

Visually Observable Behaviors Predictive of School Violence via Video Surveillance Analytics

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MTS is always striving to provide value to our customers through innovative use of video analytics and the development of policy to take advantage of those analytics. This paper discusses potential ways video analytics could be used to predict violent incidents in schools through advanced applications of video analytics.

Schools widely use CCTV: for example, 91% of U.S. public schools report security cameras on campus.¹ Today's cameras allow constant monitoring of corridors, entrances, and parking areas. School security resources and law enforcement look for (or should look for) anomalies in behavior on video – notably, students lingering without purpose, isolating themselves, hiding objects, or exhibiting odd movements are seen as potential pre-attack indicators.^{2,3} These cues have appeared in past incidents and can trigger early intervention. We believe some of these anomalies can be identified through analytics in video surveillance systems.

Some specific behavior examples include:

- *Loitering and Linger*

Loitering (suspicious lingering). A person remains in one place or walks slowly without clear purpose (especially near school exits, back doors, or parking lots). Loitering often precedes intrusion or surveillance of the campus.⁴ Video analytics define loitering as moving at noticeably slower speed or stopping repeatedly. For example, surveillance captured three teens “loitering at the campus” late at night immediately before one of them fired shots at the school’s

¹ Rhombus.com

² Citysecuritymagazine.com

³ Secretservice.gov

⁴ Citysecuritymagazine.com

entrance.⁵ Unusually long dwell times or frequent re-entering of the same area on camera (even outside school hours) should be treated as high-alert behavior.^{6,7}

- *Social Isolation and Withdrawal*

Isolation/Withdrawal. A student who separates from peers or activities (e.g. sitting alone away from classmates, skipping group events, or hiding in restrooms/stairwells) can be a warning sign. Observers have noted that many attackers showed visible sadness or loneliness, frequently “isolating themselves, withdrawing from others, appearing sad”.⁸ In practice, a student abruptly cutting off social interactions or leaving classes for no clear reason (especially if combined with poor hygiene or apathy) can signal emotional distress or secret planning.⁹ Such solitary behavior on camera – for instance, a youth loitering alone in a quiet hallway while others socialize – merits attention as a moderate-risk indicator.

- *Concealment and Hiding Objects*

Concealment of Item. Attempts to hide or obscure objects on the body or in bags can point to weapons or forbidden materials. Examples include a student tugging at a coat hem, repeatedly adjusting a backpack, or crouching to obscure something under clothing. In one documented incident, video showed a student roaming the halls and “hid in stairwells” with a rifle concealed down his pant leg.¹⁰ Cameras revealed multiple obvious cues (an oddly bulging pant leg, furtive glances) that staff had missed. Any footage of a person repeatedly covering an area of their clothing or methodically keeping hands on a pocket/waistband should trigger immediate review. Concealment behaviors (especially involving loitering in hidden spots) are considered high-risk, since they often indicate a ready weapon.¹¹

- *Abnormal Body Language and Movement*

Odd Posture or Agitation. Visible signs of agitation or readiness to fight (e.g. a “boxing” stance or bladed posture, clenched fists, hunched shoulders) are warning cues.¹² Attackers about to strike may adopt an angry defensive pose or tense up as they approach their target. Scanning and Target Glances. Another key sign is excessive looking around. If on camera someone constantly looks toward exits, peers, or security staff (a “thousand-yard stare” or rapid head

⁵ Kfoxtv.com

⁶ Citysecuritymagazine.com

⁷ Kfoxtv.com

⁸ Secretservice.gov

⁹ Secretservice.gov

¹⁰ Campussafetymagazine.com

¹¹ Campussafetymagazine.com

¹² Police1.com

turns), they may be checking for escape routes or planning a move. Law enforcement training notes that a suspect repeatedly glancing at another person’s uniform or weapon is preparing for confrontation. Footage of fast, irregular pacing (pacing loops), sudden sprints from cover, or “darting” gaze patterns are abnormal – especially when combined with other factors. These body-language clues by themselves carry moderate-to-high threat concern¹³, since they signal hostile intent.

- *Behaviors in Context*

In addition to the above, analysts watch for contextual cues on video: carrying unusual items (e.g. duffel bags, backpacks in class), accessing restricted areas without permission, or photographing security equipment can also indicate pre-offense reconnaissance. Changes from normal routine – such as a student skipping classes, abruptly wearing different clothes (like a heavy jacket in warm weather), or obsessively loitering by a locker – are noted in threat assessments. In many past cases, these visual indicators were reported by peers or caught on CCTV before an attack, underscoring their value for early detection.¹⁴

- *Improper vehicle activity*

Although not truly behavior, the use of license plate recognition in student parking lots can be beneficial. If the lot is privileged – that is the student requires to register their vehicle to obtain a parking pass – then that information can be applied to a white list. Then rules can be setup to identify vehicles not on the white list as they enter the lot, alerting school security resources to consider investigating the vehicle further.

Summary of Behaviors and Threat Levels

Behavior	Description	Threat Level
Loitering	Hanging around entrances, corridors or grounds without purpose (often moving very slowly or stopping frequently). Such lingering can signal casing or planning.	Moderate
Isolation	Separating from peers (sitting or walking alone, skipping classes, withdrawing socially).	Moderate

¹³ Police1.com

¹⁴ Secretservice.gov

Behavior	Description	Threat Level
	Appearing sad or detached on camera often accompanies this.	
Concealment	Hiding objects or obscuring parts of the body (e.g. adjusting clothes, bulging pockets, carrying items in hidden spots). Concealed weapons or materials are a high-risk sign.	High
Abnormal Posture	Unusual body language (clenched fists, hunched or side-on stance, rapid directional glances) Frequent scanning of halls or staring at others/objects betrays intent.	High

Each behavior above is grounded in research and case studies (cited). In practice, security personnel and threat assessment teams use these observable cues – often in combination – to flag individuals for further evaluation. Early recognition and reporting of loitering, isolation, concealment, or odd movement patterns on video can provide a crucial “left of bang” warning before violence occurs.

We believe video surveillance analytics can be “trained” to help identify the behaviors described here in this paper. Through early detection of these traits or anomalies, school security resources could potentially be alerted *prior* to an incident happening and intervene preventing the incident from happening. We at MTS are working with video analytic developers to explore the development of learning algorithms that could identify this type of predictable behavior.

Disclaimer: The information presented in this paper is derived from the author’s research and reasoned analysis, and should not be interpreted as definitive or absolute fact.

Sources: Empirical studies and official reports on school and active-shooter cases; law enforcement training guides; and documented incident analyses.