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Multiagent systems for deciding about the relevance and admissibility of evidence

*AI for Judges and Arbitrators
Module C*

Lisbon

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Summary

1. (continues) Which effective remedy?
2. The problems of dealing with digital evidence: overview
3. Comparative solutions at the national level
4. Which role for AI systems?
5. Multi Agent Systems
6. Some applications
7. Which Way Forward?



(continues) Which effective remedy?

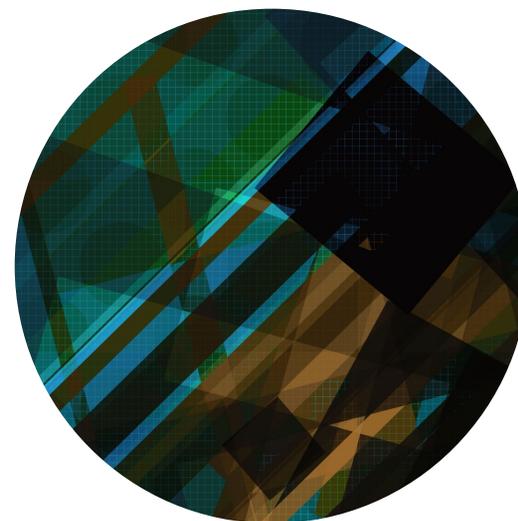
...an approach alternative to “simple human control”

- Certification
- Explicable AI

R. Guidotti, A. Monreale, S. Ruggieri, F. Turini, F. Giannotti, D. Pedreschi, “A Survey of Methods for Explaining Black Box Models,” 51 *acm Comput. Surv.*, 5 (2018), 93:1–93:42

- Redundancy approach: Right to a second automated decision

G. Contissa, G. Lasagni, *When it is (also) algorithms and AI that decide on criminal matters: In search for an effective remedy*, in *European Journal of Crime, Criminal Law and Criminal Justice*, 28, 3, 2020, pp. 280-304

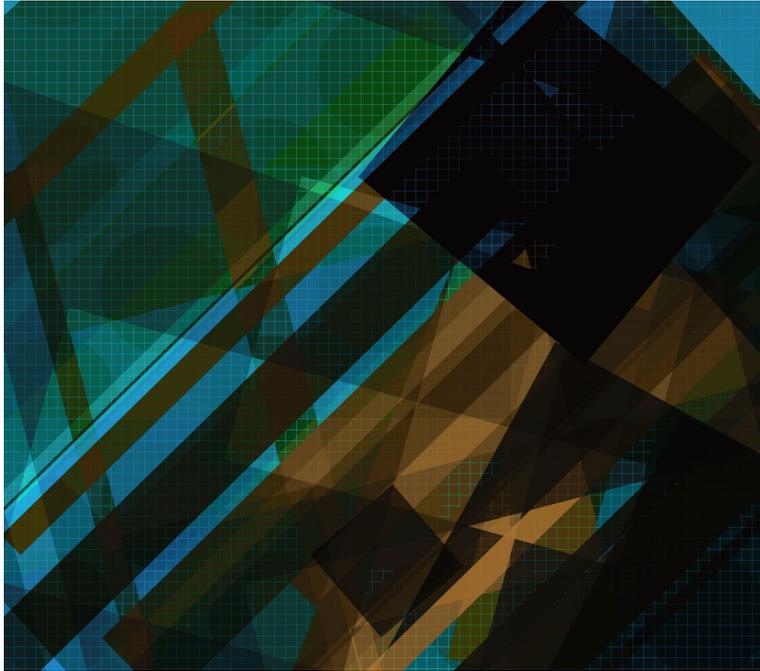


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(continues)
*Which effective
remedy?/2*



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- Which value for the second assessment?
- Does it substitute the first one?
 - expert witness approach
 - Which evaluation rules?
- Need to upgrade the structural resources, eg Appeals Court





The problems of dealing with digital evidence: Overview

- Volatile and fragile information
- Great amounts
- A type of forensic evidence...but much more common than other typologies...

