

Stochastic method before and after optimization evidence

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I performed 5 tests when it was unoptimized and took the average of them all. These test results will be shown in the Figures below.

Unoptimized Stochastic Tests

Test 1 – 56.40

Test 2 – 58.38

Test 3 – 55.45

Test 4 – 59.01

Test 5 – 57.73

Average: 57.394 (Unoptimized)

Optimized Stochastic Tests

Test 1 – 50.97

Test 2 – 50.40

Test 3 – 50.78

Test 4 – 50.07

Test 5 – 50.44

Average: 50.532 (Optimized)

Time saved from optimization: 6.862

```

(venv) PS C:\Users\aaaron\PycharmProjects\c2060506-csc1034-practical3-2022> python page_rank.py -m stochastic
The number of nodes is: 555
The number of edges is: 11849
Top 20 pages:
5.04 http://www.ncl.ac.uk/computing/about/
5.02 http://www.ncl.ac.uk/computing/
5.02 http://www.ncl.ac.uk/computing/news/
5.02 http://www.ncl.ac.uk/computing/current/
5.00 http://www.ncl.ac.uk/computing/sitemap/
4.99 http://www.ncl.ac.uk/computing/people/
4.99 http://www.ncl.ac.uk/computing/induction/
4.98 http://www.ncl.ac.uk/computing/undergraduate/
4.98 http://www.ncl.ac.uk/computing/outreach/
4.98 http://www.ncl.ac.uk/computing/visit/
4.98 http://www.ncl.ac.uk/computing/events/
4.98 http://www.ncl.ac.uk/computing/research/
4.96 http://www.ncl.ac.uk/computing/postgraduate/
0.92 http://www.ncl.ac.uk/computing/about/usb/
0.67 http://www.ncl.ac.uk/computing/people/seb/
0.67 http://www.ncl.ac.uk/computing/people/support/
0.66 http://www.ncl.ac.uk/computing/people/visiting/
0.66 http://www.ncl.ac.uk/computing/people/academic/
0.66 http://www.ncl.ac.uk/computing/people/research/
0.66 http://www.ncl.ac.uk/computing/people/professionalservices/
Calculation took 56.40 seconds.

```

Figure 2 – Unoptimized Stochastic test 1

```

(venv) PS C:\Users\aaaron\PycharmProjects\c2060506-csc1034-practical3-2022> python page_rank.py -m stochastic
The number of nodes is: 555
The number of edges is: 11849
Top 20 pages:
5.03 http://www.ncl.ac.uk/computing/visit/
5.02 http://www.ncl.ac.uk/computing/sitemap/
5.02 http://www.ncl.ac.uk/computing/research/
5.01 http://www.ncl.ac.uk/computing/people/
5.00 http://www.ncl.ac.uk/computing/events/
5.00 http://www.ncl.ac.uk/computing/undergraduate/
5.00 http://www.ncl.ac.uk/computing/
4.99 http://www.ncl.ac.uk/computing/postgraduate/
4.99 http://www.ncl.ac.uk/computing/current/
4.98 http://www.ncl.ac.uk/computing/news/
4.97 http://www.ncl.ac.uk/computing/induction/
4.97 http://www.ncl.ac.uk/computing/outreach/
4.97 http://www.ncl.ac.uk/computing/about/
0.95 http://www.ncl.ac.uk/computing/about/usb/
0.68 http://www.ncl.ac.uk/computing/people/visiting/
0.68 http://www.ncl.ac.uk/computing/people/research/
0.67 http://www.ncl.ac.uk/computing/people/seb/
0.66 http://www.ncl.ac.uk/computing/people/professionalservices/
0.66 http://www.ncl.ac.uk/computing/people/support/
0.66 http://www.ncl.ac.uk/computing/people/academic/
Calculation took 58.38 seconds.

