LPRC

LOSS PREVENTION RESEARCH COUNCIL

ORC Case Study: The Difference Face Matching Makes in ORC Investigations

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Executive Summary

In late 2023, the LPRC collaborated with a grocery retailer on the West Coast to understand how using facial recognition can affect the process and outcomes of an ORC investigation. For the study, two ORC investigators with similar experience and investigative backgrounds were assigned to the same case; however, one was allowed to use facial recognition and the other was not. On condition of the participating retailer, the investigator who was allowed to use facial recognition was given three hours to investigate the incident and the investigator who was not allowed to use facial recognition was given 18 hours to investigate.

In the end, the investigator that used facial recognition was able to build a case with 4.26 times the value, identified incidents involving the suspect at nearly twice as many locations, and identified two vehicles and temporary tags - the unassisted investigator found one vehicle and no tags). All of this was despite the fact the unassisted investigator was given 7.7 times as much time to work the case. Finally, the investigator that was allowed to use facial recognition continued to receive alerts after the study had ended, which enabled the retailer to actively deter additional incidents by alerting the store team that a known offender was in the location, as well as collect additional intelligence about the suspect.

Introduction

Countless studies have shown the growing challenges associated with organized retail crime. One of the greatest inefficiencies among ORC investigators involves video review – investigators are often provided imprecise or incomplete incident reports. Unfortunately, often, investigators never receive an incident report even if incidents are detected, and it is likely that most incidents are never detected in the first place.

Therefore, one of the greatest opportunities to increase investigative efficiencies is detecting offenders when they are on the premises, so that store teams can intervene to deter the offender (if retailers choose this approach) and so investigators can focus on those specific times, rather than looking for the proverbial needle in the haystack.

One of the solutions that can be used to detect offenders once they have been identified is facial recognition. Several retailers have adopted facial recognition to address ORC; however, there is little research on how facial recognition affects the process and outcomes of ORC investigations. This study seeks to answer this question by exploring how facial recognition makes a difference when two investigators within the same company, with similar backgrounds and investigative experience, investigate the same case but only one has access to facial recognition.

Methods

As mentioned, this study seeks to understand how facial matching affects the process, progress, and outcomes of an ORC investigation. To accomplish this, we used a case study approach, and focused on understanding how two investigators with similar backgrounds and investigative experiences investigated the case when one could use face matching and the other could not.

For this study, the investigator who was permitted to use facial recognition had 31 years of loss prevention experience, 25 years of experience in investigations, and 4 years of experience using facial matching for investigations. The unassisted investigator had 23 years of loss prevention experience, 19 years of experience in investigations, and 4 years of experience using facial matching for investigations. Finally, the investigators had similar levels of formal education and worked at the same West Coast grocer.

To accomplish this study, the LPRC established a protocol by which: (1) the case would be assigned; (2) the investigators would not be able to collaborate or communicate with each other or other members of the team about the case until the study was completed and both investigators were debriefed and interviewed; and (3) they would be required to investigate the same case for a specified period. In this case, the investigator that was permitted to use facial matching was given 3 hours and the investigator that was not permitted to use face matching was given 18 hours to work the case.

The difference in the amount of time permitted for each investigator to work the case was due to several factors. First, and most importantly, this study was an

investment by the company – the company was dedicating two investigators to the same case and the investigator was required to continue investigating, regardless of the progress of the investigation. In other words, there were clear costs to the company, and the company wanted to minimize these. Second, face matching is a key element of the retailer's investigation program; therefore, the company's leadership believed that the investigator who was assisted by face matching would progress much faster than the investigator that was not allowed to use face matching.

Identifying a Case and Initiating an Investigation

As part of the study, we asked the ORC program leader to identify an incident that was likely part of a broader organized retail crime case. As soon as a case was identified and the investigation was initiated, the "clock" would start.

