest because you have to iterate the whole set until you either find the word or do not (thus you have iterated over the whole set). **FASTEST = BINARYSEARCH**

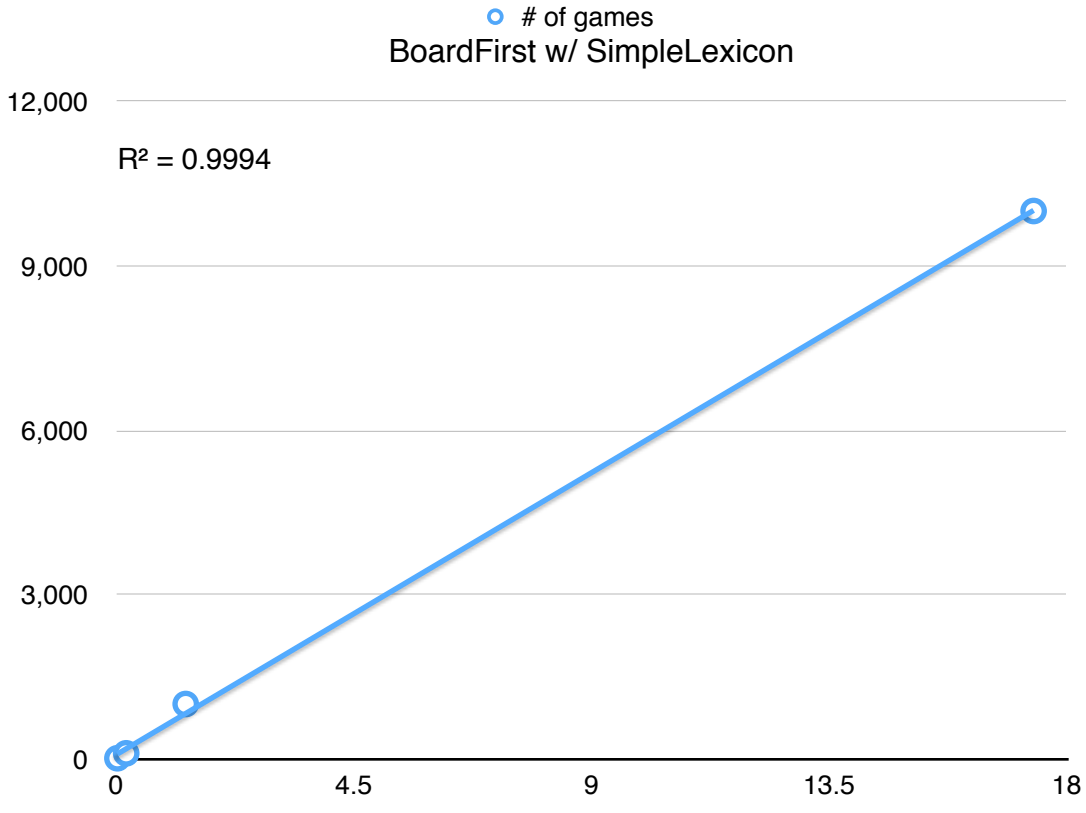
Pref Time: TrieLexicon finds prefixes the quickest because it iterates over each sequence of letters as it tries to find a word and automatically checks if it is a prefix. Simple takes longer because you have to iterate over the whole list to see if it is a prefix. **FASTEST = TRIE**

