Testausdokumentti_Testing document

Data Structures Lab Course (start of summer 2023)

What has been tested, how was this done:

In order to perform comprehensive unit testing for the entire program, firstly individual functions and components were identified to test. Below identified units' test cases were written in separate test file:

- def home():
- def geocode():
- def find_shortest_path():
- def plot_shortest_path():
- def show_shortest_path():
- def display_map():
- class binaryheap and def dijkstra function in dijkstra.py file tested in separate files.
- each function in ida_star.py tested in separate files.

Test cases for each function were developed, to cover various scenarios. For example, the geocode and home function with valid addresses and invalid addresses should be tested to ensure it returns the expected coordinates or error messages appropriately. For the find_shortest_path and plot_shortest_path function, test cases with different start and end coordinates should be created to verify that the shortest path is calculated correctly. Separate test py file was created to implement those testing. Test classes and methods were used for each function that need to be tested.

Because there was something wrong with the algorithm implementation, so in the beginning ready-made solutions were used to validate and test if the program frame can function well. The ready-made networkx.shortest_path function provided by the NetworkX library seems to a good solution, as it implements the Dijkstra's algorithm. It returns a list representing the shortest path between the start and end nodes.

How each test case works for each function. For example, test case for home function covers the behavior of the POST request, error handling, redirect and template rendering. Geocoding, path finding and the content of the html file are not covered, as they will be tested for the separate corresponding function. Therefore, significant portion of the code is covered by tests.

Unit testing coverage report:

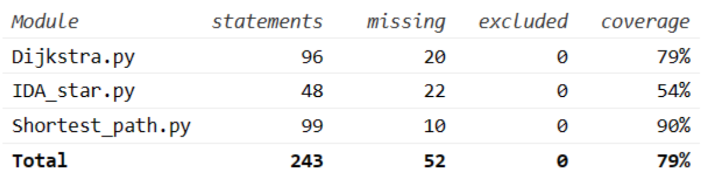
If you prefer to review or generate coverage reports to your local folder, please first install the coverage package by “pip install coverage”.

Ensure that the **shortest_path.py** module file is located in the same directory as the tests folder.

Run all test files by using the testing framework: All test files saved in tests folder, got to the root folder of the project, run command **python -m unittest discover tests** to see the test results. Or use **python -m unittest tests.testfilename** to test individual file.

Generate the coverage report by running: run command **coverage run -m unittest discover**, which tells the coverage tool to run the tests and collect coverage data, then unittest will automatically discover and run all test cases it finds in the project. Then run **coverage html**, which generates a HTML report in the current directory (wrote HTML report to htmlcov\index.html). Please open the generated HTML report (htmlcov/index.html) in a web browser to view the coverage report.

Current test coverage:



Module	*statements*	*missing*	*excluded*	*coverage*
Dijkstra.py	96	20	0	79%
IDA_star.py	48	22	0	54%
Shortest_path.py	99	10	0	90%
Total	**243**	**52**	**0**	**79%**

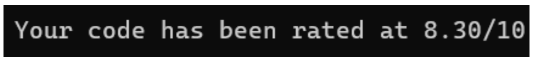
How can the tests be repeated:

If set up a testing environment to execute all those tests, place all test files in one folder, write command to run them, whenever need to repeat the tests, just run the command and review the test results.

Code quality Monitoring:

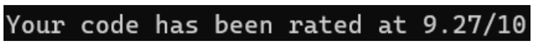
Run code style checking with pylint for python file, run **pylint shortest_path.py**. Ensure Pylint has been installed with command pip install pylint. Style checking quality remains good rates.

pylint shortest_path.py



```
Your code has been rated at 8.30/10
```

pylint dijkstra.py



```
Your code has been rated at 9.27/10
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