Urban Transport Masters Programme

Tran ing Lab Assignment 3

The deadline for subn Lch 21st 2024.

In this assignment you should utilise the data and materials provided in the lab session 'Network analysis and location modelling' (also available on GitHub: https://github.com/rafavdz/routing_tutorial).

You should address Question 1 and Question 2 of this brief, clearly labelling your answers to show which question and sub-question you are answering. Address the questions professionally as if you were a transport consultant advising a local authority. Thus, provide complete, clean, labelled, and well-presented outputs, with responses specified in their respective units, etc.

Submit through Turnitin a Word or PDF file **and** a separate .R/.RMD file containing your code.

Context of the analysis

NHS Scotland provides publicly funded healthcare in Scotland. NHS Greater Glasgow and Clyde is the largest Health Board in Scotland and it is responsible for the provision and management of the whole range of health services in this area including hospitals and General Practice.

Following concerns raised in the media about the accessibility of the 'New Victoria Hospital' in Glasgow for people who don't have a car, the local Health Board have commissioned you to undertake a data analysis to answer the queries outlined in Question 1 and Question 2 below.

Question 1: Carnwadric

The NHS board has identified 'Carnwadric' (postcode of reference is G46 8ES) residents at risk of having limited access to non-emergency health services that are only offered at New Victoria Hospital. They want to understand the travel options available under different conditions for a variety of residents.

Calculate the shortest route to the New Victoria Hospital from Carnwadric by bicycle for each of the three cyclist types given below. You should choose justified values for the average speed and stress level for each cyclist type (for the remaining parameters, you can use those employed during the lab, e.g. date/time of departure).

- Proficient cyclist
- Adult cyclist
- A family of one adult and a 11-year-old daughter

a) Present a table showing the estimated travel time and distance for each cyclist type. Specify the parameter values used for average speed and stress level and explain your choices.

b) Visualise the estimated routes including a background map. Adjust the presentation as appropriate for the targeted audience (local NHS board members) so they can easily and accurately interpret the results. For example, you might include a title, legend title, legend names, or points or areas of reference. You can use any suitable R package, e.g. {ggplot}, {ggmap}, {tma

c) In no more th paragraph targeted at the local NHS board members about the imp n parts 1.a) and 1.b).

The local NHS board a nderstanding the availability of public transport between this residential area a ate the fastest route by public transport (walking to and from bus/train stops i entative working day (9th November 2022) for each of the four scenarios indicated below. Each scenario combines a traveller profile and a time of day. Limit the "rides" on public transport vehicles to a maximum of two, and choose a suitable time of departure, walking speed, and maximum walking time.

- Adult at peak time
- Adult at night-time
- Elder (a person over 70 years old) at peak time
- Elder (a person over 70 years old) at night-time

d) Present a table summarising each of the scenarios by the total duration, number of legs, and total wait time. Explain how you chose the values for times of departure, walking speeds and maximum walking times.

e) Visualise the estimated routes including a background map. Adjust the presentation as appropriate for the target audience (local NHS board members) so they can easily and accurately interpret the results (e.g. by including a title, legend title, legend names, or points or areas of reference). You can use any suitable R package, e.g. {ggplot}, {ggmap}, {tmaps}.

f) In no more than 150 words, write a short paragraph targeted to the local NHS board members about the impacts of your findings in parts 1.d and 1.e.

Question 2: Accessing New Victoria Hospital by Public Transport

The NHS board is also evaluating how much of the city (and the surrounding area) the New Victoria Hospital could serve using public transport for scheduled health services.

Compute the travel time by public transport from each Data Zone centroid that falls within the NHS 'Greater Glasgow and Clyde' board to the New Victoria Hospital departing on a weekday (9th November 2022) at the morning peak. For the remainder of the parameters, use the defaults in {r5r}.

a) Visualise the estimated travel times in a choropleth map at the Data Zone level illustrating the travel time using breaks of 15, 30, 45, and 60 minutes or more. Adjust the presentation as appropriate for presenting to the NHS board members and ensure that they can easily and accurately interpret the results (for example by including labels, title, legend, etc). You can use any suitable R package, e.g. {ggplot}, {ggmap}, {tmaps}.

b) How many Data Zones can the New Victoria Hospital be accessed from by public transport during the morning peak period:

   i. within 15 minutes, and

ii. within 30 minutes?

c) What is the total population according the 2011 census data that can reach the hospital by public transport during the morning peak:

i. Withi

ii. Whiti

d) In no more th paragraph targeted to the NHS board members presenting your main part a), b), and c)) and explaining the limitations of the analysis, parti assumptions underpinning the estimates.