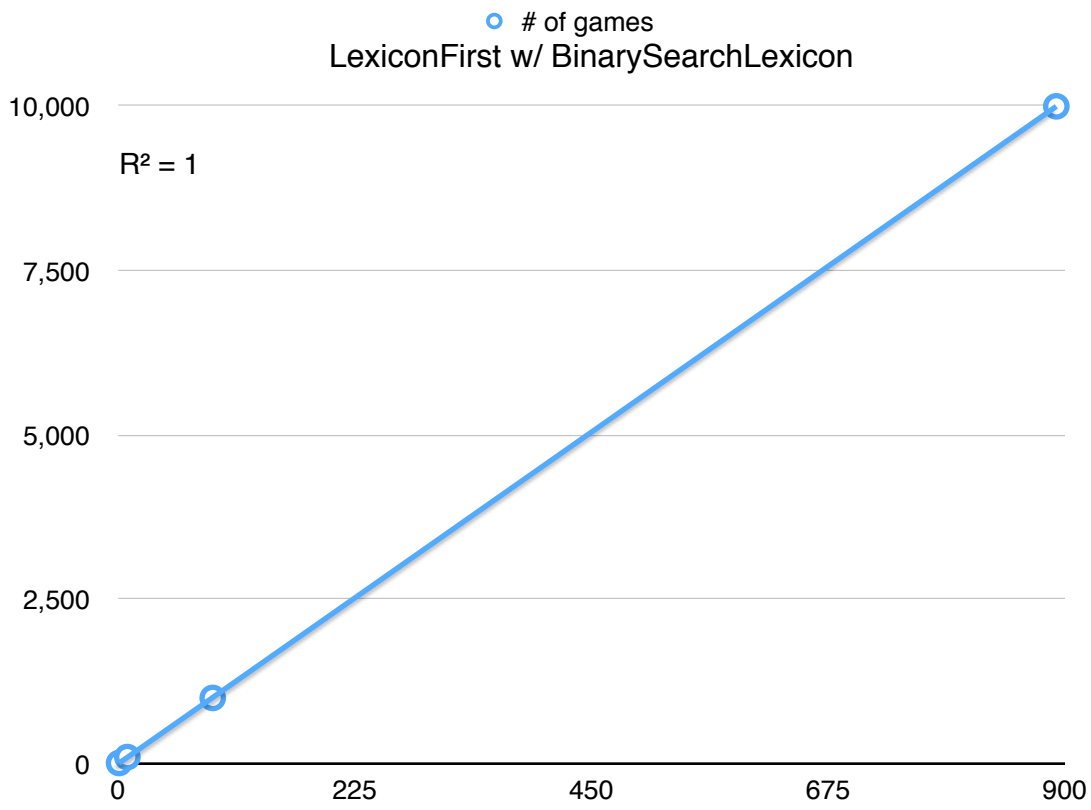
Overall times:

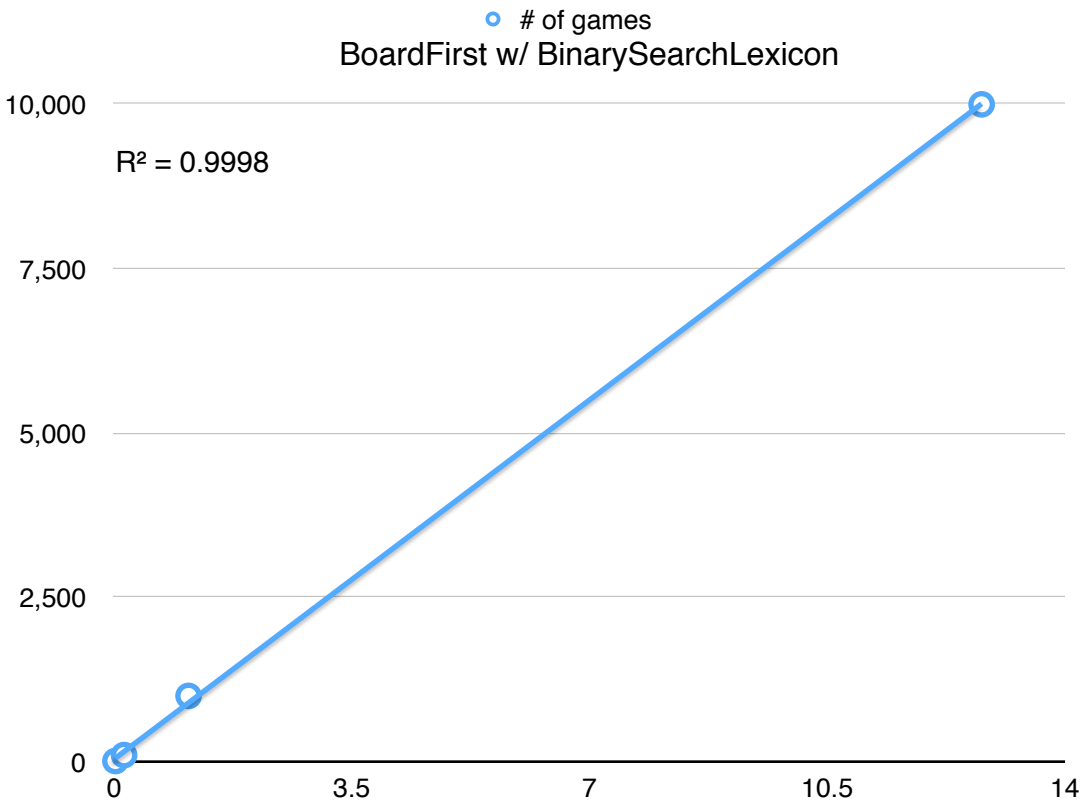
BinarySearch: .02 seconds
Trie: .099 seconds
Simple: .038 seconds

