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The Increasing Use of Artificial Intelligence in the Intelligence Community

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ABSTRACT

The management of intelligence data within a law enforcement environment has traditionally been a very manual process. Reviewing the contents of intelligence reports and creating structured records has traditionally been the responsibility of intelligence professionals. With the massive increase in the amount of data being processed and the advancements in technology, the intelligence community is increasingly turning to artificial intelligence to help automate some of the tasks. This paper discusses some of the areas of progress and some of the challenges being faced.

INTRODUCTION

Intelligence and Law Enforcement has been a major focus of my career in software development. I started working in 1997, straight out of university, for a small company in East Kilbride, Scotland, called Memex. Within the first few weeks of being with the company, I was working on site at a large law enforcement agency. While there, I worked on fixing an issue that they were seeing with the Intelligence software that we provided to them.

Fast forward 22 years (am I really that old?) and I am on a plane to Australia to visit a major law enforcement agency to discuss their new intelligence solution.

As part of that visit to Australia, I spent a few days in Sydney attending an Intelligence conference. During the 2 days of the conference, 90% of the presentations talked in some way about either analytics or more specifically the increased use of artificial intelligence.

This for me, is an indication of the current position the law enforcement market finds itself in. Traditionally slow to adopt new technologies, they now find themselves in a position of conflict. The adoption of artificial intelligence brings clear benefits to the efficiency of agencies. The flip side is that it also comes with concern around the infringement on the freedom of individuals.

Artificial Intelligence is starting to impact all aspects of our daily lives. As the volumes of data increase, intelligence and law enforcement agencies are forced to look for improvements in the way they process it. They now must ask themselves, are they ready to trust artificial intelligence?

This paper will discuss the use of AI within a law enforcement context.

WHAT IS ARTIFICIAL INTELLIGENCE?

In 1950, just over a decade after breaking the Enigma code in WWII, Alan Turing wrote a paper entitled "COMPUTING MACHINERY AND INTELLIGENCE". Within the paper, Turing posed the question "Can machines think?".

Turing sought to clear the subjective nature of this question by replacing it with something less ambiguous. He proposed that the measure of whether a computer could think would be based on an individual having 2 conversations. One of these conversations would be with a

human, the other with a computer. If the individual could not determine which one was the human, then it proved that the computer was able to think for itself.

This test became known as the Turing test and is seen as a benchmark of artificial intelligence.

The following quotation is taken directly from Turing's paper:

> *"I believe that at the end of the century the use of words and general educated opinion will have altered so much that one will be able to speak of machines thinking without expecting to be contradicted."*

As of today, a few computer systems have claimed to have passed the Turing test. Turing posed the question to try and remove ambiguity from the discussion. However, this hasn't been the case. In a lot of cases where systems have claimed to have passed the test, there has been dispute around how the tests have been performed and whether they were weighted in favor of the machine.

The Turing test focuses on one area of artificial intelligence. In the time since then the field has become significantly wider. The definition of AI is the capability of a machine to imitate intelligent human behavior. This obviously goes beyond the ability to have conversations.

TYPES OF ARTIFICIAL INTELLIGENCE

Within the context of law enforcement and intelligence agencies, there are several areas of artificial intelligence that could be used. The following sections will discuss some of these areas, the possible uses of the technology and any potential problems with doing so.

FACIAL RECOGNITION

Facial recognition is not a new capability. A lot of you will have smart phones that recognize your face and will allow access to the phone's features. Social media uses facial recognition on photos that you upload and will automatically suggest who is in the photo.

In April 2018, Chinese police used facial recognition technology at a music concert. The faces of attendees were scanned on entry to the venue. This led to the arrest of a 31-year old male who was wanted for economic crimes. His face was selected from the 60,000 people attending the concert.

Unfortunately, the use of this technology has not been plain sailing for other agencies. San Diego recently switched off their facial recognition database after 7 years of gathering more than 65,000 face scans. In the 7 years it was in use, it wasn't connected to a single arrest.

This has also been compounded by California banning the use of mobile facial recognition technology. In doing so, they became the 3rd state in the US to implement a similar ban. This came about after a test falsely matched 26 Californian legislators with the mug shots of known criminals. Concerns were also raised from studies that showed the algorithms for facial detection do not work as well identifying females or people of color. These problems can normally be traced back to the training data sets used.

Of all the areas of artificial intelligence, facial recognition is widely regarded as being one of the most contentious in terms of impinging on people's civil liberties. The American Civil Liberties Union is currently suing the FBI and DOJ to force them to release records detailing their use of facial recognition software. Their concern is that a nationwide surveillance system has been implemented.

