

## Results

We created a replica of the Wikispeedia game by loading in the list of pages and connecting the links between pages. One of the main aspects of our project included generating an adjacency matrix for the graph of the pages and their edges. Using Floyd Warshall's algorithm, we created the adjacency matrix and stored the shortest distances between pages in the data/matrix.txt file to avoid calling the algorithm repeatedly. Here is a small sample of the full matrix:

The “\_” indicates that there is no path from a Node at the row index to the Node at the column index. We discovered it is much faster to run the Floyd Warshall algorithm only once and then use this resulting matrix to run future games.

```
matrix.txt x
matrix.txt
1 0 33333325634333435_2433544334_3_42234354456642455553533242_4_33433_43_3343_34_333232424334_3444333
2 0 22222325623232424_2422544324_3_31224254456642455552522242_4_23434_34_3343_34_33333433333_3343333
3 0 33222425623232324_2333444433_3_42234343456643455553422342_4_24444_35_3343_34_334333443333_2142333
4 0 33333325634233334_2433434333_2_42334343356643455552433343_4_34333_33_3344_34_33333434333_3343434
5 0 2232333563332435_2433545434_3_42334354456643455552532242_4_34433_33_3343_34_233342534334_3443334
6 03222332452322324_2332544333_3_42233354445532344443532233_4_23433_33_3243_34_32332333233_2333332
7 01222324523232423_2222544334_3_42223254445522344442522221_4_23433_44_3343_34_23232433323_3433333
8 10111414512131334_1311544323_2_31113154445531455551511131_4_23433_33_3343_23_23333333333_2333323
9 11011414512131324_1311544323_2_31113154445531455551511131_3_23433_33_3243_23_23333333333_2333333
10 22101325623232434_2422545434_3_42224254456642455552522242_3_34433_44_3243_24_223232432333_3433233
11 22210415623232334_2422544433_3_42224254456642455552522242_4_23433_34_2343_14_23333343333_2433333
12 33333025622323242_3433544314_3_22334354456643455553532343_4_23433_34_3343_34_23333343333_2343333
13 11111404512131334_1311544323_2_31113154445531455551511131_4_23433_34_3343_23_23333333333_2332333
14 3333353013434344_2233655444_4_5333336553442323333633323_5_34534_45_4454_34_44434434444_3434442
15 33333431033343334_2233544433_3_4232235443442323333533323_5_34434_44_3343_34_33433344334_3434332
16 11111414502131324_1311544323_2_31113154445531344441511131_4_23433_33_3243_23_23322233333_2333332
17 2332425620232334_2333544423_3_32334354456633455552532333_4_33433_33_3343_34_233332433233_3433332
18 111113145121031324_1311434323_2_31113143345531344441411131_4_23333_33_3243_23_23322233333_2333332
19 22332425623202334_2333544333_3_42334254456642455552532342_4_24433_34_2343_34_33333433333_2433333
20 11111314511130334_1211544323_2_31113154445531455551511131_4_23433_34_3343_23_233322333233_2333323
21 33333435633232034_2433543232_3_42334354456643455552533242_4_23443_44_3343_33_33332433233_2444323
22 23223335633233304_2433434333_2_42233343356632344442423242_4_22332_34_3343_33_23333433333_2333223
23 3333343453333330_2333544323_3_322333544553344443533333_4_23443_44_3343_34_34333343333_2433333
24 3333343562323223402433543332_3_42334354456643455553533343_4_34443_45_3343_34_343423443333_2443333
25 11111414512121323_0211434323_2_31113143345531344441411131_4_22333_24_2243_22_233232333233_1232333
26 3333433423233334_2032544333_3_42321354434412233333533312_4_34434_44_3343_34_33334343333_3433332
27 11111414512131334_1301544323_2_31113154445531455551511131_4_23433_34_3343_23_233333332333_2343333
28 11111414512131334_1310544323_2_31113154445531455551511131_4_23434_34_3343_23_233333343333_2343333
29 23333435634333434_2433024334_3_4333432115664345555233343_4_34433_34_3343_34_33333533333_2444334
30 33333435634333434_3433104334_3_4233432125664345555233343_4_34443_45_3343_24_343433543333_2443334
31 33333425623232334_2333430131_2_42333343356633455553433343_4_24344_44_3444_33_33332443233_3444333
32 33333425623232234_2333541021_3_3233335445663345555353243_4_24443_44_3343_33_333322443233_2444333
```

Our resulting Wikispeedia game allows the user to generate the adjacency matrix with the GENERATE command. This will utilize the Floyd Warshall algorithm, which took 1-2 hours (depends on computer) to complete on our default dataset of 4600 pages. We discovered that the  $O(n^3)$  runtime of the Floyd Warshall algorithm would make it hectic to run repeatedly.

The READ command reads in an already provided adjacency matrix from the provided file path to generate the shortest distances between pages, which is much faster than generating.

This below is the result of our game, which includes the current location a player starts at, the target location, and the list of pages a user can visit from the current page. There is also the option of typing in “exit” to leave the game at any time.

```
[Wikispeedia] You are currently at: Fourteenth_Amendment_to_the_United_States_Constitution
[Wikispeedia] Your target is: Literacy
[Wikispeedia] You are able to travel to:
    United_States_Constitution
    United_States_Congress
    Government
    Slavery
    Franklin_D._Roosevelt
    United_States_House_of_Representatives
    England
    United_States_Bill_of_Rights
    Citizenship
    France
    Equal_Protection_Clause
    20th_century
    Corporation
    American_Civil_War
[Wikispeedia] Enter the title of the page you'd like to travel:
```

The path taken by the player will be printed in the console, and the most optimal path will be shown using the Iterative Deepening DFS algorithm even if the player gives up using the GIVE UP command. This involves the shortest path from the starting page to the ending page.

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL
1: wiki
    United_States_House_of_Representatives
    England
    United_States_Bill_of_Rights
    Citizenship
    France
    Equal_Protection_Clause
    20th_century
    Corporation
    American_Civil_War
[Wikispeedia] Enter the title of the page you'd like to travel:
GIVE UP
[Wikispeedia] Your path:

[Wikispeedia] The optimal path:
Fourteenth_Amendment_to_the_United_States_Constitution -> United_States_Constitution -> United_States -> Seattle%2C_Washington -> Literac
y
[Wikispeedia] Press enter to play again.
```