

Academic panel session: Predictive policing in the big data era

Chair: prof. dr. Wim Hardyns

CPS International Conference 'Street Policing in a Smart Society'
17 September 2019

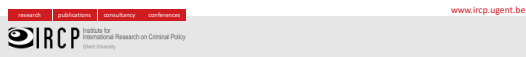


Introduction: PIXLES

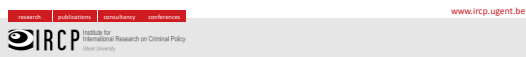
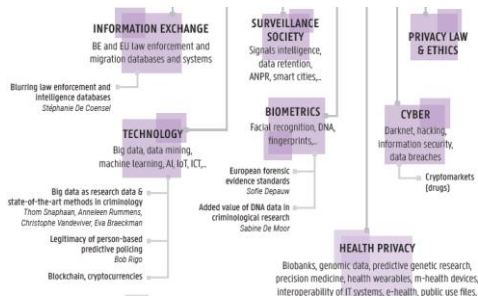
PIXLES is an interdisciplinary knowledge platform and research consortium with a focus on current societal dilemma's and developments in the context of privacy, information exchange, law enforcement & surveillance. The core value of PIXLES is to safeguard privacy while enhancing security.



Ghent University Knowledge and Research Platform on
Privacy, Information Exchange, Law Enforcement & Surveillance



Introduction: PIXLES



Overview session

1. **New and emerging data sources for spatio-temporal analyses: Opportunities and threats for big data policing**
Thom Snaphaan (speaker); Wim Hardyns

2. **Social capital variables at the neighbourhood level as predictors in a predictive policing model**
Anneleen Rummens (speaker); Wim Hardyns

3. **Automated Suspicion: Offender-Based Predictive Policing in the Age of Big Data**
Bob Rigo (speaker)



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New and emerging data sources in criminology: Opportunities and threats for big data policing

Thom Snaphaan, MSc. & prof. dr. Wim Hardyns

CPS International Conference 'Street Policing in a Smart Society'
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Content

- I. Introduction
- II. Big data
- III. Big data policing
- IV. Scoping review: big data in environmental criminology
- V. Conclusion and discussion



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I. Introduction

The best predictor of future crime is ... ?

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PRIOR CRIME



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I. Introduction

Big data policing is more than predicting the future (≠ predictive policing)

Is big data policing another type of policing? Next to, among others, intelligence-led policing (ILP), problem-oriented policing (POP), community oriented policing (COP), hot spot policing

→ More like a paradigm shift (which is not limited to the police)

Although big data predominantly have been used for crime prediction purposes, the use of big data is much broader than that

→ Big data as one type of research data

→ Crime prevention, policy



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II. Big data Dissecting the catch-all term

Innovative data sources



Innovative data collection methods



Innovative data processing and analysis methods



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II. Big data

Taxonomy of data sources in the social sciences

13

Directed data:



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II. Big data

Taxonomy of data sources in the social sciences

14

Volunteered data (proactively and retroactively user-generated content):



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II. Big data

Taxonomy of data sources in the social sciences

15

Automated data (automated surveillance, data generated by digital devices, sensed data, scan data, interaction data):



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III. Big data policing

Today's applications of new technologies

19

Survey (n=46) regarding the use of new technologies by police forces and law enforcement agencies in 11 different countries (EU + Australia)

(Custers & Vergouw, 2015)

Table 2 – Top five of obstacles of technology in policing.

Obstacle	Type	Percentage experienced
Insufficient financing	Organizational	80%
Insufficient availability of technology	Technological	56%
Legal basis not available	Legal	44%
Insufficient overview of available technologies in the market	Technological	36%
Insufficient insight and overview regarding technology in policing	Organizational	29%

Table 1 – Prevalence of the technologies among respondents.