"These technologies have the potential to enable undetectable, persistent, and suspicion less surveillance on an unprecedented scale," wrote the attorneys filing the lawsuit. "Such surveillance would permit the government to pervasively track people's movements and associations in ways that threaten core constitutional values."

The benefits of using the technology are clear however guidelines and legislation are required to ensure it is used in a manner that does not impinge on our freedom. It feels like the coming years will see lots of debate and court cases as we try and determine the level of use that can be allowed.

ENTITY RESOLUTION AND NETWORK GENERATION

Entity resolution is the process of identifying common entities across disparate data sets. How do we determine that James Smith in our Computer Aided Dispatch data is the same person as the Jim Smith mentioned within our Intelligence system?

The process of doing resolution involves looking for sets of attributes. We refer to these combinations of attributes as compounds. When choosing a compound, care must be taken to ensure that the attributes uniquely identify the entity. For example, using only first name and last name to identify an individual will certainly result in mismatches. Adding a property such as a social security or driver's license number greatly improves our chances of identifying the right person.

When specifying how to match an entity, we may end up specifying multiple compounds that can be used to match. For example, a person may be matched on the following combination of compounds:

- First name, Last name, house number, street, and zip code
- Driver's License Number
- Social Security Number

As we identify entities within data sets, we can link them back to the records they were found in. As entities are found in multiple records, we start to build up a connected network. If a user searches for James Smith, they can get a better picture of all the information known about that person.

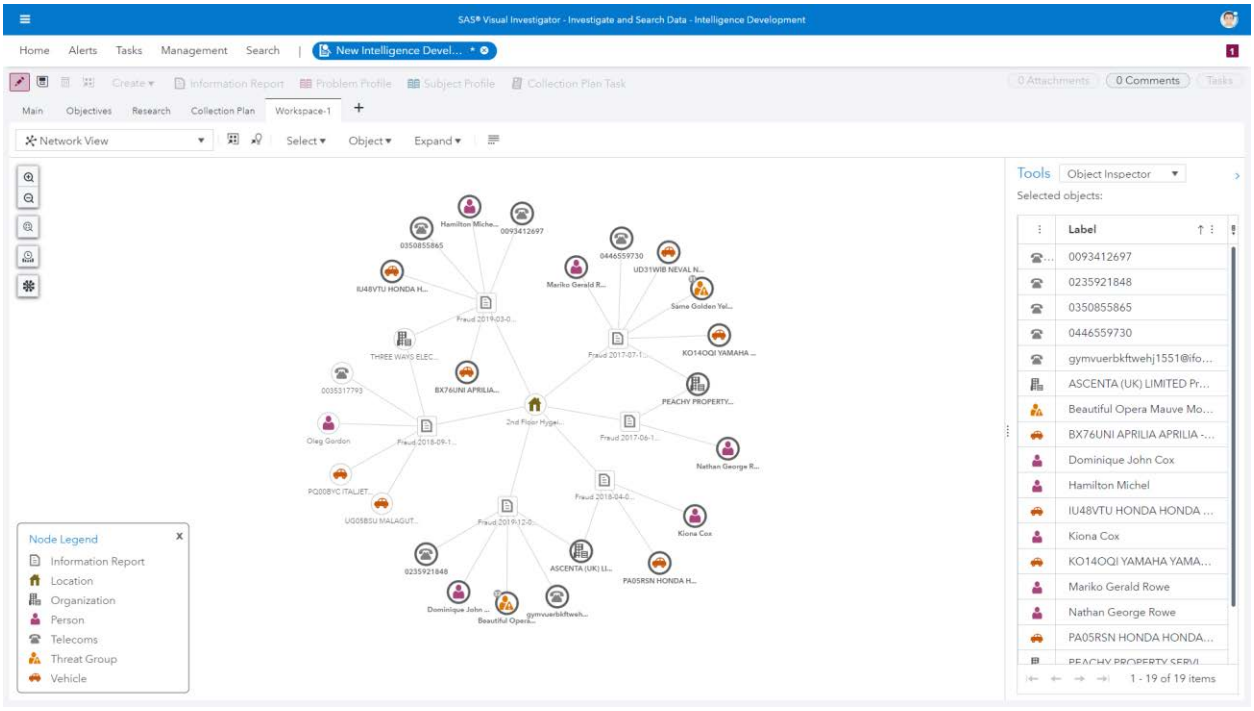

Figure 1. Visualization of networks within SAS Visual Investigator

There are a few complexities to building the network:

- We may have certain entities that are extremely common within the data, which are too heavily linked in the networks to be useful. For example, there is no point in linking together all the people who work at the SAS campus in Cary, NC as there are thousands of them.
- As data is added and we get more compounds, we may find that resolved entities may merge with each other. The flip side is true as well, if we find that a compound is removed from the data, this may cause an entity to split. These changes need to be handled in the presentation of the network.