General problems

- *Data fundamentalism*
- *Training*
- *Methodology*

Specific problems

- *Preservation*
- *Fake risk*
- *Conflicting principles*



The problems of dealing with digital evidence/2

Digital Forensics Standards and Procedure



ISO IEC technical standards (2012 – 2015):
for all kinds of digital investigations

- *International*
- *Technical neutrality*

Reference term for European and national Guidelines and Standards, e.g.:

- *Guidelines on Digital Forensic Procedures for OLAF Staff* https://ec.europa.eu/antifraud/sites/antifraud/files/guidelines_en.pdf
- *Electronic evidence - a basic guide for First Responders*, <https://www.enisa.europa.eu/publications/electronic-evidence-a-basic-guide-for-first-responders>
- *UNE standards, which are certified by AENOR (Asociación Española de Normalización y Certificación): UNE 71506 Methodology for forensic analysis of electronic evidence (July 2013); UNE 71505-1 Information Technology (IT). Electronic Evidence Handling System (SGEE). Part 1: Vocabulary and general principles. UNE 71505-2 Information Technology (IT). Electronic Evidence Handling System (SGEE).*
- *Good Practice Guide for Computer-Based Electronic Evidence (ACPO – Association of Chief Police Officers, UK, 2012)*, https://www.npcc.police.uk/documents/crime/2014/Revised%20Good%20Practice%20Guide%20for%20Digital%20Evidence_Vers%205_Oct%202011_Website.pdf



The problems of dealing with digital evidence/3

Digital Forensics Standards and Procedure

- Sets of pre-defined procedures
- Definition of roles and expertise
 - *Digital Evidence First Responder*
 - *Digital Evidence Specialist*

➤ Focus on training





The problems of dealing with digital evidence/4 Principles and Problems

General Principles

- Integrity
- Authenticity & Reliability
- Completeness
- Pertinence
- Adequacy
- Documentation: chain of custody paradigm

➤ *Completeness vs Privacy*



Comparative solutions at the national level

DEVICES

Digital forensic EVIDENCE: towards Common European Standards in antifraud administrative and criminal investigations

DIGITAL FORENSIC EVIDENCE
TOWARDS COMMON EUROPEAN STANDARDS IN
ANTIFRAUD ADMINISTRATIVE AND CRIMINAL
INVESTIGATIONS

edited by
Michele Caianiello and Alberto Camon

Wolters Kluwer

CEDAM



<https://site.unibo.it/devices/en>

The problems of dealing with digital evidence/5
Principles and Problems

Luxembourg

Agreement in advance and in writing about the procedure to be followed (*Ch. c. C., 11 November 2014, N° 824/14*)

Spain

Letrado de la Administración de Justicia (Article 569 LECRIM)

Italy

Incidente probatorio (Article 392 cpp)



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**Comparative solutions at
the national level/2**

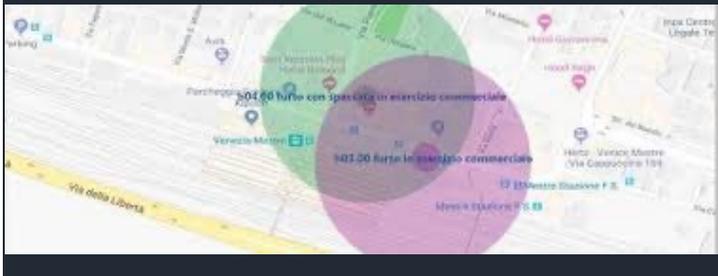
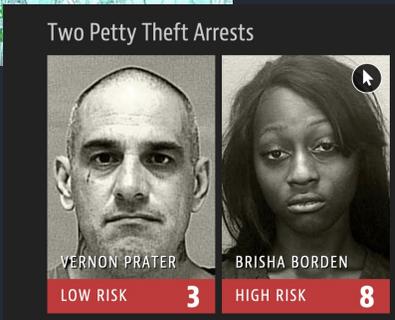
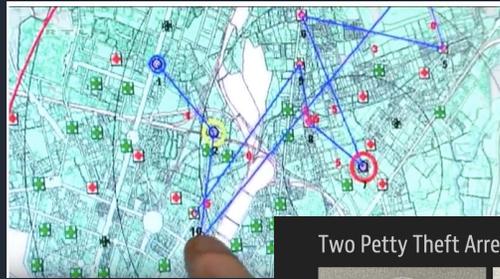
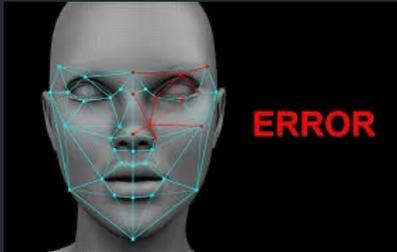
USA

«Special Master» for Mar-a-Lago Trump's investigation

Common features:

- Preponderant role of the courts
- No established model
- Usually difficult to apply on a «daily basis»





Which Role for AI Systems?