```

Figure 1 – Unoptimized Stochastic test 2

```
(venv) PS C:\Users\aaaron\PycharmProjects\c2060506-csc1034-practical3-2022> python page_rank.py -m stochastic
The number of nodes is: 555
The number of edges is: 11849
Top 20 pages:
5.03 http://www.ncl.ac.uk/computing/news/
5.03 http://www.ncl.ac.uk/computing/postgraduate/
5.02 http://www.ncl.ac.uk/computing/events/
5.01 http://www.ncl.ac.uk/computing/induction/
5.00 http://www.ncl.ac.uk/computing/people/
5.00 http://www.ncl.ac.uk/computing/research/
5.00 http://www.ncl.ac.uk/computing/outreach/
5.00 http://www.ncl.ac.uk/computing/about/
4.98 http://www.ncl.ac.uk/computing/current/
4.98 http://www.ncl.ac.uk/computing/sitemap/
4.97 http://www.ncl.ac.uk/computing/
4.97 http://www.ncl.ac.uk/computing/undergraduate/
4.97 http://www.ncl.ac.uk/computing/visit/
0.94 http://www.ncl.ac.uk/computing/about/usb/
0.67 http://www.ncl.ac.uk/computing/people/professionalservices/
0.66 http://www.ncl.ac.uk/computing/people/seb/
0.66 http://www.ncl.ac.uk/computing/people/academic/
0.66 http://www.ncl.ac.uk/computing/people/support/
0.66 http://www.ncl.ac.uk/computing/people/research/
0.65 http://www.ncl.ac.uk/computing/people/visiting/
Calculation took 55.45 seconds.
```

Figure 4 – Unoptimized Stochastic test 3

```
(venv) PS C:\Users\aaaron\PycharmProjects\c2060506-csc1034-practical3-2022> python page_rank.py -m stochastic
The number of nodes is: 555
The number of edges is: 11849
Top 20 pages:
5.01 http://www.ncl.ac.uk/computing/research/
5.01 http://www.ncl.ac.uk/computing/visit/
5.00 http://www.ncl.ac.uk/computing/undergraduate/
5.00 http://www.ncl.ac.uk/computing/events/
5.00 http://www.ncl.ac.uk/computing/sitemap/
5.00 http://www.ncl.ac.uk/computing/people/
5.00 http://www.ncl.ac.uk/computing/about/
4.99 http://www.ncl.ac.uk/computing/postgraduate/
4.98 http://www.ncl.ac.uk/computing/news/
4.96 http://www.ncl.ac.uk/computing/current/
4.96 http://www.ncl.ac.uk/computing/
4.96 http://www.ncl.ac.uk/computing/induction/
4.95 http://www.ncl.ac.uk/computing/outreach/
0.94 http://www.ncl.ac.uk/computing/about/usb/
0.67 http://www.ncl.ac.uk/computing/people/academic/
0.67 http://www.ncl.ac.uk/computing/people/visiting/
0.66 http://www.ncl.ac.uk/computing/people/research/
0.66 http://www.ncl.ac.uk/computing/people/professionalservices/
0.66 http://www.ncl.ac.uk/computing/people/seb/
0.65 http://www.ncl.ac.uk/computing/people/support/
Calculation took 59.01 seconds.
```

Figure 3 – Unoptimized Stochastic test 4

```
(venv) PS C:\Users\Aaron\PycharmProjects\c2060506-csc1034-practical3-2022> python page_rank.py -m stochastic
The number of nodes is: 555
The number of edges is: 11849
Top 20 pages:
5.02 http://www.ncl.ac.uk/computing/sitemap/
5.01 http://www.ncl.ac.uk/computing/events/
5.00 http://www.ncl.ac.uk/computing/research/
5.00 http://www.ncl.ac.uk/computing/induction/
5.00 http://www.ncl.ac.uk/computing/news/
5.00 http://www.ncl.ac.uk/computing/postgraduate/
5.00 http://www.ncl.ac.uk/computing/outreach/
4.99 http://www.ncl.ac.uk/computing/current/
4.99 http://www.ncl.ac.uk/computing/undergraduate/
4.98 http://www.ncl.ac.uk/computing/
4.98 http://www.ncl.ac.uk/computing/about/
4.97 http://www.ncl.ac.uk/computing/people/
4.95 http://www.ncl.ac.uk/computing/visit/
0.94 http://www.ncl.ac.uk/computing/about/usb/
0.68 http://www.ncl.ac.uk/computing/people/professionalservices/
0.67 http://www.ncl.ac.uk/computing/people/academic/
0.67 http://www.ncl.ac.uk/computing/people/seb/
0.66 http://www.ncl.ac.uk/computing/people/support/
0.66 http://www.ncl.ac.uk/computing/people/research/
0.65 http://www.ncl.ac.uk/computing/people/visiting/
Calculation took 57.73 seconds.
```