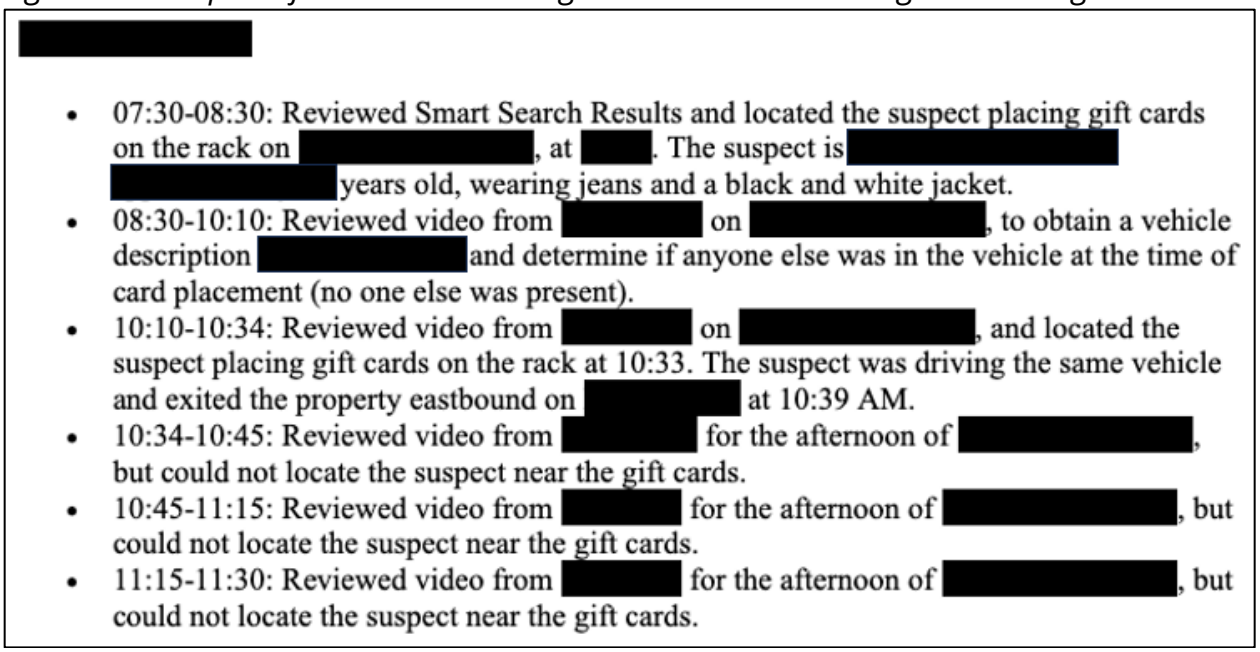
For this study, a gift card draining case was selected because leadership believed this was likely to be an ORC case. The investigation was initiated when a store manager discovered tampered gift cards at a gift card kiosk. This store manager then reached out to the district manager, and the district manager contacted the other store managers within the district, identifying tampered gift cards at 5 additional store locations. At this point, the loss prevention and investigation teams picked up the case.

Once the case was assigned to the assisted and unassisted investigators, both had to manually review video to locate the suspect in the video. The investigator who was assisted by facial matching was able to find the suspect in 35 minutes. The assisted investigator attributed his ability to find the suspect in the video to two factors: (1) the investigator was familiar with one of the stores and its video angles because he had recently worked a case involving that store; and (2) he was able to effective use AI video search features to detect interactions with the gift card kiosk. Alternatively, it took the unassisted investigator 3 hours and 30 minutes of video review and other work to locate the suspect at one of the stores.

Starting the Clock

There are two ways to approach the comparison process – either from the time both investigators started searching for the suspect, or from the time they had located the suspect on video. This study uses the latter of the two because we are focused on understanding how facial recognition affects the process and outcomes of ORC investigations. However, prior to locating the suspect on video, facial recognition has no influence on the progress of the investigation. This is why all comparisons throughout this study begin once both investigators have located the suspect on video.

Figure 1. Examples of Unassisted Investigator's Notes with Timing and Findings



- 07:30-08:30: Reviewed Smart Search Results and located the suspect placing gift cards on the rack on [redacted], at [redacted]. The suspect is [redacted] years old, wearing jeans and a black and white jacket.
- 08:30-10:10: Reviewed video from [redacted] on [redacted], to obtain a vehicle description [redacted] and determine if anyone else was in the vehicle at the time of card placement (no one else was present).
- 10:10-10:34: Reviewed video from [redacted] on [redacted], and located the suspect placing gift cards on the rack at 10:33. The suspect was driving the same vehicle and exited the property eastbound on [redacted] at 10:39 AM.
- 10:34-10:45: Reviewed video from [redacted] for the afternoon of [redacted], but could not locate the suspect near the gift cards.
- 10:45-11:15: Reviewed video from [redacted] for the afternoon of [redacted], but could not locate the suspect near the gift cards.
- 11:15-11:30: Reviewed video from [redacted] for the afternoon of [redacted], but could not locate the suspect near the gift cards.

