Applying Google Maps and Google Street View in environmental criminological research

Should criminologists be feeling lucky!?
Introduction

Widely used on daily basis ...
• 1 billion monthly users, most popular smartphone app
• Address information, route planner etc.

... and ‘discovered’ by some scientific disciplines
• Geography, archaeology, biology, social sciences
• Remote sensing, data visualization and data collection

What about criminology?
• Only a handful of studies
• Potentially powerful instruments
Google Maps & Street View in criminology

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New research questions

• Target selection of burglars with online instruments
• Street View and local crime figures
• Feedback offline awareness space and online target selection

Addition to methodological toolkit

• Data collection
  • Google Maps in offender interviewing
  • Virtual neighborhood audit
  • Google Maps API
• Method
  • Re-assessing established research practices
  • Data visualization
New research questions (1)

Are burglars likely to rely on GM & SV to select a suitable target (Van Daele et al. 2012)?

Burglars’ target selection process

• Area and target attributes affect target choice
• Targets selected while executing routine activities
• What about ‘online searches’ and GM & SV?

Experiment with 66 undergrad students criminology

• “Find a suitable house to burglarize”
• Multiple target selection strategies
  • Incl. make use of GM & SV, photograph to simulate burglary
New research questions (2)

No spontaneous use of GM & SV
• 2 out of 18 participants reported spontaneously using GM & SV
• Photograph request made participants look for targets near their home

Offline awareness space guides online search strategy
• GM & SV made target selection process easier
  • Participants checked familiar targets
  • GM & SV allow to double check!

Other research questions
• Feedback offline awareness space & online searching behavior
• Burglars’ online target selection (cf. Van Daele et al. 2012)
• Natural experiment: does availability of SV affect crime figures
Google Maps in offender interviewing (1)

Maps in offender interviewing (cf. Summers et al. 2010)

Sketch maps & cartographic maps are powerful tools but have their limits
• Sketch maps: size of paper, drawing ability, relate to cartographic map
• Carto maps: scale of map determines detail of information

GM ‘custom maps’ environment might offer solution
• Add layers of content (e.g., POI, images, videos, labels etc.)
• Draw lines, shapes etc.
• Add route descriptions
• Measurement tools
• Can be shared and co-authored
Google Maps in offender interviewing (2)

Advantages of ‘custom maps’ environment
• Size and scale become irrelevant
• Sketch map directly linked to cartographic map

Disadvantages of ‘custom maps’ environment
• Drawing ability unaffected
• Familiarity with GM
Example 1: Google Maps ‘custom maps’ environment
Virtual neighborhood audits (1)

Data collection through GM & SV
- Systematic social observation (SSO) is cost and time intensive
- SV offers many advantages (Kronkvist 2013)

Already successfully applied in public health studies (e.g., Odgers et al. 2010, Rundle et al. 2010)

Advantages of using SV
- Validity and reliability are acceptable
- Cost and time effective
- Collection of additional information or cross-checking existing information is straightforward

Disadvantages of using SV
- Qualitative assessments are not straightforward
- Quality of imagery
- Temporal variability in imagery

Future data collection strategies
- Mobile apps & SSO – access GM & SV on the spot for additional information
- International comparative research from a single location
Virtual neighborhood audits (2)

SV has already been used to collect data in criminology

Fujita (2011)
• Car theft
• SV imagery to estimate number of vehicles on street segments (incl. make, model & generation)

Kronkvist (2013)
• Disorder & victimization
• SV used to assess levels of physical disorder in Swedish neighborhoods

Apps (2012)
• Effects of physical & social features on burglary
• SV used to assess house design
Example 2: Street View image with map insert
Google Maps APIs

API = application programming interface

Geocoding API
• Batch geocode address information
• Returns xy-coordinates or address information (reverse geocoding)

Places API
• Automatically query Google database for place information
• Returns location, business hours, price categories etc.
• Additional information via Places Details API

Directions API
• Returns directions between set of locations for a range of transport modes

Distance Matrix API
• Returns recommended travel distances and times for address matrix
Re-assess established research practices (1)

Improve measurement of crime-deterring effect of CCTV cameras (Caplan et al. 2011)

Crime-deterring effect of CCTV cameras is limited
- Only where camera is present
- Only when offenders are aware of camera presence, are convinced camera is monitored and swift reaction will follow
- CCTV camera has limited line of sight

Improved measurement acknowledges limited line of sight
- Before: observe viewshed in camera control room, transplant onto map, expensive, difficult to replicate
- Caplan et al. use GM aerial photography to improve measurement
Example 3: CCTV camera viewshed measurement using GM aerial imagery (Caplan et al. 2011: 262)

Fig. 1 Shaded region within the circular buffer exemplifies a viewshed drawn using a Google Aerial Photograph
Re-assess established research practices (2)

New method is equally reliable as previous method

Additional advantages

• Less time-consuming
• Replicability of method

SV could be included to further increase viewshed measurement
Data visualization (1)

Use GM to visualize criminological data and make results accessible to a broad audience

Krimistat.si project (Eman et al. 2013)
- Make crime mapping accessible and understandable for a broad audience
- Combine recorded crime data with socio-economic variables
- Display enriched crime data through GM
Example 4: dog shootings by police officers

Dog shootings by police officers 2011-2013

This map is a partial list of reported, suspicious, dog deaths from 2011-2013 shot by police officers in the United States.

The map is limited to deaths where the circumstances surrounding the event are disputed. This includes differing statements from police and dog owners, eyewitnesses, video evidence, or a criminal case.

*** WARNING: Links may contain graphic images ***

Map created by: Matthew E. Tumer
www.Journocrash.com

You are free to share — to copy, distribute and transmit this work. Attribution appreciated.

This list was last updated in August 2013.

\[ Image: Map of dog shootings with annotations for each case. \]
Example 5: maps.met.police.uk
Discussion (1)

GM & SV in criminological research
• Only a handful of studies so far, but potentially powerful instruments

New research questions come to mind

Primary focus on ‘methodological tools’
• Data collection: interviews, neighborhood audits
• Method: improve measurement, visualize data
Discussion (2)

Major advantages
- Usability
- Accessibility
- Cheap

Major weaknesses
- Privacy policy, general ToS and additional ToS
  - Might affect offenders’ consent to participate
  - Explicitly prohibits ‘instructional information about illegal activities’
- Some familiarity with (basic) programming for advanced use

Further reading