Figure 5 – Unoptimized Stochastic test 5

```
(venv) PS C:\Users\aaaron\PycharmProjects\c2060506-csc1034-practical3-2022> python page_rank.py -m stochastic
The number of nodes is: 555
The number of edges is: 11849
Top 20 pages:
5.03 http://www.ncl.ac.uk/computing/news/
5.02 http://www.ncl.ac.uk/computing/induction/
5.01 http://www.ncl.ac.uk/computing/sitemap/
5.01 http://www.ncl.ac.uk/computing/outreach/
5.01 http://www.ncl.ac.uk/computing/about/
5.00 http://www.ncl.ac.uk/computing/people/
4.98 http://www.ncl.ac.uk/computing/current/
4.98 http://www.ncl.ac.uk/computing/visit/
4.97 http://www.ncl.ac.uk/computing/events/
4.97 http://www.ncl.ac.uk/computing/
4.97 http://www.ncl.ac.uk/computing/research/
4.97 http://www.ncl.ac.uk/computing/undergraduate/
4.95 http://www.ncl.ac.uk/computing/postgraduate/
0.94 http://www.ncl.ac.uk/computing/about/usb/
0.68 http://www.ncl.ac.uk/computing/people/research/
0.66 http://www.ncl.ac.uk/computing/people/professionalservices/
0.66 http://www.ncl.ac.uk/computing/people/support/
0.66 http://www.ncl.ac.uk/computing/people/academic/
0.66 http://www.ncl.ac.uk/computing/people/visiting/
0.66 http://www.ncl.ac.uk/computing/people/seb/
Calculation took 50.97 seconds.
```

Figure 6 – Optimized Stochastic test 1

```
(venv) PS C:\Users\aaaron\PycharmProjects\c2060506-csc1034-practical3-2022> python page_rank.py -m stochastic
The number of nodes is: 555
The number of edges is: 11849
Top 20 pages:
5.03 http://www.ncl.ac.uk/computing/postgraduate/
5.02 http://www.ncl.ac.uk/computing/events/
5.01 http://www.ncl.ac.uk/computing/outreach/
5.01 http://www.ncl.ac.uk/computing/undergraduate/
5.00 http://www.ncl.ac.uk/computing/
5.00 http://www.ncl.ac.uk/computing/induction/
5.00 http://www.ncl.ac.uk/computing/research/
4.99 http://www.ncl.ac.uk/computing/sitemap/
4.99 http://www.ncl.ac.uk/computing/about/
4.99 http://www.ncl.ac.uk/computing/current/
4.99 http://www.ncl.ac.uk/computing/visit/
4.97 http://www.ncl.ac.uk/computing/people/
4.97 http://www.ncl.ac.uk/computing/news/
0.93 http://www.ncl.ac.uk/computing/about/usb/
0.68 http://www.ncl.ac.uk/computing/people/visiting/
0.67 http://www.ncl.ac.uk/computing/people/academic/
0.66 http://www.ncl.ac.uk/computing/people/support/
0.66 http://www.ncl.ac.uk/computing/people/research/
0.66 http://www.ncl.ac.uk/computing/people/professionalservices/
0.66 http://www.ncl.ac.uk/computing/people/seb/
Calculation took 50.40 seconds.
```

