Navigating in Time with VCIS: A Dynamic Approach for Investigation, Prediction, and Pattern Drawing

Our lives, the work we do and the world we live in all move forward through time. Problems we face also happen forward through time. But the investigation of a problem builds backward through time. ***Why is that?*** A crime, production outage or equipment failure is the last domino to fall in the chain of events. Those negative consequences are the end of the problem, and the starting point for the investigation. The details of how a crime occurred are found by reversing and analyzing the chain of events.

VCIS offers dynamic timeless insights, a comprehensive analysis unveiling past, present and Future Perspectives.

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Introduction

In recent years, the world has witnessed a significant increase in data generation and availability from various sources such as geospatial data, Call Detail Records (CDR), Software Development Kits (SDK), and more. This wealth of data has presented an opportunity for leveraging a dynamic approach to navigate in time, both backward and forward, to solve investigations, predict criminal events or crowd movements, and draw digital patterns for devices. This concept forms the core of Valoores Crowd Intelligence system, going beyond being just a tool, and offering a high level of maturity in the analysis process. An investigation, also known as an analysis, breaks a problem down into its parts. Those parts can be organized in different ways. One way is using a chronology or timeline.

The timeline is also called a sequence of events. It is a convenient way to organize the details of an issue. Every piece of information from the incident is put in chronological order.

In the ever-evolving landscape of security and intelligence, the dynamic Crowd Intelligence system emerges as a game-changer. By seamlessly navigating through time, both backward and forward, this sophisticated system leverages vast amounts of data to unveil hidden links, relationships, and connections between devices, places, and events in the past. Armed with this knowledge, the system can predict future events and criminal attacks, making it a formidable tool in enhancing public safety and security.

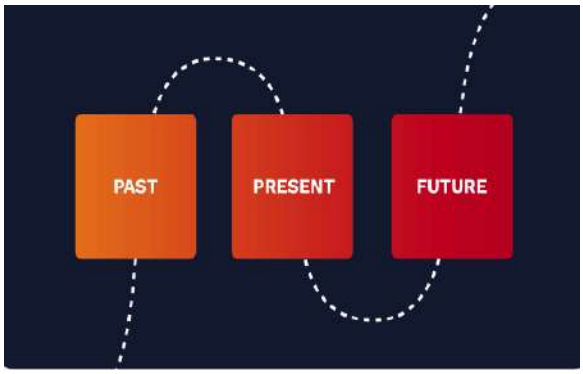
Dynamic Time Navigation for Insights

The essence of Valoores Crowd Intelligence system lies in its dynamic approach to time navigation. By venturing into the past, the system uncovers a treasure trove of patterns and links that might remain concealed in real-time analysis. As the system travels further back in time, it gains a comprehensive understanding of historical events and their implications, enabling law enforcement agencies and intelligence organizations to discern crucial connections and motives that contribute to present-day situations.

Navigating in time as a dynamic approach, backed by a multitude of data sources, is the driving force behind the Crowd Intelligence system's capabilities. This approach empowers investigators to solve complex cases, predict future events, and draw patterns for devices, enhancing public safety and security. By fragmenting time frames, identifying co-traveler patterns, predicting device locations, and offering both backward insights and forward predictions, the system reaches a high level of maturity in the analysis process, making it an indispensable tool for law enforcement agencies and intelligence organizations.

PPF Concept

The PPF concept lies at the heart of the Crowd Intelligence system. It represents a holistic approach to intelligence gathering and analysis:



Past: Delving into the past enables the system to unveil historical connections, incidents, and patterns. By scrutinizing past events and their outcomes, the system uncovers essential information that forms the foundation for present and future insights.

Present: The present serves as the starting point for real-time analysis and understanding ongoing events. VCIS continuously collects and processes data from various sources, providing law enforcement with up-to-date information to address immediate threats and challenges.

Future: Armed with the insights gained from the past and present, the Crowd Intelligence system ventures into the future to predict potential scenarios and events. By identifying emerging trends and patterns, the system equips authorities with the ability to take proactive actions and mitigate future risks effectively.

Timeframes Fragmentation

Time frames in VCIS are not static but fragmented into smaller, more manageable segments. This fragmentation allows for a granular analysis of events and patterns, enabling investigators to focus on specific periods of interest and handle the vast amount of data and make sense of complex historical relationships. By dividing time frames into smaller chunks, the system can effectively analyze and correlate data across different intervals, revealing hidden insights and trends that might not be apparent when considering larger time windows alone.