Technology	Percentage of respondents using this technology
Databases/coupling of files and databases	72
Camera surveillance/CCTV	63
Fingerprints	63
GPS/tracking systems	61
Sensing	52
Cryptography/data recovery	50
RNA	50
Biometrics	48
Citizen participation networks	48
Wiretapping	46
Data mining/automated data analyses	46
Bodycam	43
Network analyses	43
Profiling/target group analyses	41
Social media	41
ANPR/number plate recognition	37
Voice recognition	37
Polysphoric detectors	35
RFD	33
Privacy enhancing technologies	33
Weapon technologies	30
Narrowcasting/target group approach via networks	26
Drones	26
Face recognition	24
Other	24
Virtual reality	11

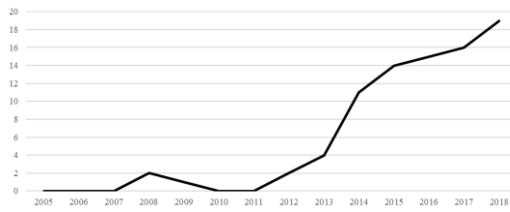
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IV. Scoping review: big data in environmental criminology

Evolution of the number of included studies

20

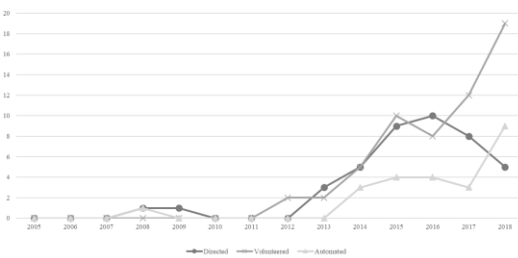


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IV. Scoping review: big data in environmental criminology

Evolution of the number of data sources used

21



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**Making the most of the available data:
Social capital variables at the
neighbourhood level as predictors in a
predictive policing model**

Anneleen Rummens
Wim Hardyns

17 September 2019
Predictive policing in the big data era
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Ghent University



Contents

29

- I. What is predictive policing?
- II. (Big data) sources for predictive policing
- III. Social capital research in Ghent: SWING and SCAN
- IV. Predictive modelling using SWING
- Conclusions



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I. What is predictive policing?

30

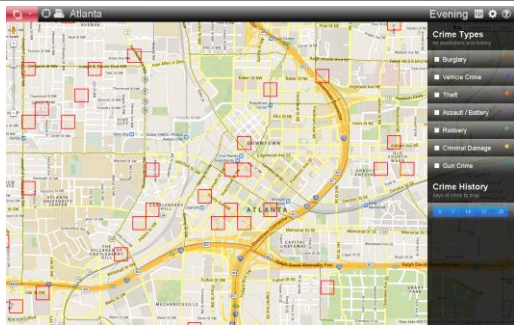
- Predictive policing: *"the use of historical data to create a spatiotemporal forecast of areas of criminality or crime hot spots that will be the basis for police resource allocation decisions with the expectation that having officers at the proposed place and time will deter or detect criminal activity"* (Ratcliffe 2014, p. 4)
- Recent development: use of big data and predictive analysis in criminology
- Evolution to small units of analysis (street segments, grids) and complex machine learning methods
- More dynamic than methods such as hotspot analysis



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I. What is predictive policing?

31



I. What is predictive policing

32

Main objectives of predictive policing:

- Short-term:
 - Use available resources more efficiently
 - Proactively target crime
- Long-term:
 - Cost-efficiency
 - Decrease crime rate

II. Predictive policing using the SWING data

33


- **SWING: Social capital and Well-being in Neighborhoods in Ghent (2011-2015)** (Hardyns et al. 2015)
 - Extensive study of relationship between social capital, crime and health
 - Collected data on among others social and physical disorder, social trust, informal control, ...
- **Doctoral research at Ghent University: Performance of different data sources and methods for predictive policing?**
 - Retrospective analysis: predicting crime for a period that has already happened, so that we can compare the predicted zones to the real crime zones
 - Using the SWING data, a predictive model for home burglary in Ghent was created

III. Selecting variables for predictive policing

37

- One of the main characteristics of predictive policing, is its use of (big data) sources
=> More advanced systems even provide real-time integration
- New technologies open up new possibilities: ANPR, mobile phone data, ...
- Some applications are also looking at civilian inputs, e.g. 'citizen science' apps
=> This kind of data can also be of interest in the context of predictive policing, for example, with regards to fear of crime, well-being, social control, cleanliness, ...