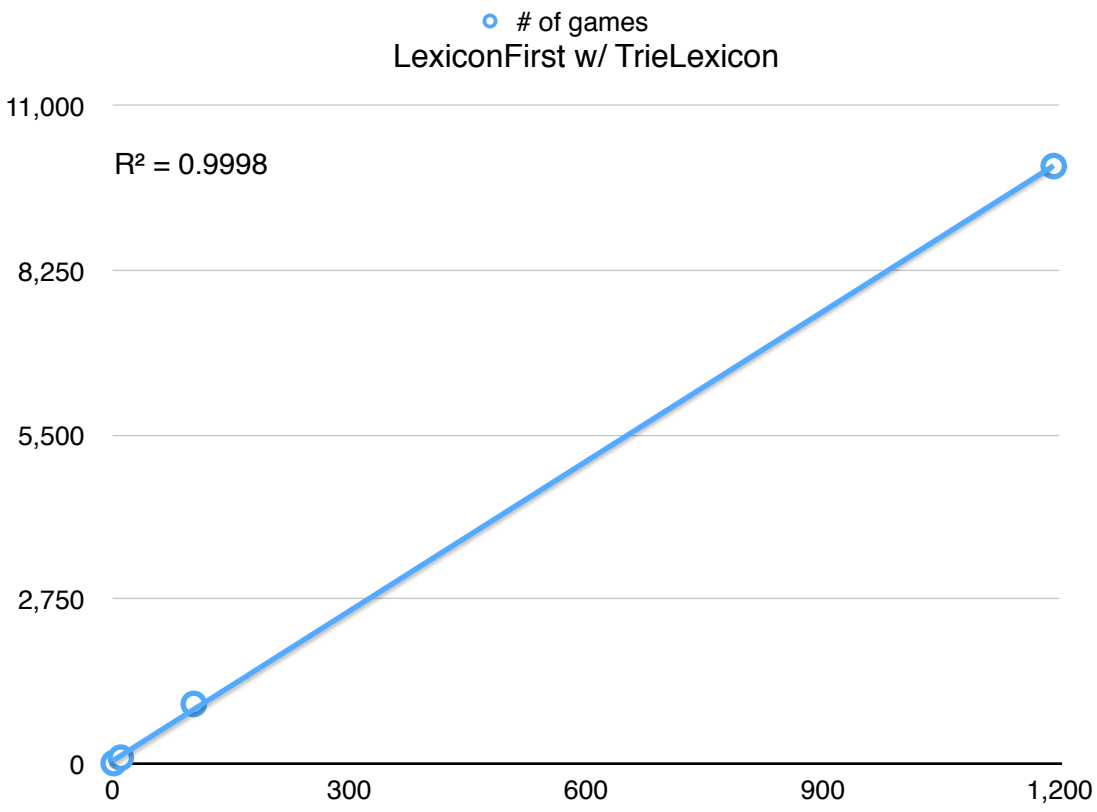
BoggleStats (4x4)
(only could run up to 10,000 games)
Graphs display number of games (x) vs. number of seconds (y)

