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 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 ×

        ≡ matrix.txt

              .33333325634333435_2433544334_3_42234354456642455553533242_4_33433_43_3343_34__333232424334_3444333
             _22222325623232424_2422544324_3_31224254456642455552522242_4_23434_34_3343_34__33333343333_3343333
             _33222425623232324_2333444433_3_42234343456643455553422342_4_24444_35_3343_34__334333443333_2142333
             _33333325634233334_2433434333_2_42334343356643455552433343_4_34333_33_3344_34__3333333434333_3343434
           <u>,</u>0_22323335633332435_2433545434_3_42334354456643455552532242_4_34433_33_3343_34__233342534334_3443334
            _032223324523222324_2332544333_3_42233354445532344443532233_4_23433_33_3243_34__323332333233_233332
             <u>_01222324523232423_222544334_3_42223254445522344442522221_4_23433_44_3343_34_</u>232332433323_3433333
              .10111414512131334_1311544323_2_31113154445531455551511131_4_23433_33_3343_23__23333333333_2333323
              .11011414512131324_1311544323_2_31113154445531455551511131_3_23433_33_3243_23__233333333332233333
              .22101325623232434_2422545434_3_4222425445664245555252242_3_34433_44_3243_24__223232432333_3433233
              .22210415623232334_2422544433_3_42224254456642455552522242_4_23433_34_2343_14<u>_</u>233333343333<u>3</u>2433333
              .33333025622332432_3433544314_3_22334354456643455553532343_4_23433_34_3343_34__233333433333_2343333
              .11111404512131334_1311544323_2_31113154445531455551511131_4_23433_34_3343_23__233333333333_2332333
              .33333530134343444_2233655444_4_53333365534423233333633323_5_34534_45_4454_34_444344344444_3434442
              .33333431033343334_2233544433_3_42322354434423233333533323_5_34434_44_3343_34__334333344334_343433
              .11111414502131324_1311544323_2_31113154445531344441511131_4_23433_33_3243_23__233222333333_233332
              23323425620232334_2333544423_3_32334354456633455552532333_4_33433_33_3343_34__233332433233_3433332
              .11111314512031324_1311434323_2_31113143345531344441411131_4_23333_33_3243_23__233322233333_233332
              .22332425623202334_2333544333_3_42334254456642455552532342_4_24433_34_2343_34__333333433333_2433333
              11111314511130334_1211544323_2_31113154445531455551511131_4_23433_34_3343_23__233322333233_233323
              .
.33333435633232034_2433543232_3_42334354456643455552533242_4_23443_44_3343_33_33332433233_2444323
              23223335633233304_2433434333_2_42233343356632344442432342_4_22332_34_3343_33__23333343333_2333223
              _3333343562323223402433543332_3_42334354456643455553533343_4_34443_45_3343_34__34323443333_2443333
_11111414512121323_0211434323_2_31113143345531344441411131_4_22333_24_2243_22__233232333233_1232333
              33333433423233334_2032544333_3_42321354434412233333553312_4_34434_44_3343_34__333343343333_3433332
              11111414512131334_1301544323_2_31113154445531455551511131_4_23433_34_3343_23_233333332333_2343333
             _11111414512131334_1310544323_2_31113154445531455551511131_4_23434_34_343333_233333343333_2343333
23333435634333434 2433024334 3 43334321156643455553233343 4 34433 34 3343 34 33333533333 2444334
```

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] Welcome to Wikispeedia! Please type one of these commands EXACTLY to continue!
[Wikispeedia] GENERATE — Generates an adjacency matrix using the Floyd-Warshall algorithm. Will take a VERY VERY long time (30 minutes).
[Wikispeedia] READ — Reads in an adjacency matrix from a file, and starts the game. Super fast to start (3 seconds).
[Wikispeedia] Reading dataset...
[Wikispeedia] Reading pre—generated matrix...
[Wikispeedia] Creating game...
[Wikispeedia] You are currently at: Oenothera
[Wikispeedia] You are able to travel to:

Seed

North America
Flower
Finland

Ice_age
Europe
Soil
Sand
Dune
Mexico
Chile
Black_pepper
Carolus_Linnaeus
Drought
Scientific_classification
Botany
```

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. This involves the shortest path from the starting page to the ending page.