Figure 7 – Optimized Stochastic test 2

```
(venv) PS C:\Users\aaaron\PycharmProjects\c2060506-csc1034-practical3-2022> python page_rank.py -m stochastic
The number of nodes is: 555
The number of edges is: 11849
Top 20 pages:
5.03 http://www.ncl.ac.uk/computing/events/
5.01 http://www.ncl.ac.uk/computing/sitemap/
5.00 http://www.ncl.ac.uk/computing/postgraduate/
5.00 http://www.ncl.ac.uk/computing/outreach/
5.00 http://www.ncl.ac.uk/computing/induction/
4.99 http://www.ncl.ac.uk/computing/about/
4.99 http://www.ncl.ac.uk/computing/visit/
4.99 http://www.ncl.ac.uk/computing/people/
4.99 http://www.ncl.ac.uk/computing/current/
4.98 http://www.ncl.ac.uk/computing/research/
4.98 http://www.ncl.ac.uk/computing/undergraduate/
4.98 http://www.ncl.ac.uk/computing/
4.97 http://www.ncl.ac.uk/computing/news/
0.94 http://www.ncl.ac.uk/computing/about/usb/
0.67 http://www.ncl.ac.uk/computing/people/professionalservices/
0.67 http://www.ncl.ac.uk/computing/people/support/
0.66 http://www.ncl.ac.uk/computing/people/visiting/
0.66 http://www.ncl.ac.uk/computing/people/research/
0.65 http://www.ncl.ac.uk/computing/people/seb/
0.64 http://www.ncl.ac.uk/computing/people/academic/
Calculation took 50.78 seconds.
```

Figure 8 – Optimized Stochastic test 3

```
(venv) PS C:\Users\aaaron\PycharmProjects\c2060506-csc1034-practical3-2022> python page_rank.py -m stochastic
The number of nodes is: 555
The number of edges is: 11849
Top 20 pages:
5.02 http://www.ncl.ac.uk/computing/about/
5.00 http://www.ncl.ac.uk/computing/current/
5.00 http://www.ncl.ac.uk/computing/events/
5.00 http://www.ncl.ac.uk/computing/undergraduate/
5.00 http://www.ncl.ac.uk/computing/
5.00 http://www.ncl.ac.uk/computing/news/
5.00 http://www.ncl.ac.uk/computing/research/
4.99 http://www.ncl.ac.uk/computing/people/
4.98 http://www.ncl.ac.uk/computing/postgraduate/
4.97 http://www.ncl.ac.uk/computing/visit/
4.97 http://www.ncl.ac.uk/computing/sitemap/
4.97 http://www.ncl.ac.uk/computing/induction/
4.96 http://www.ncl.ac.uk/computing/outreach/
0.93 http://www.ncl.ac.uk/computing/about/usb/
0.68 http://www.ncl.ac.uk/computing/people/visiting/
0.66 http://www.ncl.ac.uk/computing/people/research/
0.66 http://www.ncl.ac.uk/computing/people/seb/
0.66 http://www.ncl.ac.uk/computing/people/support/
0.66 http://www.ncl.ac.uk/computing/people/professionalservices/
0.65 http://www.ncl.ac.uk/computing/people/academic/
Calculation took 50.07 seconds.
```

Figure 9 – Optimized Stochastic test 4

```
(venv) PS C:\Users\aaaron\PycharmProjects\c2060506-csc1034-practical3-2022> python page_rank.py -m stochastic
The number of nodes is: 555
The number of edges is: 11849
Top 20 pages:
5.03 http://www.ncl.ac.uk/computing/news/
5.02 http://www.ncl.ac.uk/computing/about/
5.01 http://www.ncl.ac.uk/computing/current/
5.00 http://www.ncl.ac.uk/computing/events/
5.00 http://www.ncl.ac.uk/computing/people/
4.99 http://www.ncl.ac.uk/computing/visit/
4.99 http://www.ncl.ac.uk/computing/undergraduate/
4.99 http://www.ncl.ac.uk/computing/research/
4.98 http://www.ncl.ac.uk/computing/
4.98 http://www.ncl.ac.uk/computing/induction/
4.98 http://www.ncl.ac.uk/computing/sitemap/
4.97 http://www.ncl.ac.uk/computing/postgraduate/
4.95 http://www.ncl.ac.uk/computing/outreach/
0.93 http://www.ncl.ac.uk/computing/about/usb/
0.68 http://www.ncl.ac.uk/computing/people/visiting/
0.67 http://www.ncl.ac.uk/computing/people/professionalservices/
0.66 http://www.ncl.ac.uk/computing/people/academic/
0.66 http://www.ncl.ac.uk/computing/people/support/
0.66 http://www.ncl.ac.uk/computing/people/seb/
0.65 http://www.ncl.ac.uk/computing/people/research/
Calculation took 50.44 seconds.
```

Figure 10 – Optimized Stochastic test 5