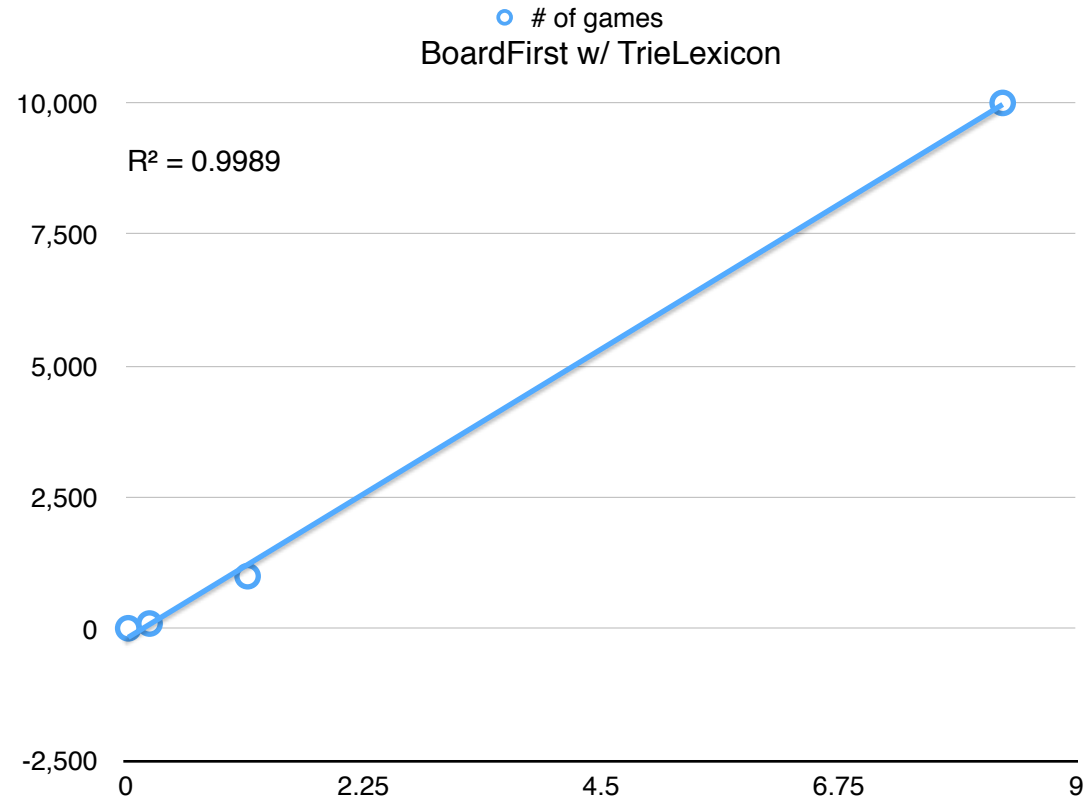





# of games
LexiconFirst w/ BinarySearchLexicon
10,000
7,500
5,000
2,500
0
R² = 1
0
225
450
675
900


# of games
BoardFirst w/ BinarySearchLexicon
10,000
7,500
5,000
2,500
0
R² = 0.9998
0
3.5
7
10.5
14


# of games
LexiconFirst w/ TrieLexicon
11,000
8,250
5,500
2,750
0
R² = 0.9998
0
300
600
900
1,200


# of games
BoardFirst w/ TrieLexicon
10,000
7,500
5,000
2,500
0
-2,500
R² = 0.9989
0
2.25
4.5
6.75
9

Because all R^2 values were either 1 or very close to it, extrapolating for tests with more test cases is simple:

For LexiconFirst w/ SimpleLexicon…

- 50000 games ~ 4717.825 seconds
- 100000 games ~ 9435.65 seconds
- 1000000 games ~ 94356.5

For BoardFirst w/ SimpleLex…

- 50000 games ~ 86.86 seconds
- 100000 games ~ 173.72 seconds
- 1000000 games ~ 1737.2 seconds

For LexiconFirst w/ BinarySearchLexicon…

- 50000 games ~ 4459.38 seconds
- 100000 games ~ 8918.76 seconds
- 1000000 games ~ 89187.6 seconds

For BoardFirst w/ BinarySearchLexicon…

- 50000 games ~ 63.87 seconds
- 100000 games ~ 127.74 seconds
- 1000000 games ~ 1277.4 seconds

For LexiconFirst w/ TrieLexicon…

- 50000 games ~ 5961.74 seconds
- 100000 games ~ 11923.48 seconds
- 1000000 games ~ 119234.8 seconds

For BinaryFirst w/ TrieLexicon…

- 50000 games ~ 41.505 seconds
- 100000 games ~ 83.01 seconds
- 1000000 games ~ 830.1 seconds

Highest Scoring Boards
(Used 12345 as seed)

10 trials:

e	s	a	h
l	e	f	o
t	n	e	y
c	r	u	qu

100 trials:

