

Effective Policing

Solving crimes and cold cases with Artificial Intelligence (AI)

Soliton[®]





Effective Policing: Solving crimes and cold cases with Artificial Intelligence (AI)

This eBook focuses on machine learning (or learning algorithms) in crime deduction.

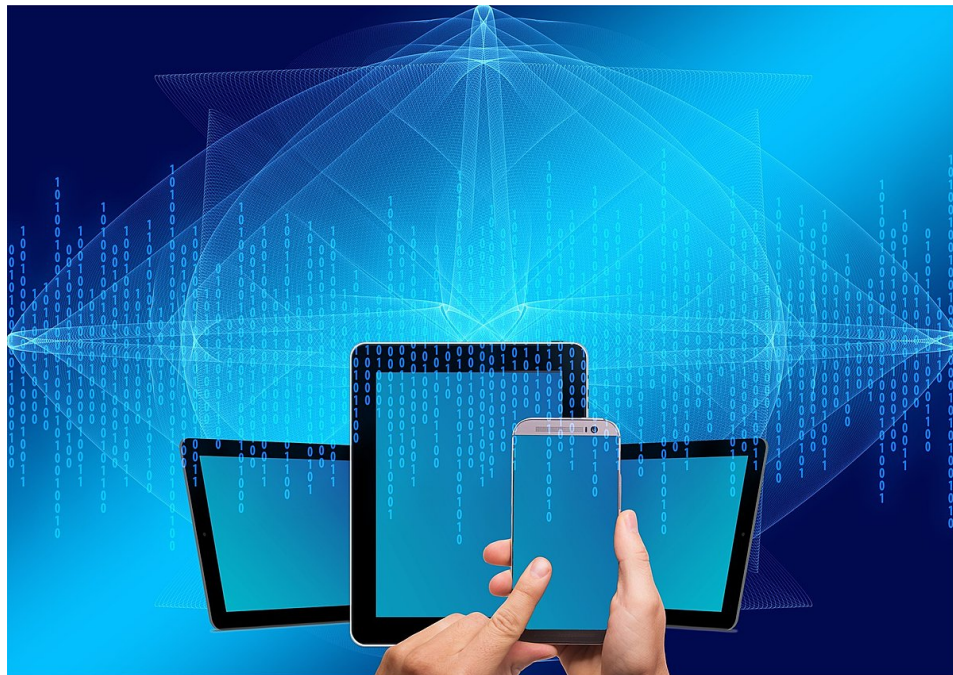
This looks at the evidence trail from our increasing adoption of IoT (Internet of Things) AI and robotic police, then describes Dutch and British examples of AI used to speed up archive matching, data analysis, analyse DNA etc.

This eBook also covers AI being used to prioritise active and cold cases to (re-)investigate, and to aide deduction by finding and linking the right pieces of information together.

Robots and IoT further transform police investigations

As the Internet of Things (IoT), artificial intelligence (AI) and robots come of age, they represent new sources of data for law enforcement and police agencies around the world. There are many new benefits to applying our growing love of 'big brother technology' to help fight crime.*

* Source: <https://www.forbes.com/sites/bernardmarr/2017/09/19/how-robots-iot-and-artificial-intelligence-are-transforming-the-police/2/#613da5322bde>



By logging in to personal Google Maps records, tracked often automatically on our smartphones, police can trace victims and suspects locations. In 2017 Law enforcement agencies were able to make the first arrests due to the information found on home smart speakers (such as Alexa, Amazon dot), digital assistants (such as Cortana and Siri) and digital smart devices (such as Fitbits and Google Maps on smartphones).^

^ Source <https://www.theguardian.com/technology/2017/jun/23/smart-devices-solve-crime-murder-internet-of-things>

