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WHITE PAPER

The Analytics Foundry

Custom AI-powered video analytics solutions enable campus security and safety professionals to build and maintain the safest and most productive educational institutions in the world.



Introduction

Campus Security and Police agencies at educational institutions are tasked with ensuring their communities of people, properties and critical assets are safe and secure without enforcing draconian safety measures that disrupt the educational experience. AI-powered video analytics solutions that deliver total-environment intelligence in real time from any camera source, including video from mobile cameras, have become the choice solution for Campus Security Directors and Police Departments. As cameras continue to improve in quality and decrease in price, educational institutions can have eyes everywhere. Video analytics solutions, like Vintra's FulcrumAI, are the brains for the cameras that empower safety stakeholders at modern education campuses to deliver on their goals of enhancing and improving physical security and reducing the threat to human life and assets.

The safety and security community at large has bought in to the force-multiplying power of video analytics. In fact, the video analytics market is expected to be a \$11.7 Billion market by 2022 with a compound annual growth rate of 33.7%.¹ The questions that campus security professionals are asking are: What's next after we implement Vintra's FulcrumAI Real Time video analytics solution? And, How do we transform our security program to make sure our campus is safe?

THE ANALYTICS FOUNDRY

Casualties during the 5 academic years prior to 2016 **skyrocketed by 241%** compared to the amount of shooting-related casualties between 2001/02 - 2005/06 school years.

Internal and external threat matrices facing today's educational institutions continue to diversify, and so do the potential use cases security operators are looking to solve with video analytics security solutions. In addition to perimeter control, access management, unauthorized entry, the modern campus security team must also solve for student-on-student assaults as well as external and internal violence. In fact, researchers estimate that more than half of campus crime occurs less than 500 feet off campus, yet due to reporting requirements these crimes are not reflected in official Clery statistics. In 2014, students reported under the Clery Act that 56% of crimes occurred on campus, with an additional 28% occurring in residence halls.² Even more alarming is the rise of shootings on campuses across America.

A study completed in 2016 found that incidents of gun violence on college campuses rose from 12 between 2010-2011 to almost 30 incidents in the 2015-2016 academic year. In addition, the study also found that that casualties during the five academic years before 2016 skyrocketed by 241% compared to the amount of shooting-related casualties between the 2001-2002 to 2005-2006 school years.³

By mitigating or even eliminating the factors that lead to campus-related violence incidents, such as shootings, an organization can not only prevent more but give a voice, or eyes, to those that were previously afraid to speak up about on-campus violence of any type.

The ideal video analytics solution is able to work with many enterprise-grade video management systems (VMS) and will not only provide a unified solution capable of handling key security concerns, but can be adapted and customized to fit the specific and various needs of each campus's deployment. At Vintra, we call this the Analytics Foundry.

The Analytics Foundry, made possible by proprietary deep learning algorithms, democratizes artificial intelligence by putting the power of AI into the hands of the end users. The arc of technological advancement, in general, bends towards more user control and greater customization which in turn yields greater efficiency and productivity. In this paper, we will discuss the force-multiplying power of the Analytics Foundry, how it works, and a few practical use cases that will result in demonstrably better security and safety outcomes for educational settings of all kinds.

WHAT IS IT?

The Analytics Foundry is the next step in the evolution of video analytics. Before deep learning, video analytics solutions required near-perfect conditions, including a fixed background, which made successful implementation of a comprehensive security solution quite difficult and frustrating for the end user. They also required heavy hand-tuning of analytics models, which meant there were very limited customization capabilities, if at all. In order to identify a vehicle sub-type, for example, most of the algorithm had to be hand-tuned.

Now that there are proven solutions available, like Vintra's FulcrumAI, that deliver advanced object detection, person identification & classification, blocklists and BOLOs powered by face recognition, person re-identification, vehicle detection and classification, and more from any camera source, security professionals at educational institutions can start thinking a step ahead and, thus, seek out ways to enhance their ability to solve their campus's unique security and safety issues.