c	i	t	y
e	r	t	qu
e	e	a	w
d	r	f	o

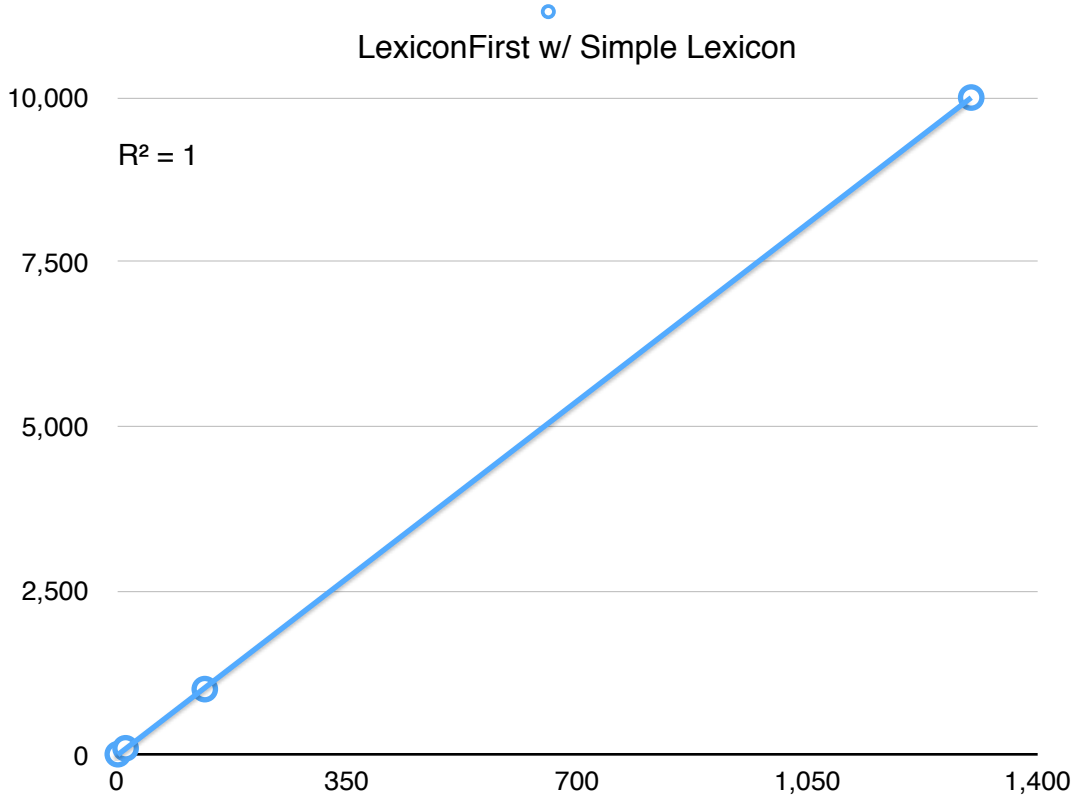
1000 trials:

