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**Computational Representations and Dissemination
of Fine Scale Geographic Data**

I am working on representing geographic data associated with spatial analysis and modelling in forms that enable a wide variety of users to access analytical information. This information is in a form that can be mapped thematically as well as information on movement that can be animated. Although the technologies we are working on are independent of scale (within obvious limits), the recent focus of this work is on fine scale data required for agent-based modelling such as remotely sensed data from GPS in various contexts ranging from monitoring pollution to tracking children moving from home to school.

We are building various tools to display such data in non-proprietary web-based systems such as *Google Maps* and *Google Earth*. In this note, I will explain our work with *Google Maps* which involved the development of a freeware application to aid with the production and publishing of maps on the web. If the data involves movement on the map we can display this in a form that links the movement to other critical variables such as pollution and energy levels. This project is part of our work on developing new computational resources for analysis and modelling in terms of display and dissemination which are currently web based services with the potential to utilise grid based services when the size of the problem exceeds certain thresholds.

- The Google Map Creator is a Java application designed to make publishing thematic data on Google Maps easier. The application takes data in the form of a shapefile and colours the areas according to a user defined colour scale. All the Google Maps tiles for the area covered by the data are rendered and saved to disk, along with an html file. The result is a working web site that can be copied to a web server for publishing on the internet. The key feature of this software is that it allows maps to be published by a wider range of users than was previously possible. The result is a completely file based site that does not rely on a web service to create the tiles, so maps can be published by anyone with access to web space that they can copy files to.

The software works with shapefiles containing data in any projection, as long as there is a valid projection file. This is achieved by using the Geotools library to do the necessary reprojection into the two projections needed to create the tiles for the Google Map. Once a colour scale has been chosen by the user, the features are rendered to all the tiles covered by the data. This is done outside of Geotools, but using some of the Geotools functions to access and transform the

data, along with some of the spatial indexing functionality built into JTS. The time taken to render all the tiles can be very long, so this part of the software had to be threaded to enable the user interface to work while the tile rendering is taking place.

- Another application that we developed is the Google Maps Image Cutter. This application takes an image and displays it on the web using Google Maps. Using Google Maps in this way allows the publishing of very large images such as panoramas and gives the user the ability to pan over the image and zoom in to see more detail.
- Work has also been done on animating GPS tracked data and publishing it on the web. This mainly involves GPS tracked carbonmonoxide data from a previous project, but we were also involved in the filming of the BBC programme 'Don't Die Young' (screened on 23rd January 2007) where a cyclist was tracked through Bristol with a carbonmonoxide sensor. The data is published on the CASA web site at the following address:

http://www.casa.ucl.ac.uk/bbc/dontdieyoung/log_25-09-2006_154206.html



Further Information about Google Map Creator and related software systems is available from:

<http://www.casa.ucl.ac.uk/software/googlemapcreator.asp>

<http://www.casa.ucl.ac.uk/software/googlemapimagecutter.asp>

Reference:

Milton, R., and Steed, A. (2007) Mapping Carbon Monoxide Using GPS Tracked Sensors, *Environmental Monitoring and Assessment*, DOI 10.1007/s10661-006-9488-y