- Often used to optimize (or trying to optimize) parts of criminal investigation
 - Can AI be used to solve the problem concerning digital evidence?



Which Role for AI Systems? /2

Multi-Agent Systems



= complex informatic systems resulting from the interaction of several “intelligent” artificial agents

- subject of study and research by the most careful literature since the late 1990s (R. CONTE, R. FALCONE e G. SARTOR, *Introduction: Agents and Norms How to Fill the Gap*, in *Artificial Intelligence and Law 1999*, 7, p. 1–15; C. CEVENINI e A. OSKAMP, *Proceedings of the 4th International Workshop on the Law of Electronic Agents*, LEA 2005)

--> Interesting potential for the criminal justice field in several contexts



Which Role for AI Systems? /3 Multi-Agent Systems

- A way to address complex problems
 - different layers
 - hierarchical organization
 - rules to establish priorities/taking decisions

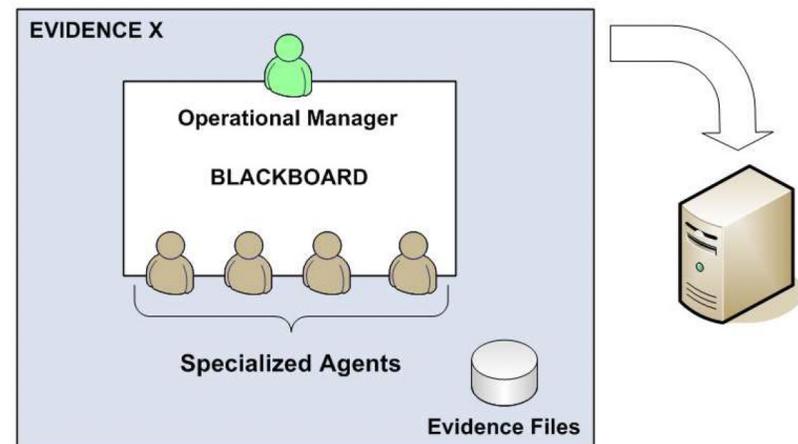


Figure 1. The operational manager actuation.



Which Role for AI Systems? /4

Multi-Agent Systems & Digital Forensics

- A way to answer to the completeness/privacy dilemma?
- More accessible than the other methods?
 - What about the asymmetry among parties?



OTM Confederated International Conferences "On the Move to Meaningful Internet Systems"
↳ OTM 2008: On the Move to Meaningful Internet Systems: OTM 2008 Workshops pp 20–21

MADIK: A Collaborative Multi-agent ToolKit to Computer Forensics

[Bruno W. P. Hoelz](#), [Célia G. Ralha](#), [Rajiv Geeverghese](#) & [Hugo C. Junior](#)

Conference paper

1389 Accesses | 1 Citations

Part of the [Lecture Notes in Computer Science](#) book series (LNISA, volume 5333)

Abstract

In this article, we present **MADIK**, a **Multi-Agent Digital Investigation ToolKit** to help experts during the forensic examination process. MADIK uses a four layer multi-agent architecture, as a metaphor to the organizational hierarchy levels: strategic, tactical,



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Not just digital evidence: AML/CFT Investigations



Inefficiency of AML/CFT regimes under several aspects:

- Excessive number of SARs
- SARs of poor quality
- No homogeneous standards for red flags
- Limited FIU resources

Table 1: Growth of STRs over the Years

SAR/STR/SMR numbers received	2012	2013	2014	2015	2016	Average annual growth rate 2013 to 2015
US	N/A	1,218,083	1,659,119	1,812,247	1,975,644	23%
UK	278,665	316,527	354,186	381,882	Not published	10%
HK	23,282	32,907	37,188	42,555	76,590	14%
Singapore	17,975	22,417	29,082	30,511	34,129	17%
Australia	44,062	64,076	81,074	78,846	Not published	12%
Canada	79,294	81,735	92,531	114,422	Not published	18%

The Role of Financial Information-Sharing Partnerships in the Disruption of Crime
RUSI Occasional Paper, October 2017



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Which Way Forward?



- Are other deployments possible?

For instance, to enhance defence rights?

G Lasagni, *Policing through AI and algorithms: The new face of criminal investigations?* In L. Bachmaier Winter, S. Ruggeri (eds), *Investigating and Preventing Crime in the Digital Era. New Safeguards, New Rights*, Springer 2022



Thank you for the attention!

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