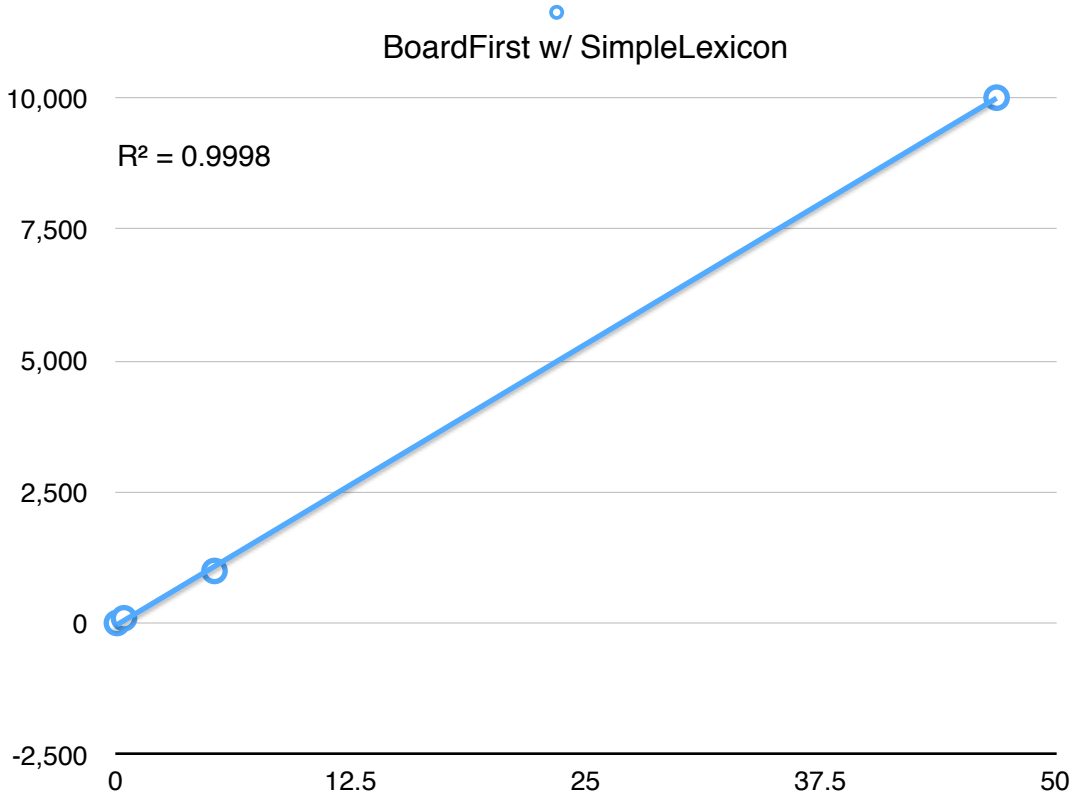
g	s	r	g
n	e	t	i
i	o	s	b
p	r	e	n

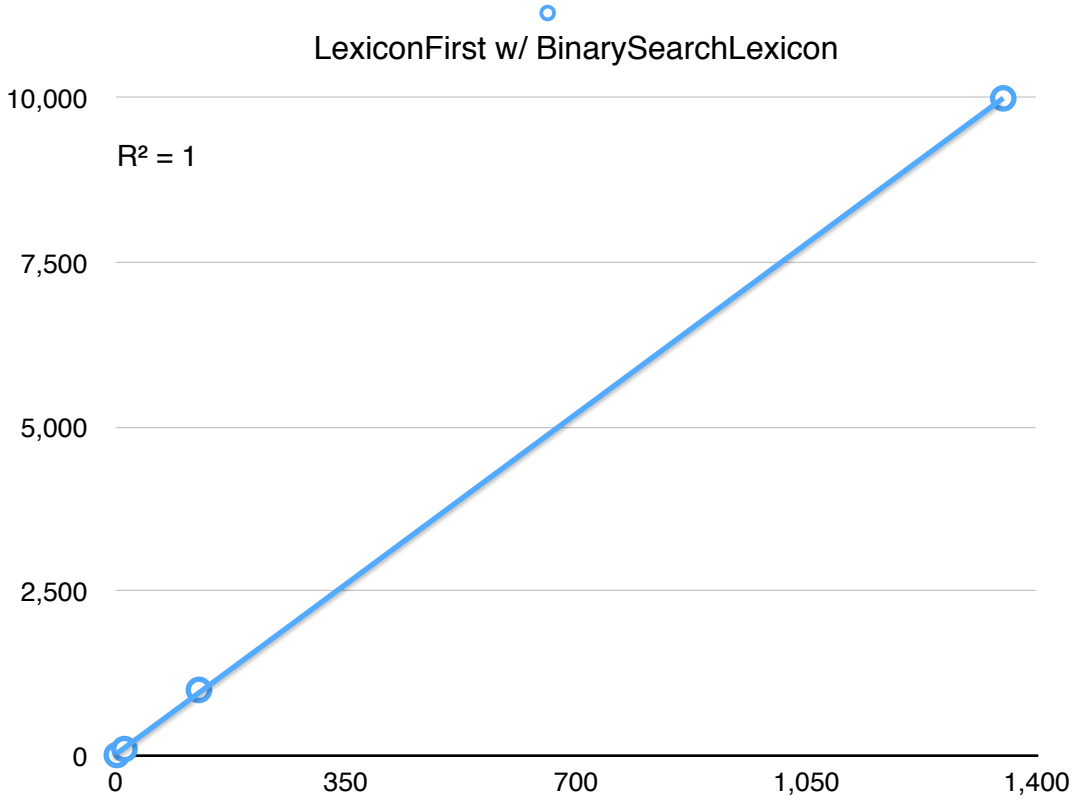
10000 trials:

