



IS MY CRIME ANALYTICS SOFTWARE PREDICTIVE?

A GUIDE TO FINDING THE RIGHT PREDICTIVE SOFTWARE

As law enforcement budgets have decreased or remained flat, the challenge to continue the downward trend in crime rates remains despite such budgetary constraints. Recent research shows that 49% of agencies expect their 2014 budget to remain flat¹. The outstanding question many police chiefs and sheriffs are still grappling to answer is, **“How can my agency be more effective with less budget, less headcount, or less resources?”**

The question of how to be more efficient with less is a challenge that has been faced by other industries - ranging from retail sales to music streaming and healthcare - and one of the common answers has been **predictive analytics**.

Predictive analytics uses advanced mathematical modeling to help predict future behavior and is successfully utilized by many organizations to more effectively limit operating costs, predict traffic flow, or even map disease across geography. Today's law enforcement agencies are eager to understand how predictive analytics can be used to successfully prevent and reduce crime, and whether “big data” analysis can help their agencies prevent and reduce crime within the constraints of existing resources.

As with any new concept, the term predictive analytics has been vague when applied to crime analysis and prevention. Many agencies are uncertain as to what it is and which software, including their existing analysis tools, are truly “predictive” and able to help them maximize their efficiency at preventing crime. This white paper is designed to help you understand what predictive analytics is and isn't and how to choose and deploy the right solution for you.



PREDICTIVE ANALYTICS AND PREDICTIVE POLICING – THERE IS A DIFFERENCE

The Merriam-Webster Dictionary defines a prediction as

1. A statement about what will happen or might happen in the future, 2. the act of saying what will happen.

On the surface, this is straightforward. But, some confusion exists as to what predictive analytics is and in particular if it is the same thing as predictive policing. When considering the National Institute of Justice (NIJ) definition of Predictive Policing, it's easy to see why:

“Predictive policing refers to any policing strategy or tactic that develops and uses information and advanced analysis to inform forward-thinking crime prevention.”

By this definition, predictive policing is a concept that includes policies, strategies or tactics, and almost anything else, including:

- A strategic approach or initiative like Intelligence-Led Policing
- A policy such as Community Oriented Policing or Problem Oriented Policing
- An analysis tool such as hot spot or linear trending analysis

These initiatives and tools are beneficial and can help agencies with “forwardthinking crime prevention.” But typically they do no more than summarize and present what has happened up to that point. Often, these tools and

initiatives require additional resources, including personnel, to accomplish their objectives, making it difficult for agencies to adopt and use them.

Predictive analytics, by contrast, combines two tangible concepts: **prediction** (a forecast) and **analytics** (advanced mathematical statistical algorithms). Therefore we've adopted the following working definition:

“Predictive analytics refers to the use of computer-based statistical tools to analyze crime data and criminal behavior to create a forecast of the future probability of crime that is specific, timely, and actionable.”

It is important to note that predictive analysis is not a summary of past data or reporting of what has happened to date. It is a forecast of future crime, including where and when crime is likely to occur so that it is actionable. This means the forecast includes:

- Where (Area-Specific)
- When (Day and Shift-specific)
- Additional data (such as types of crimes) to empower officers to take action

In addition, because predictive analytics uses computer-generated statistical analysis to learn and analyze data over long periods of time, an important by-product is that it creates actionable outcomes without a heavy investment in extra personnel, dedicated analyst time or other significant resources.

IS MY CURRENT CRIME ANALYTICS SOFTWARE PREDICTIVE?

Many agencies wonder whether software they currently use or are evaluating delivers predictive analytics. Given the confusion around tools that support predictive policing vs. predictive analytics, this is a legitimate question. The following may help clarify what predictive analytics does and doesn't do:

TRUE PREDICTIVE ANALYTICS

DOES

- Provide specific, actionable future crime predictions
 - Where (Area-Specific)
 - When (Day and Shift-specific)
- Deliver information in a timely manner
- Use sophisticated data and analysis that:
 - Takes into account both short term and long term data
 - Goes beyond what is immediately apparent or calculable

DOES

- Simply generalize, summarize or report on past information
- Overgeneralize or expand area size to make the analysis unusable
- Ignore specific timeframes, such as day and shift, to make it un-actionable
- Look only at short-term, immediate data or trends
- Require extensive personnel resources to calculate the forecast

Currently there are many tools being marketed as predictive- because they support predictive policing, but which do not have the attributes of predictive analytics: providing crime forecasts that are specific, timely, and actionable. Examples of these pseudo-predictive tools include: time series and trend line analysis, “predictive zone” and “look ahead hotspots,” textual searching and linking of key works, and simplistic geospatial/temporal models. While these tools are helpful in crime analysis, they often simply summarize or report on historical data or lack the statistical rigor to provide accurate analysis.

