Caverns Routing Application for Artificial Intelligence

There are caverns that are connected by straight tunnels. Some tunnels can be only navigated in one direction. The robot has to find the (shortest) path from the first cavern to the last cavern if the path does exist. The robot has a map of caverns and and binary matrix presenting which cavern can be reached from which other caverns.

Cavern Map

Cavern maps are stored in .cav files that contain integers in the following format:

The first: number of caverns - N.
The next N*2: the coordinates of each of the caverns, x and y
The final N*N: the connectivity of the tunnels. 1 means connected, 0 means not

Tunnel connectivity:
Connectivity of Cavern 1 to Cavern 1
Connectivity of Cavern 2 to Cavern 1
Connectivity of Cavern 3 to Cavern 1
.
.
Connectivity of Cavern 1 to Cavern 2
Connectivity of Cavern 2 to Cavern 2
Connectivity of Cavern 3 to Cavern 2

The program

The goal of the program is to find the shortest path from the first cavern to the last cavern as fast as possible. The program must be able to read a file up to 5,000 caverns and must be able to find the path under 1 minute if the path does exist. The program reads the map file (.cav) and tries to find the path. The program outputs the order of visiting caverns from the first to the last cavern in the file (.csn) if the path does exist. If the path does not exist then the program outputs 0.

To use the program:

1. Create a folder
2. Copy to the created folder the following files:
   - cavernroute.exe and caveroute.bat from batch.zip
   - files ending with .cav extension to find the path for
3. Open command prompt (cmd)
4. Navigate to the created folder
5. Type caveroute <file_name> and press enter (DO NOT add .cav)

Example: caveroute "generated30-1" // will generate generated30-1.csn

The generated .csn file will have number of nodes to visit to reach the destination or 0 if the path from the first cavern to the last cavern does not exist.