Note: text has been redacted to protect the participating retailer's confidentiality

Findings

As mentioned previously, we asked the investigators to keep detailed notes of the investigation process, including any investigation progress they made along the way. For example, whenever they identified the suspect(s) at a location or any other information pertinent to the investigation, they were asked to include that in their notes, as well as any assets associated with the incident. In this case, the case

involved suspects who were involved in a gift card fraud – all the behavior was indicative of a gift card draining scheme; therefore, each time an incident was associated with the case, the investigator was asked to include the number and value of gift cards involved.

For the purposes of this study, stores and brands are referred to using capitalized letters (e.g., Store A, Store B, Restaurant A, Company A, etc.); Day 0 is used to refer to the date when the first incident was detected, and Day plus or minus a value is used to indicate incidents that happened before or after the initial incident, respectively. For example, "Day +1" refers to the day after the first event, and "Day -1" refers to the day immediately prior to the day of the first incident detected. Finally, in Table 1 and 2 below, all the timing in hours refers to the investigation time that elapsed from when the suspect was first located on video.

Table 1. Investigation Process: Investigator Unassisted by Facial Recognition

Timing (Hours)	Activities and Progress
00:00 – 01:40	Manually review video from STORE A for DAY 0 to obtain vehicle description (Toyota Camry) and determine whether any accomplices were involved
01:40 – 02:04	Reviewed video from STORE E for morning of DAY 0, found suspect placing gift cards, and used video to determine potential departure direction.
02:04 – 02:15	Reviewed video from STORE B for DAY 0 afternoon, but did not locate suspect in the video
02:15 – 02:45	Reviewed video for STORE F for DAY 0 afternoon, but did not locate suspect in the video
02:45 – 03:00	Reviewed video from STORE G for afternoon of DAY 0, but did not locate suspect on video
03:00 – 03:11	Returned to review footage from original locations. Reviewed video from Store D for Day 0 and found suspect placing gift cards for Retailer A, Retailer B, and Restaurant A. This enabled the investigator to establish a better timeline and begin developing a map of travel.
03:11 – 03:31	Reviewed video from STORE G for earlier on DAY 0 and found the suspect placing cards
03:31 – 03:36	Reviewed video from STORE C for morning of DAY 0, and found the suspect removing gift cards for Retailer B.

Table 1. Continued

03:36 – 04:05	Reviewed video from Store H for morning of DAY 0, and found the suspect removing gift cards
04:05 – 04:08	Reviewed video from STORE I for morning of DAY 0, found suspect placing gift cards
04:08 – 04:56	Spoke to manager at STORE G who reported RETAILER C gift card fraud, reviewed video for days prior to day 0, suspect not found
04:56 – 05:01	Video from STORE J for morning of DAY 0, located suspect removing gift cards
05:01 – 05:41	Video from STORE K (unspecified day/time), suspect not found
05:41 – 05:45	Video from STORE L for morning of DAY 0, suspect not found
05:45 – 05:50	Video from STORE K for 10:30-11:00 AM on DAY 0, suspect not found
05:50 – 05:55	Video from STORE M (unspecified day/time), suspect not found
05:55 – 06:03	Video from STORE N (time/date unspecified), suspect not found
06:03 – 06:07	Reviewed video from STORE B for morning of DAY 0; found suspect removing gift cards
06:07 – 06:11	Reviewed video from STORE F for morning of DAY 0, found suspect removing gift cards
06:11 – 06:14	Video from STORE O (time/date unspecified), suspect not found
06:14 – 06:30	Video from STORE P (time/date unspecified), suspect not found
06:30 – 06:41	Revisited video from STORE M to focus on later in the day on DAY 0 but suspect was not found on video
06:41 – 06:57	Reviewed video from STORE Q (time/date of video unspecified), but suspect not found on video
06:57 – 07:11	Reviewed video from STORE R (time/date of video unspecified), but suspect not found on video
07:11 – 07:56	Reviewed video from Store S for DAY -1 through DAY +1, but suspect was not located on video
07:56 – 08:26	Reviewed video from Store K for DAY -1 through DAY +1, but suspect was not located on video
08:26 – 08:53	Video from STORE M for DAY -1 through DAY +1, suspect not found
08:53 – 09:31	Video from STORE R for DAY -1 through DAY +1, suspect not found

Table 1. Continued

09:31 – 12:34	Video from "nearby stores" from DAY -7 through DAY +1, suspect not found
12:34 – 14:04	Video from "nearby stores" from Day -7 through DAY +1, suspect not found
14:04 – 15:04	Video from "nearby stores" from Day -7 through DAY +1, suspect not found

Table 2 provides the investigation notes for the investigator who was assisted by facial recognition. Once this investigator located the suspect on camera, he was able to quickly get an image of the suspect and conduct a federated search for the suspect in all the video the retailer had in retention. Within the first 10 minutes of having a suspect, the assisted investigator had located the suspect at 19 stores.

