The Logistics of Travel Time Calculations (and Associated Pitfalls)

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Overview

• Ministry of Justice Reform Programme
  • Investing over £1bn in updating infrastructure
    • Prisons, Courts, etc.

• HM Courts and Tribunals Service
  • Over 300 properties around the country
  • Over 20,000 employees
    • Judges, Analysts, Clerks, etc.
  • Thousands of cases heard each year for each jurisdiction
    • Are the current locations still providing value for money?
    • Would it be more cost effective to buy/build new properties?
    • How would those changes affect court workloads, users, staff, etc.?
  • As lead GIScientist, advise on best approach
Travel Times – Internal Option

• Internal Infrastructure
  • Open Source
    • QGIS, PostgreSQL/PostGIS, pgrouting, Leaflet/node.js
  • Proprietary
    • ArcGIS, DBMS, Network Analyst, ArcGIS Online

• Pros
  • Manage and Edit in-house
  • Store/Maintain/Verify Outputs

• Cons
  • Initial time/cost to set up
  • Requires GIScientist to maintain
  • Requires IT support
Travel Times – External Option

• **External Infrastructure**
  • Commercial Contract (ad hoc)
  • Commercial Solution (regular use)
  • APIs
    • Google Maps API
    • TransportAPI

• **Pros**
  • No need to have/maintain internal infrastructure and/or resources
  • External entity (should) add confidence to accuracy of output

• **Cons**
  • Can be expensive depending upon need
  • Reliant upon external resources
  • Inability to change calculation parameters easily
  • Possible restrictions of use
Travel Times – Current Methodology

• Initially no Geography/GIS experts to advise on methodology
  • Data Scientists, Statisticians, Economists, etc.

• Origin / Destination Pairs (CSV)
  • Staff: origin (home postcode) / destination (court postcode) pairs
  • Users: origin (LSOA centroid [latitude/longitude]), destination (court postcode) pairs

• Requirement for Public Transportation as well as Drive Time results

• Analysis of interest to HR and Property
  • Separately Resourced
Travel Times – Current Methodology

• API calls made to Google Maps API to do calculations
  • Initially written in Python, rewritten in R
    • Difficulties maintaining in Python; more familiar with R
  • Code written in a way to chunk processing and allow timeouts
    • Tens of thousands of calls
    • Network/VPN issues

• Outputs then analysed in Excel and reported in Excel, Word, etc.
  • No involvement of GIS
Travel Times –
Current Methodology

• Google Maps API Challenges
  • Transparency of Calculation Method
  • Scientific Verifiability
    • Run for different days
    • Run from different machines
    • Ability to store results
      • FOI requests
  • Escalating costs based on number of calls and how often it’s run
    • Sample population under pay threshold
    • LSOA centroids of staff to court
    • LSOA to LSOA matrix
• Lack of dedicated development support
Travel Times – Current Methodology

• General Challenges
  • Non-Experts setting/tweaking parameters
  • Lack of internal infrastructure/funds/resources for creation and sustainability of in-house solution
  • Lack of prioritisation
    • Med/High impact, but Low priority
      • Possibly because existing solution provide figures “sufficient” for purpose
  • Difficulties associated with sustainability of any solution due to churn
  • Internal connectedness with regard to shared communication, analyses, costs AND benefits
Travel Times –
Internal Pilot

• GIS Intern – 3 months

• Failure to Attend Warrants – Analysis
  • Publication – 10 years of data (~1.6 M records)
    • Defendant Information
    • Receiving Court
    • Analyses and Information largely quantitative/statistical
  • Desire for a complementary GIS analysis
    • Intersect with spatial layers
      • CAMEO, Indices of Deprivation, Average Income, Education, Employment, etc.
    • Visualise outputs in an impactful way
      • Static and Dynamic
Travel Times – Internal Pilot

• Challenges
  • Getting security clearance and HR processing
  • Difficulties obtaining data due to bureaucracy, legacy system issues, lack of area expertise, etc.
    • Data quality and matching issues
      • Missing postcodes, different names, manual errors, etc.
  • Providing equipment with the necessary capabilities
    • Setup and Licencing Software
    • Developing workarounds when functionalities were blocked
      • Intern brought their own laptop with ArcGIS and Network Analyst
      • Unable to unzip outputs as Geodatabase is blocked by Antivirus
    • Laptop did not have enough processing power
      • 4 days to load 2000 network points
      • Analysis instead used As the Crow Flies
  • Lack of internal visibility, recognition and prioritisation of this work
Travel Times –
Overall Recommendations

• Involve a Geographer/GIScientist
Travel Times – Overall Recommendations

• Modernise your data infrastructure
Travel Times –
Overall Recommendations

• Pool resources to share benefits
Travel Times –
Overall Recommendations

• Consider your existing infrastructure and resources
  • Select the right solution for your organisation
  • Make sure your solution is sustainable
Travel Times –
Overall Recommendations

• Better demonstrate the value of GIS
Travel Times – Government Geography Profession

• Standardised Methodology

• Recommended Infrastructures and Industry Partners

• Centralise Efforts for Cross Government Benefit
Government Geography Profession

• Sign up: [www.surveymonkey.co.uk/r/CRL289S](www.surveymonkey.co.uk/r/CRL289S)
  - Answer “Geography” for Question 11


• Slack: govgeography.slack.com

• Events information, job listings, mentorship and support