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CSC 520
Homework 1
Fall 2018

This document serves to outline information pertinent to Homework 1. A brief project description is included under Project Description. Instructions on how to compile and run code is included under Instructions. An overview of the source code files and environment is thereafter. Lastly, there is an included example that includes command and output.

------- Project Description -------
The project tracks a pathway between source and destination cities by implementing different search algorithms (A*, greedy, dynamic programming). The cities and roads that interconnect them are provided by a U.S. telecom map via usroads.pl. A user simply has to run SearchUSA with three command line arguments to generate a pathway and some other relevant information referring to number of hops and algorithm expansion. The expected output will include a print out of input argument information and solution path information. An example is included below.

------- Instructions -------
<arg0> is argument to describe search type (e.g. astar, greedy, dynamic)
- To implement A*, use “astar” for <arg0>
- To implement greedy best-first, use “greedy” for <arg0>
- To implement dynamic programming, use “dynamic” for <arg0>

<arg1> is argument to describe start/source city
<arg2> is argument to describe end/destination city

Please refer to usroads.pl for city name spelling.

Linux command line:
In the directory that contains source code files:
1. make clean
   - (ignore error as .class files may not exist yet)
2. make
3. java SearchUSA <arg0> <arg1> <arg2>

------- Source Code Files -------
SearchUSA.java
City.java
Road.java
Node.java
Makefile
readme.pdf

heuristic.pl
usroads.pl

------- Environment -------
remote-linux.eos.ncsu.edu
engr-ras-203
Java JDK v1.8.0

------- Example 1 -------
Linux command line:
java SearchUSA astar albanyNY toronto

Expected output:

```
[mrpatel5@engr-ras-203 hw1]$ java SearchUSA astar albanyNY toronto
------------------------------------------------------------
Search type: astar
Source city: albanyNY
Destination city: toronto
------------------------------------------------------------
Expanded nodes: [albanyNY, rochester, buffalo]
Number of expanded nodes: 3
Solution path: [albanyNY, rochester, buffalo, toronto]
Number of nodes in solution path: 4
Total distance from albanyNY to toronto: 317.0
[mrpatel5@engr-ras-203 hw1]$
```

------- Example 2 -------
Linux command line:
Java SearchUSA greedy boston seattle

Expected output:

```
[mrpatel5@engr-ras-203 hw1]$ java SearchUSA greedy boston seattle
------------------------------------------------------------
Search type: greedy
Source city: boston
Destination city: seattle
------------------------------------------------------------
Expanded nodes: [boston, albanyNY, rochester, buffalo, cleveland, columbus, dayton, cincinnati, indianapolis, stLouis
, kansasCity, wichita, denver, grandJunction, provo, coloradoSprings, santaFe, albuquerque, lincoln, omaha, elPaso, t
ucson, phoenix, yuma, sanDiego, losAngeles, sanLuisObispo, salinas, sanJose, oakland, sanFrancisco, sacramento, reno,
 pointReyes, redding, medford, stockton, modesto, saltLakeCity, boise, portland]
Number of expanded nodes: 41
Solution path: [boston, albanyNY, rochester, buffalo, cleveland, columbus, dayton, cincinnati, indianapolis, stLouis,
 kansasCity, wichita, denver, coloradoSprings, santaFe, albuquerque, elPaso, tucson, phoenix, yuma, sanDiego, losAnge
les, sanLuisObispo, salinas, sanJose, oakland, sanFrancisco, sacramento, reno, saltLakeCity, boise, portland, seattle
]
Number of nodes in solution path: 33
Total distance from boston to seattle: 5888.0
[mrpatel5@engr-ras-203 hw1]$
```