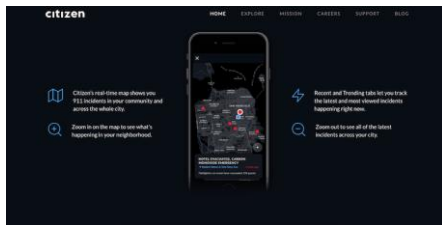
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III. Selecting variables for predictive policing

38



Such an approach could also help to make data more dynamic, thus increasing its predictive value

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Conclusions

39

- Making the most of predictive policing also requires making the most out of the available (big) data
 - Predictive vs supporting variables, e.g. social capital data
 - Use of big data & new technologies
- General guidelines for selecting variables for predictive policing, but specific context is important
 - ⇒ Explorative analysis needed before implementing predictive policing
 - ⇒ Test different configurations
- Important questions to ask:
 - Which data resources are available?
 - Which data could be interesting to include?
 - For prediction?
 - For support?

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Automated Suspicion: Person-Based Predictive Policing in the Age of Big Data

EU data protection law
in a privacy-friendly mass
surveillance society

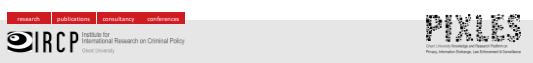
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42

- Intro
- Research
- Definition
- S&W
- LED
- Reflection
- Conclusion

“To what extent are person-based predictive policing tactics legitimate in light of what EU data law is and ought to be in a privacy-friendly mass surveillance society?”



- Intro
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To what extent is person-based predictive policing legitimate in light of art. 11 LED?

- Intro
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What is person-based predictive policing?

- Predictive algorithms
- Algorithmic decisionmaking
- Prediction-led policing business process

- Intro
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Strengths

- Effective management information system
- Amplifications of prior surveillance practices
- New patterns



- Intro
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- Conclusion

Some concerns ...

- Intro
- Research
- Definition**
- S&W
- LED
- Reflection
- Conclusion

The Prediction-Led Policing Business Process



- Intro
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Some concerns

Data Analysis:

- False positives / Echo-chambers
- Opacity / Black box

- **Police operations**
- Automation bias

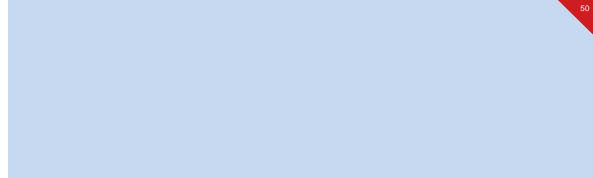
48

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- Research
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data protection as a fundamental right

- Article 8(1) ('the Charter')
- Article 16 TFEU (the *Lisbon Treaty*)
- 2008 Framework Decision, replaced by:
- Law Enforcement Directive

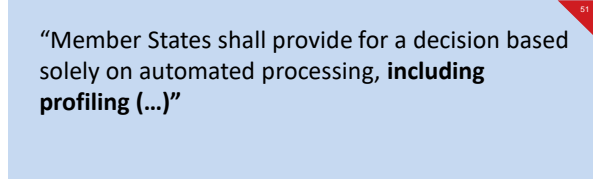




49

“Member States shall provide for a decision **based solely on automated processing**, including profiling, which produces an adverse legal effect concerning the data subject or significantly affects him or her, to be prohibited unless authorised by Union or Member State law to which the controller is subject and which provides appropriate safeguards for the rights and freedoms of the data subject, at least the right to obtain human intervention on the part of the controller.”  Art. 11(1) LED