Predictive Power

Armed with the insights from the past, and the dynamic approach of navigating backward and forward in time the Crowd Intelligence system gains predictive capabilities that transcend traditional intelligence gathering by analyzing historical geospatial data, CDRs, and other relevant sources. By identifying patterns and relationships between historical events and criminal activities, the system can forecast future events or potential criminal attacks and can model the movement patterns of devices and individuals. This predictive capability proves valuable in search and rescue missions, tracking stolen devices, and even monitoring the movements of potential suspects. It empowers authorities to take proactive measures, thwarting threats before they materialize and safeguarding communities from harm.

Co-Traveler Pattern

The Crowd Intelligence system's capability to navigate through time empowers it to identify co-traveler patterns. This refers to the detection of individuals or devices that frequently appear together in space and time, indicating potential connections or relationships. Such patterns can be critical in criminal investigations, helping law enforcement agencies track and apprehend organized groups or accomplices.

Backward Navigation for Insights

Navigating backward in time allows the Crowd Intelligence system to explore the history of events leading up to a particular incident or situation. This process can uncover crucial details that might have been missed in real-time analysis. By understanding the context and factors that contributed to a particular event, investigators can make more informed decisions and gain deeper insights into the case at hand.

Forward Navigation for Predictions

On the other hand, navigating forward in time empowers the Crowd Intelligence system to predict future events, movements, and patterns. By leveraging historical data and applying advanced predictive algorithms, the system can anticipate potential criminal activities or crowd movements, enabling proactive interventions and preventive measures. This predictive aspect of the system enhances its effectiveness in enhancing public safety and security.

High Level of Maturity in Analysis Process

VCIS is characterized by a high level of maturity in its analysis process. This maturity stems from the integration of multiple sources of data, such as geospatial information, CDRs, SDK data, social media data, and more. By synthesizing these diverse datasets, the system can offer comprehensive and multidimensional insights, improving the

accuracy and reliability of its conclusions.

Counter Terrorism

Conspiracies do not frequently become known to law enforcement agencies until after the completion of the act or other arrests are made. Consequently, non-overt acts of conspiracies, such as meetings and phone calls, may not come to the attention of local law enforcement agencies. However, three-fourths of these crimes involved "observable" offenses which might lead the police to suspicion of more sinister activities.

“pre-incident indicators”

How long does it typically take for a terrorism group to go from formation to executing a terrorism incident? What role does the timing of planning and preparatory acts play in this temporal relationship? Additionally, how close do terrorism groups live to their targets and what is the spatial relationship between their residences, planning locations, preparatory activities, and the location of incidents?

To answer these questions, we selected terrorist incidents and groups operating within a specific region of interest, including international and three types of domestic terrorism: left-wing, right-wing, and single issue. We used court case data, which provides a robust record of dates and locations of supposed criminal activity, as well as information from law enforcement authorities and subject matter experts. We selected 54 cases for analysis, including 19 right-wing, 7 left-wing, 8 international, and 16 single issue cases, resulting in information on some 180 terrorist incidents. We created a relational database with 265 variables, including geospatial data on terrorists' residences, planning locations, preparatory activities, and target locations.

Preparatory conduct included criminal and noncriminal activity, such as meetings, phone calls, supply and material purchases, and banking activities. On average, terrorist groups engaged in 2.3 known behaviors per incident. We ran different types of queries to identify basic patterns of preparatory conduct.

By analyzing this data, we aim to better understand the temporal and spatial relationships between terrorist group formation, preparatory activities, and the execution of terrorism incidents.

Temporal Patterns

On average, the terrorist cells held their first planning meetings slightly over three months before committing the

studied terrorist incidents. The lifespan of these "cells" varied from a few weeks to over three years. The initial "planning phase" typically lasted between twelve days and two months, offering law enforcement agencies the highest probability of successful intervention. It's important to note that planning and preparatory activities cannot be temporally separated as they often overlap. Meetings, training, preparation, and procurement of materials for terrorist incidents are not sequential activities. Notably, there was significant variation among different types of terrorist groups (e.g., single-issue, international) in terms of the duration of their planning and preparatory activities. The analysis suggests that the planning process for terrorist incidents typically lasts for a relatively short period of three to four months prior to the commission of the incident. During this period, planning and preparation occur concurrently and often involve surveillance and meetings. Known preparatory behaviors generally conclude three to six weeks prior to the incident, followed by a lull in activity leading up to the date of the incident. Understanding the spatial relationship between where preparatory acts occur and the location of the terrorist's residence and target location is crucial in identifying potential pre-incident indicators for local law enforcement agencies.

Conclusion

The dynamic Crowd Intelligence system represents a groundbreaking advancement in the realm of security and intelligence. Its ability to navigate through time, exploring the past and predicting the future, is a testament to its immense potential. By drawing links and relationships between devices, system offers invaluable insights into present-day situations, while its predictive capabilities enable proactive measures to secure communities from potential threats. With time frame fragmentation and the PPF concept guiding its approach, the Crowd