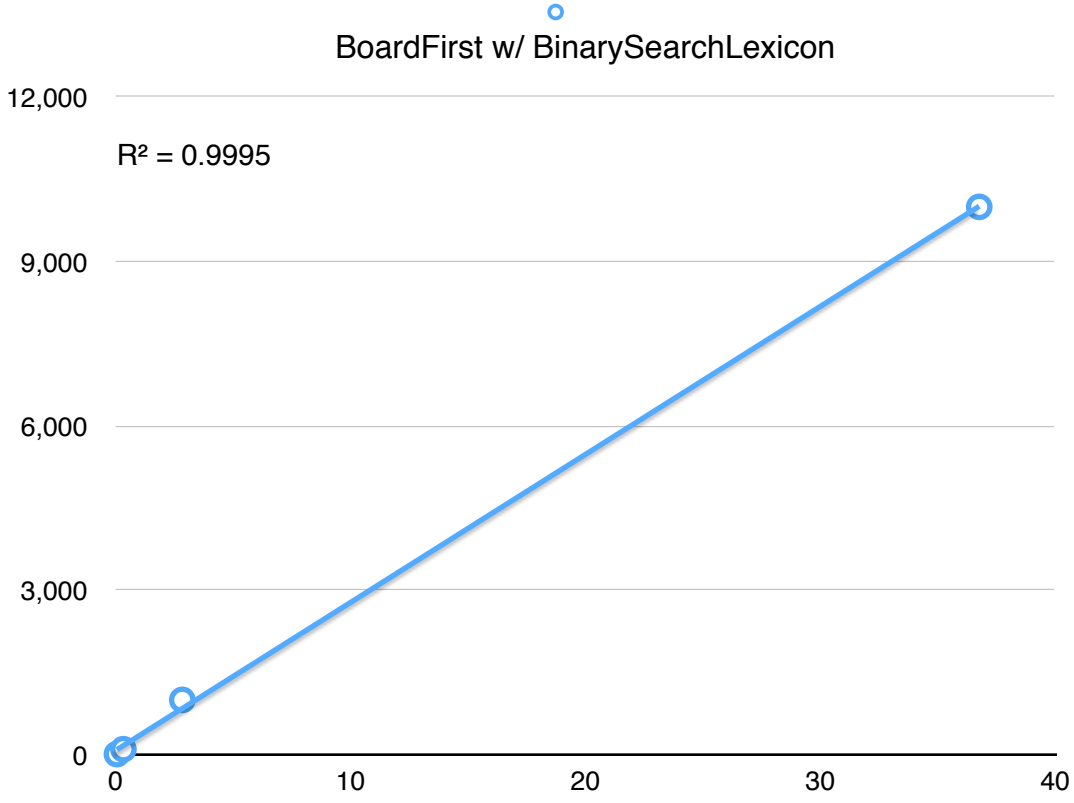
g	s	r	g
n	e	t	i
i	o	s	b
p	r	e	n

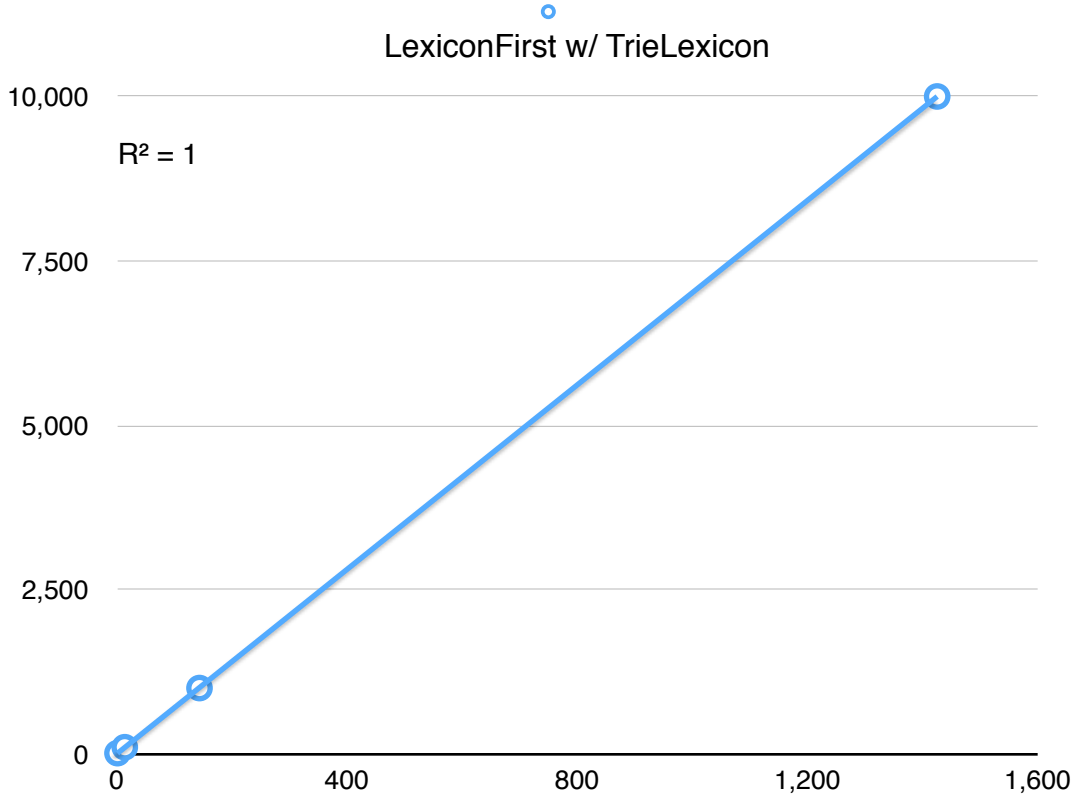
BoggleStats (5x5)
(only could run up to 10,000 games)
Graphs display number of games (x) vs. number of seconds (y)