51

“Member States shall provide for a decision based solely on automated processing, **including profiling (...)**”

- Predictions (vs. decision)
- Some form of automated processing (e.g. data mining)



“Member States shall provide for a **decision** based solely on automated processing, including profiling (...)” 📖 Art. 11 LED

- What constitutes a decision?
- Process matters
- Stages in the algorithmic process



“Member States shall provide for a decision **based solely on automated processing**, including profiling, (...)” 📖 Art. 11 LED

Solely


- without any human intervention?
- Ambiguous

“Member States shall provide for a decision **based solely on automated processing**, including profiling, (...)” 📖 Art. 11 LED

What constitutes human intervention?

Nominal (human rubber stamping) or meaningful human intervention?




“Member States shall provide for a decision **based solely on automated processing**, including profiling, (...)”  Art. 11 LED

Unauthorised law-making by Art. 29?



- “not any human involvement”
- “with an influence on the result”
- “meaningful”




“(...) a decision (...) **which produces an adverse legal effect concerning the data subject or significantly affects him or her** (...)”  Art. 11 LED

Adverse legal effect (↔ GDPR)

- No definition
- Discriminatory effects?




“(...) a decision (...) **which produces an adverse legal effect concerning the data subject or significantly affects him or her** (...)”  Art. 11 LED

Significant effect


- Less clear
- “substantial”



“(...) prohibited unless (...) appropriate safeguards for (...), **at least the right to obtain human intervention on the part of the controller.**” 
Art. 11 LED

- Human intervention?
- Automation bias




“(...) prohibited unless (...) **appropriate safeguards** for the rights and freedoms of the data subject (...)”  Art. 11 LED

Some clarity?


- to express point of view
- to obtain an explanation
- to challenge the decision



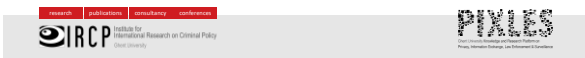
“(...) prohibited unless (...) **appropriate safeguards** for the rights and freedoms of the data subject (...)”  Art. 11 LED

However,

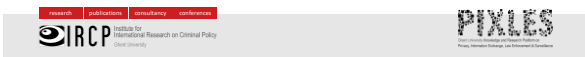
- Recital/Directive ↔ art. 15 GDPR?
- Trade secrets
- Need for flexibility (recital 44)
- Black box

“(...) prohibited unless (...) **appropriate safeguards** for the rights and freedoms of the data subject (...)”
”  Art. 11 LED

Other safeguards?

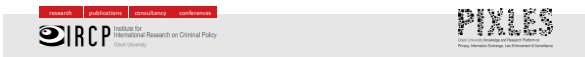


Determinism vs. Probability
Two-way-mirror



- Intro
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- Definition
- S&W
- LED
- Reflection
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To what extent is person-based predictive policing legitimate in light of art. 11 LED?



64

- Intro
- Research
- Definition
- S&W
- LED
- Reflection
- Conclusion

- Human intervention?
- Explainability?

65

- Intro
- Research
- Definition
- S&W
- LED
- Reflection
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- Legal nature
- Vague concepts → inapplicability
- Obstacles for transparency

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Discussion

Technology is value-free (neutral)

The question is not whether or not we can predict the future. The question is more fundamental: what do we want to do with this knowledge?

- Based on linking data and data fusion, we can provide you a social credibility score, but do we want this?
- Based on new and emerging data collection methods, we can fine any non-paying parked car, but do we want this? And we can fine every car that drives too fast, but do we want this?

China's social credit system awards points to citizens who conform



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Discussion

Technology is the means, it is not the end goal

"There is no soul in the new machine" (Corbett & Marx, 1991)



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Discussion

70


Methodology is fallible

- There are some things big data can never quantify, but
- there are also quantities that human can never phathom

and



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