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Google Maps Travel Matrix Generator

A User Guide to a Travel Matrix Generator Tool with Google Maps Application Programming Interface (API)

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The instructions presented in this document refer to the use of a tool developed for a doctoral research project investigating vehicle deployment in the Welsh Ambulance Services NHS Trust.

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Introduction

The tool discussed in this document enables the user to create a travel time or travel distance matrix from a given list of geographic locations. A Google Maps interface has been embedded in a simulation tool developed in the C# programming language. The purpose of the simulation is to model the processes of an ambulance service system over a network and so requires as input a travel time (or distance) matrix. Here, the functionality of the Google Maps API and the generator contained within the simulation model that creates such matrices will be explained.

About Google Maps API

The Google Maps Javascript API Version 3 (V3) allows a user to embed Google Maps within a web page, so that visitors to the site may utilise Google Maps functionality internally.

Please note that the use of any Google Maps API product is limited by Google's terms of service. For further details on the regulations set by Google for the use of Google Maps API V3, please refer to <http://code.google.com/apis/maps/terms.html>. (Legal notices for Google Maps APIs can be found at http://www.google.com/help/legalnotices_maps.html)

For further information and details on how to implement Google Maps Javascript API V3, please see <http://code.google.com/apis/maps/documentation/javascript/basics.html>, (understanding of the information given in this particular reference documentation is not required in order to make use of the travel matrix tool explained throughout this user guide).

Purpose

As part of ongoing research, funded by the LANCS Initiative (EPSRC) at Cardiff University School of Mathematics, a tool has been developed for the purposes of determining travel time and distance matrices utilising the Google Maps API.

By sending multiple requests to Google Maps, a user can build up a collection of time and distance values between location pairs. A location pair consists of a start location and an end location (which may or may not refer to the same geographic points) of a journey. The journey information returned by the Google Maps API is stored, and after all requests have been made, a data table of the information will be displayed where the user may select whether they wish to view travel times or travel distances of the routes. From this, the user may export the data to an external software package, such as Microsoft Excel or similar, in order to analyse or work with the information further if desired.

Requirements

Please ensure Google Maps API V3 regulations have been referred to with regards to your project specifications and usage. Certify also, that any data may be used for the purposes intended.

An internet connection is necessary for the application to obtain the route information provided by Google Maps. No other specialist software or hardware is required; the application runs as a standalone tool.

Data Input

Preparation

Before making full use of the Travel Matrix Generator, some preparation of data is required. The only data necessary for input is that of the start and end locations of each route. Due to the structure of submission of requests to Google Maps, every location in a given list will form pairs with every other location (including itself). That is, travel time/distance values will be returned for routes between each location (as a starting location) and every other location given (as the end location) in a single list. If not all routes are desired they should be removed individually from the final collection in another software package after completion of all the requests processes.

Location Data Format

Locations may refer to full or partial addresses (with or without postcodes), to full or partial postcodes or to geographical references such as latitude or longitude coordinates. If the addresses, postcodes or references in the location list are able to be recognised by Google Maps, then the travel matrix tool will be able to return route details between all start and end locations.

Data File Format

In order for the location list to be accessed by the tool, the data must be in comma separated text file format. Addresses, postcodes and/or references should be stored as text files (txt) or comma separated values (csv) created simply in programs such as Notepad or Notepad++ (a copy of which can be downloaded from <http://notepad-plus-plus.org/download/v5.9.6.2.html>). Importantly, there must be no commas contained within any individual address; commas may only be used to separate individual address entries.

The final entry in the list should **not** be followed by a comma. Due to the nature of csv files, it is not necessary to have location entries on separate lines of the file, but in Figure 1. the data is portrayed this way for demonstration purposes.

Saving the Data File

Save the file as 'Location List' followed by the extension '.txt' or '.csv' depending upon the software package used.

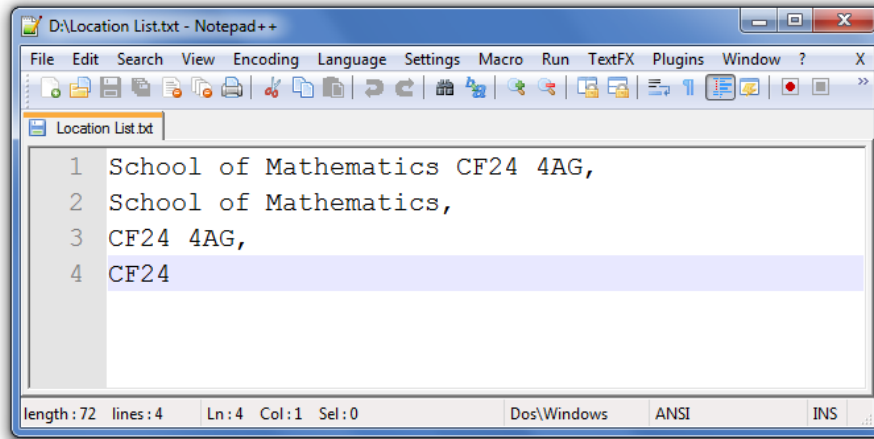


Figure 1. Examples of input format for location data

Data Output

As mentioned previously, it is possible to obtain both travel time and travel distance route information or specify which of these to work with and export if needed. The output is displayed in matrix form and can simply be copied and pasted to programs such as Microsoft Excel. If journey leg information, other route details or output formats are required, please contact the authors who may be able to assist with additional requests.

Contact Information

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