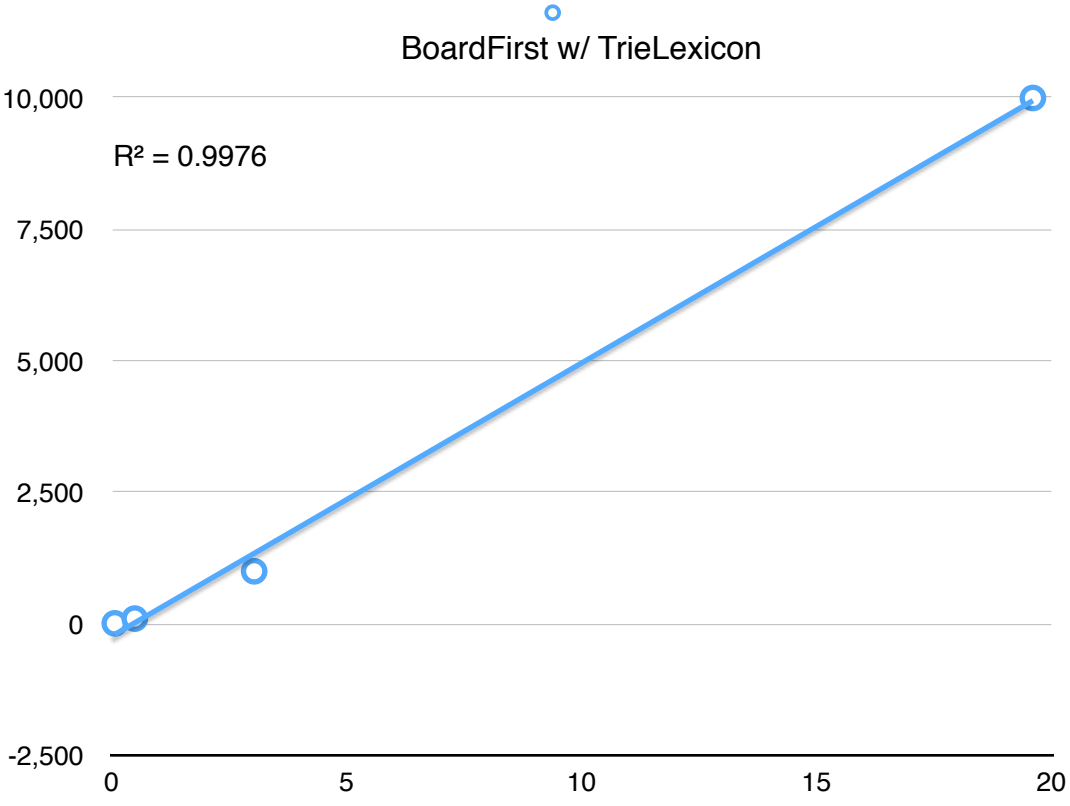





LexiconFirst w/ BinarySearchLexicon
10,000
7,500
5,000
2,500
0
R² = 1
0
350
700
1,050
1,400


BoardFirst w/ BinarySearchLexicon
12,000
9,000
6,000
3,000
0
R² = 0.9995
0
10
20
30
40


LexiconFirst w/ TrieLexicon
10,000
7,500
5,000
2,500
0
R² = 1
0
400
800
1,200
1,600


BoardFirst w/ TrieLexicon
10,000
7,500
5,000
2,500
0
-2,500
R² = 0.9976
0
5
10
15
20

Because all R^2 values were either 1 or very close to it, extrapolating for tests with more test cases is simple:

For LexiconFirst w/ SimpleLexicon…

- 50000 games ~ 6495.235 seconds
- 100000 games ~ 12990.47 seconds
- 1000000 games ~ 129904.7

For BoardFirst w/ SimpleLex…

- 50000 games ~ 234.38 seconds
- 100000 games ~ 468.76 seconds
- 1000000 games ~ 46876 seconds

For LexiconFirst w/ BinarySearchLexicon…

- 50000 games ~ 6745.975 seconds
- 100000 games ~ 13491.95 seconds
- 1000000 games ~ 134919.5 seconds

For BoardFirst w/ BinarySearchLexicon…

- 50000 games ~ 183.825 seconds
- 100000 games ~ 367.65 seconds
- 1000000 games ~ 3676.5 seconds

For LexiconFirst w/ TrieLexicon…

- 50000 games ~ 7127.575 seconds
- 100000 games ~ 14255.15 seconds
- 1000000 games ~ 142551.5 seconds

For BinaryFirst w/ TrieLexicon…

- 50000 games ~ 98.04 seconds
- 100000 games ~ 196.08 seconds
- 1000000 games ~ 1960.8 seconds

Highest Scoring Boards
(Used 12345 as seed)

10 trials:

l	n	c	a	t
o	a	l	e	d
n	p	w	s	e
e	e	y	k	i
n	d	p	o	r

100 trials:

o	t	r	p	w
d	b	n	o	l
r	e	s	e	s
s	t	n	i	m
w	n	i	s	h

1000 trials:

o	t	r	p	w
d	b	n	o	l
r	e	s	e	s
s	t	n	i	m
w	n	i	s	h

10000 trials:

p	a	c	o	d
o	x	s	e	r
a	t	n	t	r
n	i	e	a	s
d	r	n	c	e