Internet of Things (IoT) leveraged by the police

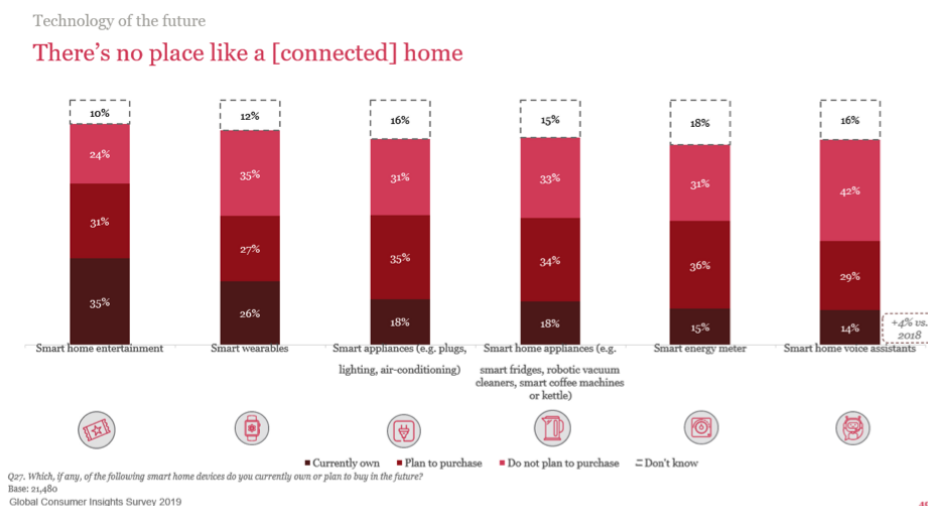
We depend unashamedly on our mobile phones and ever increasingly other digital smart devices. As such, these devices provide law enforcement agencies with a wealth of data. Police forces are starting to understand their full benefits through data analysis in supporting crime solving.



A modern transformation in law enforcement agencies across the world is the adoption and training police forces how to handle digital evidence. Many 'people of interest' will own several different digital devices from fitbits, smartphones, smart TVs, to home speaker systems and smart remote house monitoring alarms. Most people don't comprehend the complexity of tracking, recording and cookies in these devices, to show who was where, when and what they have been researching. These devices always on and always connected. They can now contradict alibis through disproving movements or show motive or intent through researched information.

The advent of Internet of Things (IoT) enables even more devices to become 'Smart'. These range from cars, fridges, doorbells, alarms (and video remote surveillance), phones, 'wearables' such as watches, fitness/health monitors and trainer tags/step counters, televisions, gaming consoles etc. The growing dependence on information, which is shared between consumer's smart-enabled gadgets and corporation's databases provide a wealth of big data for the police.*

* Source: <https://www.theguardian.com/technology/2017/jun/23/smart-devices-solve-crime-murder-internet-of-things>



PwC's Global Consumer Insights: 2019 adoption of home smart systems

Searches can be carried out through laptops, but also home assistants, smart phones and many more smart devices. Anyone whose inept at covering their google searches such as "what poisons are undetectable?", "what is the best way to murder your ex" are just begging to be found on a person's search history.

It's becoming commonplace for officers to have body cams on when on patrol. Cameras can also be mounted on drones, helicopters, police dashcams and police horses or dogs. Equipped with live streaming, these cameras can provide another set of eyes to 'smart' analysis. Facial recognition versus a database of suspects, car registration plate recognition and GPS overlapping can provide direct data for the command centre. This is also useful when planning patrol deployment in emergencies and the allocation of vehicles and other resources.



Commercially available GPS magnetic tracking devices can be as cheap as \$50*. These can also be professionally used by police to ensure they can track vehicles from a safe distance, rendering the old fashioned "tailing a suspect" out of date. It could reduce the need to engage in high-speed chases.

Smart sensors could be fixed to the inside of an officer's gun to track whether it has been unholstered or discharged. This information could prove valuable in criminal trials and create alerts of 'police officer in distress' or back-up required.

* Source: <https://www.amazon.com/Spy-Tec-Portable-Personal-Vehicle/dp/B00JG8KCLO>

Robotic Police Agents

In May 2017, Dubai introduced robotic police!* "Our aim is to raise the number of robots to 25 percent of the police force by 2030," said Brigadier Khaled al-Razzooqi, head of Smart Services at Dubai police.



The world's first operational police robot stands to attention in front of Dubai's Burj Khalifa, the tallest tower in the world, on May 31, 2017 Credit: AFP

At 5ft 5in tall and weighing 100kg, it can speak six languages and is designed to read facial expressions. It has a computer touch screen where people can report a crime. The robot is deployed mainly to tourist spots and is equipped with a livestream camera that sends live images back to police headquarters to identify wanted suspects. Although the robo cop can help deter crime and relieve some tasks from its human counterparts, humans are still expected to make arrests.

* <https://www.telegraph.co.uk/news/2017/06/01/first-robotic-cop-joins-dubai-police/>

Other robots are deployed around the world to collect evidence, investigate and detonate bombs and for crowd control among other tasks.