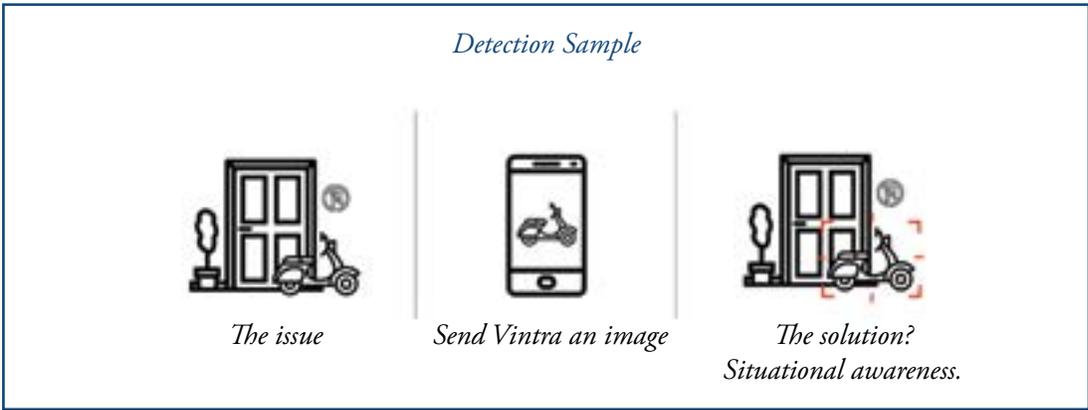


The Analytics Foundry is where educational organizations can have custom analytics created to bridge the gap between their unique needs and the pre-built features that come standard with Vintra's video analytics solution.

HOW DOES IT WORK?

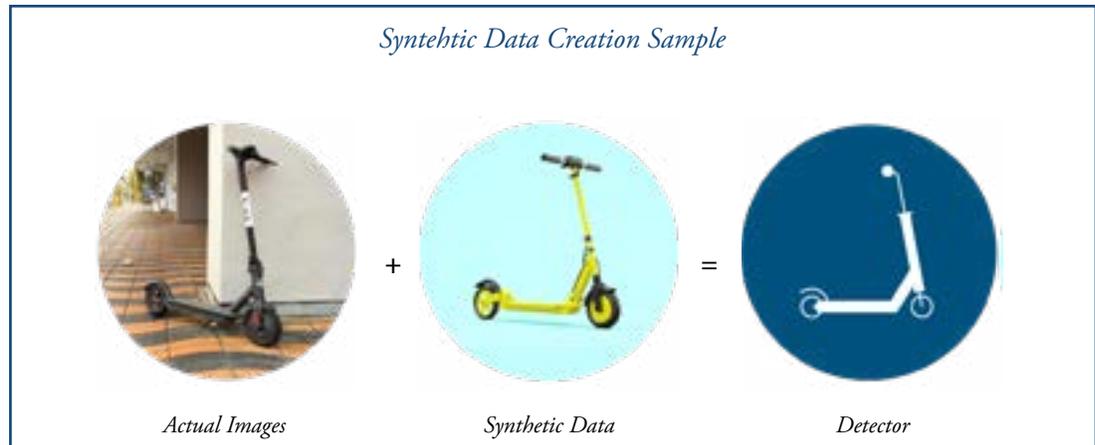
Conceptually, the Analytics Foundry is fairly simple to understand. A customer notices that, for instance, rideshare scooters such as Bird and Lime are being left all over campus. In and of itself, a scooter is harmless. But left in front of a handicap access ramp or just outside of an elevator, that scooter quickly turns into not only a safety hazard but a potential lawsuit when someone in a wheelchair cannot enter the building, or is trapped in the elevator due to the blockage.

To solve this critical and potentially costly issue, a scooter detector can be created in the Analytics Foundry. The custom detector empowers the end user with the ability to then create an alarm which will notify security operators in real time whenever a scooter is parked in a restricted zone.



When a customer makes a request for a scooter detection, the next step is to take the image of the object supplied by the customer and gather 10s of 1000s more images of that same object. The images must be from all different angles, in different lighting conditions, and of different types of the same object.

That data is then labeled through a proprietary process and is munged together with synthetic data, i.e. artificial images of the object. Thanks to our novel approach in creating accurate, custom detectors, the new algorithm is available to the customer in a fraction of the time and with far less resources typically required of traditional analytics.