Table 2. Investigation Process: Investigator Assisted by Facial Recognition

Timing (Hours)	Activities and Progress
00:00 – 00:10	• Collected screenshot of suspect's face from network video • Conducted federated search (4 minutes) for prior 30 days • Suspect found at STORE B, C, D, E, F, G, H, I, J, T, U, V, W, X, Y, Z, AA, BB, CC in addition to STORE A on DAY 0, Day -22, Day -24 • Enrolled suspect in watchlist as "GIFT CARD TAMPER" suspect so the FaceFirst system would generate alerts every time the suspect was detected in the store moving forward
00:10 – 00:31	• Reviewed video around detections at 6 of 19 stores • Suspect parked at edge of parking lot; unable to obtain plate • Confirmed suspect purchased fresh sushi at STORE Y on DAY -22
00:31 – 00:33	• Emailed leadership and gift card vendor about RETAILER's gift card packaging and whether others were experiencing similar issues
00:33 – 01:13	• Reviewed video around detections at another 8 stores • Found the same vehicle and same tactic to reduce plate visibility
01:13 – 01:32	• Reviewed video from final 5 stores; never found any usable plate information nor any additional accomplices

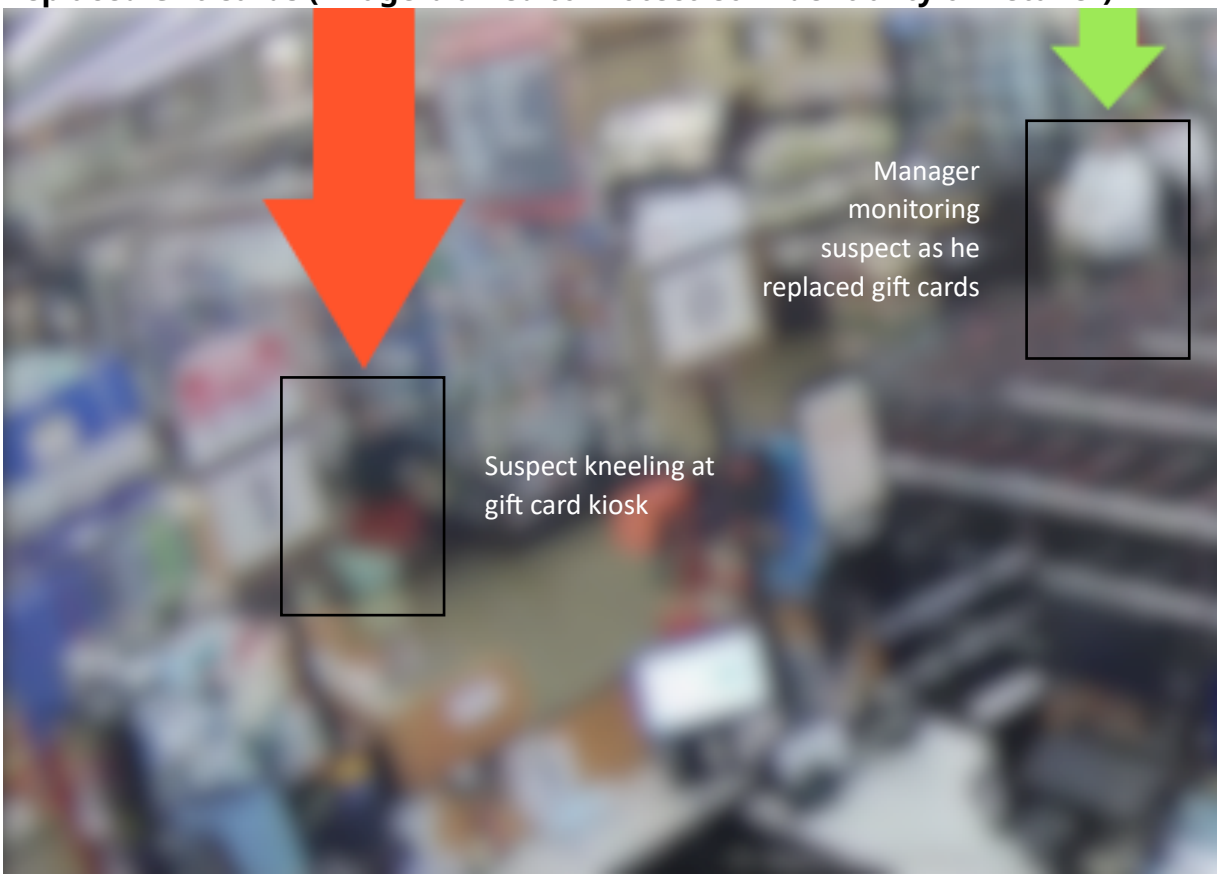
Figures 2. Detections from Retrospective FaceFirst Search