Intelligence and Law Enforcement agencies tend to have multiple different silos of data. They are realizing the true value in being able to allow their users to search across these data sets from a single application. Adding entity resolution on top of this, to look for commonality within the data takes it to the next level.

An obvious next step in the development of entity resolution will be to utilize facial recognition as part of the process. This would match closely to what a human would do if there were images available. A compound in this case could be:

- First name, Last name and Facial Match

VOICE TO TEXT

In a law enforcement organization, gathering intelligence will regularly require officers out on the streets. They may be speaking to members of a community. They may be following a suspected criminal.

The intel they gather needs to be entered into the system used by the organization to be made available to others. Traditionally, law enforcement officers would do this when they went back to their station and sat down at a computer.

Mobile technologies have allowed them to spend more time out of the police stations. Being able to enter intelligence from laptops within their cars, or even from their cell phone has optimized their time.

Voice to text is the process of converting spoken words to text. Almost all of us will have used Alexa or Siri at some point. We are all aware that computers have the artificial intelligence to understand what we are saying. The use of this capability to allow officers to dictate the intelligence they have gathered allows for further optimization of their time.

The speed of making intelligence searchable and available to others is key to utilizing it to its full potential. Allowing officers to enter this as easily and as quickly as possible is key.

ENTITY RECOGNITION

Entity recognition (or entity extraction) is the process of identifying entities within a body of text. This allows us to create structured information from unstructured data.

SAS Intelligence and Investigation Management provides users with access to SAS Text Analytics. The use of entity recognition makes the process of structuring the data significantly quicker as suggestions are made to analysts, which allow them to quickly create records.

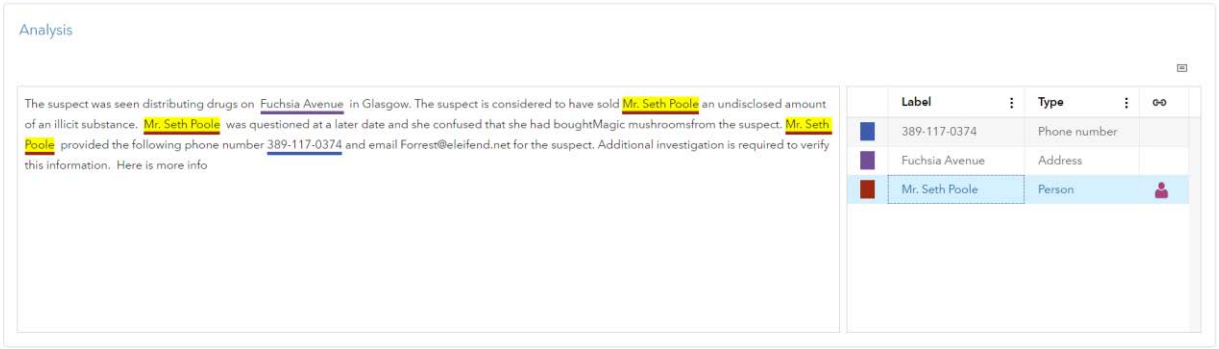

Figure 2. Entity Recognition within SAS Intelligence and Investigation Management

More and more though, agencies are looking to fully automate this process to reduce the need for manual intervention. Combining Voice to Text, Entity Recognition, and Entity Resolution allows us to go from spoken words to structured intelligence with no humans involved.

SAS has started working with some innovative law enforcement agencies where we are doing this full end to end automation. This is an exciting trend which we see being used as a model for future implementations with other agencies.

SENTIMENT ANALYSIS

Sentiment analysis refers to the use of natural language processing, text analysis, computational linguistics, and biometrics to systematically identify, extract, quantify, and study affective states and subjective information.

With the expansion of use of social media, more and more people are using these platforms to share their thoughts, opinions, emotions, and intentions.

Police forces are using sentiment analysis to monitor public data sources to evaluate their performance. Studies have shown that this is a more effective means of looking at performance over approaches like surveys. Individuals are more likely to complete surveys if they have a negative perspective on the subject.

These same public data sources can also be used to find tips and intelligence that perhaps would not have been reported to the police. In a lot of places, speaking to the police is seen as something people do not do. We've all heard of people being referred to as "snitches" or a "grass" within gangster movies. I've seen this personally from my experiences growing up in Scotland.