Examples of typical crime analytics tools and why they don’t qualify as predictive analytics:

FEATURES SUPPORTED						
	Specific Location	Specific Time	Factors in short and long term data	Exposes underlying data	Deliverable in timely manner	Provides actionable underlying
TRUE PREDICTIVE ANALYTICS	YES	YES	YES	YES	YES	YES
TYPICAL NON-PREDICTIVE CRIME ANALYTIC TOOLS						
TIME SERIES	YES	NO	YES	NO	NO	NO
TREND LINES	YES	NO	YES	NO	NO	NO
HOT SPOTS	YES	NO	NO	NO	NO	NO
TEXTUAL SEARCHING AND LINKING	YES	NO	NO	NO	NO	YES
SIMPLISTIC GEOSPATIAL/ TEMPORAL MODELS	YES	NO	NO	NO	YES	NO

Predictive analytics can provide significant benefits to an agency in their crime reduction efforts by providing information that is specific enough to take targeted action. To demonstrate this, a test was conducted by Motorola Solutions to analyze the effectiveness of common hotspot analysis vs. true predictive analytics, conducted over almost 90 days, found that true predictive analytics was 2.7 times more accurate in predicting crime the next day vs. a hotspot summary of recently committed crime. This level of accuracy means that officers can be assigned to the right place at the right time to disrupt and prevent crime before it occurs.

IN SEARCH OF PREDICTION: WHAT TO ASK WHEN EVALUATING SOFTWARE

Predictive analytics can be a powerfully effective tool for any agency to accurately predict and prevent crime. However, it is critical that the solution you choose includes essential features to make it the most effective. The following questions may help in determining whether a solution truly uses predictive analytics and if the solution is right for your agency.

QUESTIONS	ANSWERS
Does the solution automatically create predictions or does an analyst have to manipulate the data?	Automatically generated predictions provide the force multiplier for an agency to create accurate forecasts on a regular basis without additional headcount requirements.
Does it create forward-looking predictions based on area, day, time (broken into shifts), and crime types?	In order for predictions to be actionable, they must include specific data. Summaries, trend lines, and hotspots are not specific enough to be actionable on a shift-by-shift basis.

QUESTIONS	ANSWERS
Does it use an ensembled prediction engine?	An ensembled prediction engine uses multiple individual models to create predictions. Previous studies have shown ensembled models to be up to 30% more accurate than single-model based predictions.
Does it clearly delineate the target areas of focus to make it actionable?	Hotspots and other crime summary tools vary in shape and size. Prediction boxes provide an accurate, targeted focus for a clearly defined area.
Does it prioritize areas into tiers to facilitate focus?	Not all predictions are of equal probability. Using prediction tiers or ratings helps officers to prioritize their focus.
Does it base predictions off of long-term and short-term data?	Pseudo predictive tools often base output on a short period of historical data or even a single event. More accurate models use longer periods of historical data to forecast crime and criminal behavior.
Does it automate the delivery of predictions to officers?	Predictive analytics are not useful if the officers never log in to receive the predictions. Find a solution that delivers predictions in a way that makes them easy to deploy and use.
Does it provide additional data beyond the predictions to make it actionable?	True predictive analytics go beyond delivery of a prediction, providing officers with the underlying data – like previous crimes in an area and the police reports associated with those crimes - to help them decide the best course of action in any given area.

BENEFITS OF PREDICTIVE ANALYTICS: CRIME PREVENTION

Once the meaning of predictive analytics is clarified, it is easy to see the value of true predictive analytics in providing timely, accurate, and actionable information on future crime. The ability to actively predict and proactively prevent crimes will result in:

- Lower crimes for targeted incidents and areas
- Cost savings by reducing reaction time and response to crime
- A safer and more confident community
- Better utilization of officers, analysts, and resources

The Predictive Analysis Feature Pack with CommandCentral Analytics uses agency RMS data to learn long- and short-term crime patterns and generate timely and actionable crime

predictions, helping you to reduce crime. Key features of the Predictive Analysis Feature Pack include:

- Crime-Type Definable Predictions
- Targeted Area Prediction Tiering
- Geospatial And Narrative-Based Prediction Context

Today's agencies require strategies and solutions that help them to maximize their efforts while living within the constraints of their budget and headcount limitations. Predictive analytics is a key part of that strategy.

For more information on predictive analytics, visit www.motorolasolutions.com/analytics

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