
Using the NAG Library to underpin advanced Transport Planning and Optimization

Andrew Koh, at the Institute for Transport Studies¹, University of Leeds, has long experience in the application of transport planning models and research, both in Europe and Asia, including responsibilities for directing courses on the [‘SATURN’](#) network analysis program. He was working in the area of road pricing models when he made use of the [NAG Library](#) to solve difficult operational research (OR) problems.

Andrew was aware of the reputation that NAG has for quality and accuracy from his colleagues, before he attended a NAG training course on how to call routines from a wide range of computing environments. He realised that it was easy to call NAG Library routines, to prototype and develop his models, from many different tools, without having to resort to programming languages such as C or C#. This enabled him to rapidly move on with his research. Working initially from Excel, with VB, then MATLAB, Andrew was able to produce the detailed model that he needed within a month.

The OR fields at the core of Andrew’s work can be summarised as very large sparse matrix problems. The NAG Library has a number of ways to approach such problems depending on the exact mathematical details of the data sets and constraint parameters. In this case Andrew made use of NAG shortest path algorithms and some specialist routines, for managing real sparse non-symmetric matrix problems, as the foundation for his model.

‘I found that NAG has exactly the routines that I need to solve complex OR issues’ said Andrew, ‘the Library documentation is very detailed and complete. It was also very reassuring to know that NAG can provide the depth of consultancy knowledge and support understanding needed to help tune the use of routines to make the most of multiple processor or memory constrained environments. The support team were particularly brilliant and patient with my queries given that I do not have formal programming training’

Andrew is also very interested in the use of Evolutionary Computation and Heuristics, such as Particle Swarm algorithms, for Transportation applications. These interests are very closely aligned to NAG research topics into the latest algorithmic approaches to multicore and HPC computer platforms.

¹ The Institute for Transport Studies was recently awarded a “Queen’s Anniversary Prize” for **Forty years’ sustained excellence in teaching and applied research in transport**
http://www.royalanniversarytrust.org.uk/index.php?article_id=7