As with any adoption of AI, there are concerns to address. Law enforcement agencies across the world are grappling with these and trying to find the right balance to take advantage of the benefits of this technology to fight and solve crime, while preserving privacy and security.**



Credit: AFP



Artificial Intelligence tools and their use in cold cases

AI to speed up evidence review

According to DutchNews.nl in May 2017, police started turning to digital technology to try to solve some of the 1,500 'cold cases' that remain unsolved in the Netherlands. The national police force is in the process of digitising its entire cold case archive, which runs to around 25 million pages of material.



Currently only around 15 per cent of evidence on file is stored digitally. The transfer will enable police to analyse the evidence by computer, speeding up the process from several weeks to around a day. Artificial intelligence will also select which of the enquiries, which include around 1,000 murders, are worth reopening.*

Investigations specialist Roel Wolfert told NOS: 'Systems like this will allow us to do much more in future, such as seeing connections between cases. It may be that we can soon apply it to live cases too.'

* Source: <https://www.dutchnews.nl/news/2018/05/computer-says-solved-police-hope-ai-advances-can-crack-cold-cases/>

AI tool proposes which cases to reopen

It is not the first inventive method Dutch police have come up with to deal with the backlog of unsolved cases.

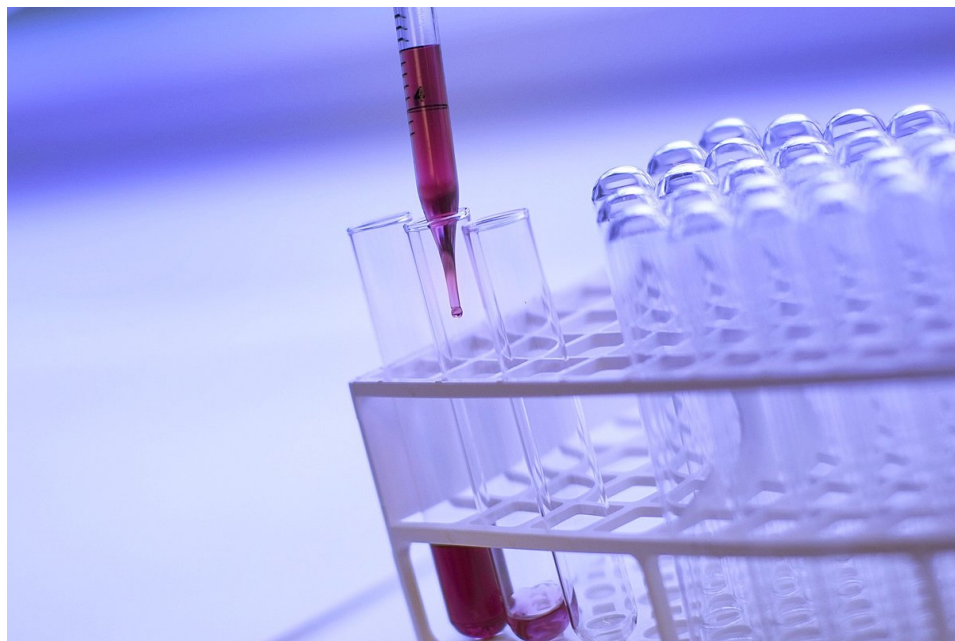
Last year a 'cold case calendar' was distributed a round prisons with details of 52 crimes to encourage inmates to come forward with information. The initiative led to seven investigations being reopened and has been repeated this year.



<https://www.parool.nl/nieuws/politie-zet-kunstmatige-intelligentie-voor-cold-cases~bbcde91e/> Credit: AFP

AI to do forensic screening

thenextweb.com states: “We’re teaching the machine to do forensic screening,” Hammer tells me, not without a hint of pride. “The goal is that the AI can read cold cases we’re currently digitising, and decide which ones contain promising evidence that could lead to solving the case.”*



Credit: [Philippe Delavie](#) from [Pixabay](#)

In May 2017 the Dutch news channel NOS said, that since 2012, DNA kinship research may be conducted during forensic investigation. There are now 250,000 people in the database and 25,000 are added every year, says DNA-expert Arnoud Kal from the NFI.**

* <https://thenextweb.com/the-next-police/2018/05/23/how-the-dutch-police-is-using-ai-to-unravel-cold-cases/>

** <https://nos.nl/artikel/2167074-het-dna-tijdperk-betekent-dat-je-cold-cases-weer-kunt-opwarmen.html>

AI tool to prioritise police cases

The AI tool aims to rank cases by solvability, giving the forensic detectives a clearer view on where to focus their limited resources. This is a huge boon, especially for regional units that have less manpower to investigate cases from long ago.