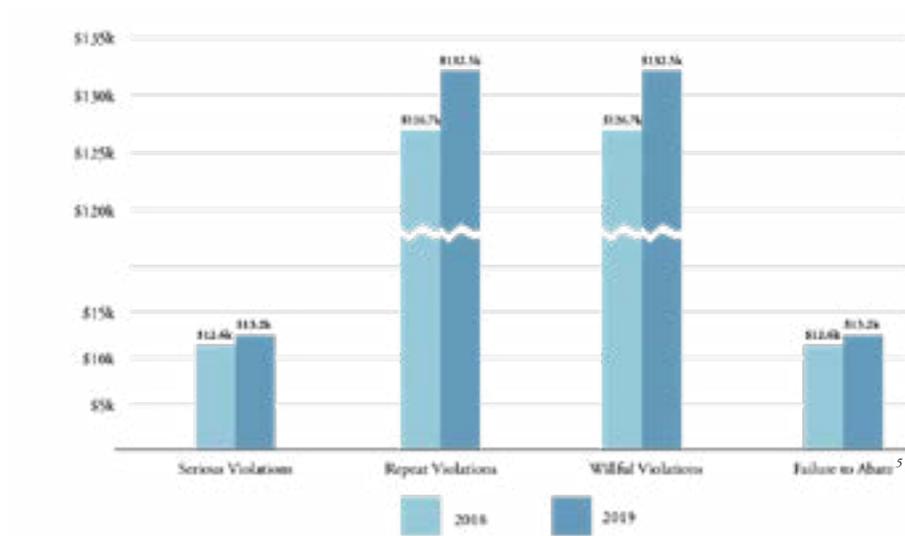
OTHER USE CASES

Among the first detectors we built using the Analytics Foundry at the direction of a customer was for long-guns. As we covered previously, one of the most pressing, and public, situations that many educational institutions are solving for is how to prevent mass shootings. Weapon and rifle detection is a complex algorithm, but the end result of being able to detect a rifle in real time and in turn alert campus security and police to enact safety measures is potentially a life-saving ability on the part of campus Security and Police.

On a lighter note, intelligence surrounding Workplace and/or Campus Wellness issues can also be gathered using custom-made detectors. One could track how many times a student in the library moves from a seated to a standing position, for instance. Studies show that those who sit for eight or more hours a day with little movement experience mortality rates similar to those who smoke or are obese.⁴ In this scenario, real-time alerts could be set to notify the Library's Wellness Agent when a student fails to reach minimum movement thresholds.

Another common request comes from educational institutions engaged in construction and/or from those that deal with highly toxic or sensitive materials in research labs. This requires the correct safety gear to be worn at all times in certain areas of interest. To that end, a hard hat detector, often in a specific type and color, is a must-have for construction sites on campus. With the algorithm up and running and an alert set for "no hard hat detected on a person", the appropriate persons can be immediately notified and action can be taken to avoid potential injury and also financial penalties.

OSHA's penalties for employer safety violations⁵ have been raised for 2019 and are as follows:



The financial incentives alone for investing in solutions that can solve these complex problems should provide the Director of Security and CFO enough evidence to push for adopting an on-premises video analytics solution.

You already have the cameras in place, all they need is the brains to know what to look for.

WHO CAN BENEFIT FROM THE ANALYTICS FOUNRY?

- Schools that need to know whether a person is wearing a specific type of identification badge upon entering a secure area.
- Educational institutions that want to validate certain work is accomplished, like the presence of specific cleaning equipment in a zone which, if not cleaned regularly, carries heavy non-compliance risk.
- Campus Security agencies that want to ensure certain valuable equipment is never removed from certain zones.

WHAT'S YOUR USE CASE?

Do you have a specific security, safety or productivity scenario that a custom-made detector would be able to solve? The Machine Learning researchers, Software Engineers, and our team of PhDs dedicated to computer vision at Vintra are eager to help you solve the unique security and safety scenarios through custom-made video analytics. We stand by the wide-range of analytics that are currently offered in FulcrumAI, and strive to continually improve and expand upon our technology by using the full power of what our proprietary deep learning-powered solution uniquely affords us.

It's time to know what the cameras know.

How can you take advantage of the Analytics Foundry?

Visit vintra.io/analyticsfoundry to get the conversation started.

Endnotes

1 <http://news.sys-con.com/node/4214366>

2 https://ovc.ncjrs.gov/ncvru2017/images/en_artwork/Fact_Sheets/2017NCVRW_SchoolCrime_508.pdf

3 <https://www.campusafety.com/university/college-campus-shooting-statistics/>

4 <https://www.mayoclinic.org/healthy-lifestyle/adult-health/expert-answers/sitting/faq-20058005>

5 <https://www.ehstoday.com/standards/osha-raises-employer-penalties-2019>

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