One thing that should be noted is that there were never any detections for Stores K, M, N, O, P, Q, R, S; video for all these stores was manually reviewed to determine whether they were involved, but they were not. Alternatively, in the assisted investigator's first 10 minutes, he found the suspect at all the stores the unassisted investigators found the suspect at, plus 10 other stores.

Ongoing Detections for Assisted Investigator

In addition to the detections discussed above, the FaceFirst system continued to detect the suspect when he visited stores. For example, on Day +19, the suspect was detected upon entering Store L. This is a key distinction between assisted and unassisted investigations because, at this point, real-time alerting made it possible for the store manager to monitor the suspects behavior and then capture the suspect's license plate information and the description of another vehicle. This detection also enabled the store manager to prevent additional victimization by removing the $2,200 in tampered gift cards the suspect placed on the gift card kiosk during his visit.

Figure 3. Manager (Green Arrow) Monitoring the Suspect (Red Arrow) as Suspect Replaced Gift Cards (Image blurred to Protect Confidentiality of Retailer)



However, this was not the last significant detection after the prescribed study period had ended. On Day +25, the FaceFirst system detected the suspect entering Store DD. Store DD is a store for which neither investigator had yet detected the suspect. In this store, the suspect removed and placed gift cards for two brands, The store manager was able to approach the suspect and inquire about the gift cards. The suspect complied without incident, purchased a few items and departed. The store recovered 18 gift cards from one brand and 24 gift cards from another brand. In both cases, the cards could be activated for between 25 and 500 dollars. Finally, while the suspect was in the store, the store team was able to photograph the suspect's tag and VIN number.

Comparing Investigations and Outcomes

Table 3. Investigation and Real-time Alert Outcomes

Metric	Unassisted Investigator	Assisted Investigator
Total Time Elapsed After Locating Suspect on Video	15:04 (904 minutes)	1:57 (117 minutes)
Total Case Value	$8,800	$37,475
Number of Stores with Identified Incidents	11	19
Number of Vehicles Connected to Suspect	1	2
Number of License Plates	0	2 (temporary tags)

As Table 3 shows, the assisted investigator used 12.9% of the time used by the unassisted investigator; however, the assisted investigator was able to build a case with a value 4.26 times greater (based on the face value of the gift cards involved) and located the suspect at 1.73 times the number of stores (19 as opposed to 11). Once again, the assisted investigator completed all this using 12.9% of the time (117 minutes) used by the unassisted investigator (904 minutes).

Other Learnings from the Study

There were several other things we learned during the study, especially since these two investigators worked for a company that utilizes face matching as a normal course of business for investigations. For example, both investigators are familiar with face matching, and both said that the progress made by the assisted investigator is typical for these types of cases. Both investigators also noted that camera placement, camera quality, and lighting throughout the day play an important role in the utility of face matching. For example, if the camera does not capture an appropriate view of people's faces upon entering and/or exiting, then the face matching system will not have the raw materials needed to succeed with the system.

Discussion, Conclusion, and Future Research

ORC investigations teams are faced with more cases than they can possibly investigate; therefore, they must be as efficient as possible with the cases they choose to work, and the "solvability" of a case is often a driving factor in case selection. The results from this study show that face matching can be an important and useful tool in ORC investigations, driving both the speed with which a case progresses, as well as the outcomes of investigations. Retailers interested in enhancing the efficiency of their investigations should consider technologies like face matching.

There are limitations with this study which will need to be addressed in future research. For example, this research examined how face matching affecting the process, progress, and outcomes for one case at one retailer, which limits the generalizability of the study. In other words, we need additional research involving other case types at other retailers to be able to understand the typical differences in efficiencies by case type.