AI to initially focus on possible DNA evidence in cases

For now, the machine is focussing only on finding possible DNA evidence in cases, but they are confident it can be used to recognize other forensic and maybe even non-forensic evidence in the future.

“We could add in social sciences and networks, witness statements, and all kinds of other non-forensic evidence”. In the very best case, they believe that the system might even be useful for ‘hot cases.’

“In the so-called ‘golden hours’ right after a crime has taken place, the system might be able to point out which leads to pursue first based on similar cases. It could end up meaning a lot for the way we go about investigations.”*

* <https://thenextweb.com/the-next-police/2018/05/23/how-the-dutch-police-is-using-ai-to-unravel-cold-cases/>

Development of AI

The technique is so new, the team is also looking for outside input. In the coming year, they'll be organizing workshops for external developers to give them an idea of the data they're working with, and hopefully finding new ways of analysing them.

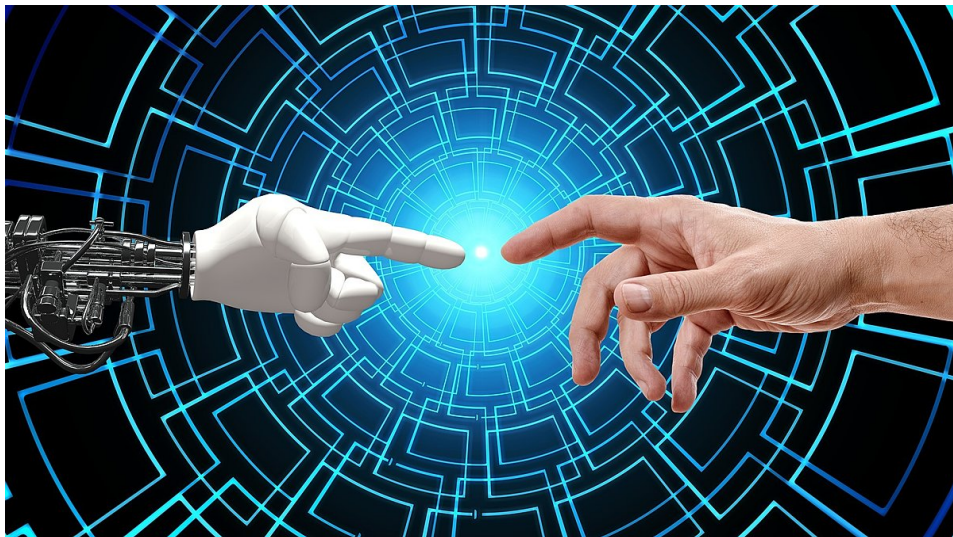


Image by [Gerd Altmann](#) from [Pixabay](#)

“Best case, we’d have a centralized database where police can see all the collected data, but also an API for external partners who want to participate in the investigation”*, while also recognizing this would have to be done in a way that respects the privacy of victims and suspects.

* <https://thenextweb.com/the-next-police/2018/05/23/how-the-dutch-police-is-using-ai-to-unravel-cold-cases/>

AI innovation for police

“At the moment there are very few people who are doing this, and no one with cold cases, as far as I know”.
“There are in fact police officers who have a yearly reminder in their Outlook calendar to call the national forensic institute to ask them if they have any new ways to analyse evidence.”*

Their system could help detectives avoid this, by automatically re-prioritising cases that have a better chance at being solved thanks to new technology.

Law enforcement agencies from across the world are using more AI and data-driven approaches to solve crimes. Machine learning in particular can identify patterns quickly and effectively and is progressing well in the ability to identify the traits of an offender. This latter ability will have a future impact in detecting serial crimes.

Smart-automation tools can speed up administration, retrieving archived information and form connections between data. Their processing speed enables them to analyse and research faster than agents. This allows them to work on gathering more evidence, field work, interviews and all other elements required to prosecute. Although, this may be in the infancy stages, certain pioneers are showing the range of possibilities for such technology.