As an example, figure 3 shows a real post from a Facebook friend of mine in relation to the threat faced from a group of youths. Whilst the person who posted this did eventually speak to the police, this post was created 2 weeks prior to them doing so. Being able to monitor these public data sources for information like this would allow the police to intervene earlier and to be seen to be proactive. By stepping in earlier and being seen to be doing something, the overall perception of the force will improve.

Figure 3. Sample Facebook post

It doesn't stop there though. Terrorist organizations are known to use social media platforms to distribute messages. A 2012 study showed that 90% of online terrorist activity was happening within social media platforms. Pressure on Facebook, Twitter, and others to identify users associated promoting terrorism has increased. In the second half of 2017, Twitter shut down around 270,000 accounts for promoting terrorism.

Monitoring these messages can greatly improve the ability to detect and disrupt attacks. The challenge we face is that the social media companies are not particularly keen on monitoring of posts. They see this as a threat to their business model as they are scared that if people become aware of this, they will stop using the platform.

AUTOMATED VEHICLES

I recently read an article that posed the question… "Have you bought your last car?". The author of the article used the example of the transition from horses and carts to motor vehicles in the early 20th century. They included 2 pictures of 5th avenue in New York.

The first picture is from 1900 and has rows and rows of horses pulling carts. There isn't a single car in the picture. The second picture takes us forward 13 years to 1913. In this picture there is not a single horse. They have been replaced with rows of cars.

The point of the article is to show just how disruptive a new technology can be to the transport industry.

We've probably all heard about the experiments that companies like Uber have been doing with driverless cars. Some of you may own a Tesla, which is already shipped with an Autopilot feature. The point is, the artificial intelligence to automate the driving of a vehicle is here and it is only going to get better over the coming years.

Automated vehicles will be the next disruption to the transport industry. It won't be long before we are stepping into driverless cabs on a regular basis. It's also worth considering the following facts:

- Removing the driver reduces the cost of running the cab by 50%.

- As we shift to more electric cars, the forecast is that they will be cheaper to run and last longer.
- Most people do less than 10,000 miles a year and their cars are parked 95% of the time.

It's easy to see a future where a significant number of us do not actually own a car. Instead, we press a button on our cell phone, and one turns up within a few minutes to take us to where we need to be.

The impact of this technology on intelligence agencies and law enforcement is something that we need to start thinking about.

Automated Police Vehicles will soon be commonplace. Ford recently registered a patent for an "Autonomous Police Vehicle" that would be able to perform some of the tasks normally performed by an Officer such as issuing speeding tickets. Equipped with video recording capabilities, license plate readers, and other technology, these vehicles can also be used for surveillance of locations or individuals.

Removing the need for Officers to drive their vehicles will also lead to efficiencies. The time spent driving between locations can be utilized to enter intelligence into systems or to complete other administrative tasks. Getting intelligence entered quicker and available to others could save lives.

APVs will also bring improvements for officer safety. Driverless cars should become safer than those driven by humans. A recent study has shown that 40% of officer deaths are related to car crashes or being hit by a car. The conclusion of the study was that the distractions faced by the officers, such as responding to their radio system, was a contributing factor.

It's not all positive though, there are challenges faced by law enforcement and other intelligence agencies.

Terrorist organizations are known to be working on the use of automated vehicles. An ISIS supporter in England was recently arrested for plotting to use a driverless car in an attack. Security organizations around the world need to work on plans now to prevent this technology to be used in a destructive way.

For law enforcement, thought needs to be given to some of the legal issues around these cars. What happens if a driverless car goes through a red light? Is that the fault of the car owner or the manufacturer? How does a police officer know if the car is being driven by the human or the computer? This has implications on things like whether it is safe for the individual in the car to be using their cell phone.

CONCLUSION

Artificial Intelligence brings clear benefits to law enforcement and other intelligence gathering agencies.

Boundaries need to be set on the use of AI to ensure that the freedom of civilians is protected. A good example of this is the predictive policing programs that were utilized by cities such as Chicago, New York, Los Angeles, and New Orleans. It's claimed that these programs were focused on trying to predict criminals and potential gang members. In each of these cities, lawsuits have been filed to get more information about the data being used and the algorithms used to identify individuals.

It's clear that we are only at the start of the journey and there are obstacles to get over. The benefits are too large to be ignored and the relentless advancement and usage of AI will continue.

The balance between improved safety and the infringement on freedoms will be a hot topic over the next decade.

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