* <https://thenextweb.com/the-next-police/2018/05/23/how-the-dutch-police-is-using-ai-to-unravel-cold-cases/>

AI detective to deduce crime motive and method

- Valcri was created by scientists at the University of Middlesex in London
- It scans millions of police files to suggest how and why a crime happened
- West Midlands Police has recently been testing Valcri initially with historical data and hopes to use live data in the future.
- Its creators hope to implement the system in real-time in the near future

Sherlock Holmes is famed for his ability to deduce through detailed observation and rational thinking. His deduction led to connecting the dots between seemingly unrelated pieces of information. Now scientists at the University of Middlesex have developed an AI system that can emulate this ability on a massive scale.



The researchers at the university have created Valcri, Visual Analytics for sense-making in Criminal Intelligence Analysis. It is an AI tool that can scan data to suggest how and why a crime may have been committed. Valcri scans millions of pieces of data to suggest how and why a crime may have been committed.*

* [1]<http://www.dailymail.co.uk/sciencetech/article-4495164/AI-solve-crimes-studying-police-data.html>



VISUAL ANALYTICS FOR SENSE-MAKING IN CRIMINAL INTELLIGENCE ANALYSIS

Valcri studies millions of police reports, including text, images and videos, to suggest links that may be worth further investigation. This data is then presented to crime with the ability to drill down into any piece of evidence.

West Midlands Police has been testing Valcri with around 6.5 million anonymised records gathered over three years. A police force in Antwerp, Belgium has also been testing the tool.

Valcri was initially used to provide early warnings of impending criminal activity, including online fraud and global terrorism. But the tool can also be used to automate and speed up police work and admin, such as searching. Neesha Kodagoda, an expert in human computer interactions from the university, was quoted by the Daily Mail as saying: 'An experienced analyst needs 73 individual searches to gather all of this information, before manually putting it into an easily digestible form. 'Valcri can do this with a single click.'

Crime analysts can spend hours trawling through records, but Valcri allows them to access relevant information at the touch of a button. And by using the latest in machine learning and facial recognition technology, the system can improve its results based on input from the analysts.

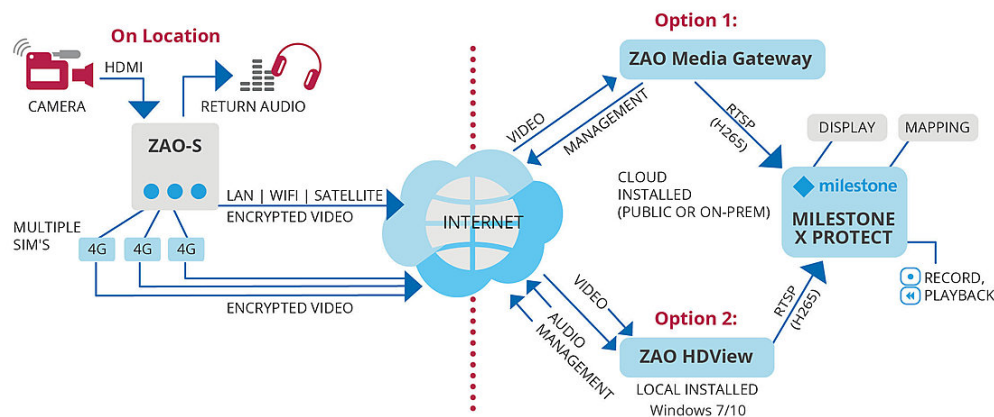
Who is Soliton?

Soliton Systems have their mobile transmitters deployed with law enforcement and first responders across the globe. Their ability to provide secure, full HD quality and highly reliable video streaming, from a remote location or a moving vehicle, has made them a favourite choice with many companies and government agencies.

Soliton can livestream over multiple 3G and 4G networks direct from a mobile camera. It can stream a fully encrypted HD video back to a command centre from remote locations, with a latency of less than one second delay end-to-end. Milestone's Xprotect Video Management Software (VMS), can select, monitor and record incoming video streams, and allows organisation a secure and scalable platform for managing all their live surveillance needs.

For more information on Soliton please refer to their website:

www.solitonsystems.com/solutions/public-safety-broadcasting



See further uses of Soliton's Live Mobile Broadcasting for Law Enforcement and download a white paper on Mobile Surveillance in the Public Safety Domain.

[Click here](#)



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