Magna Data

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For police trying to piece together the circumstances of a crime, every little bit of information counts. When connections between those bits aren't obvious, investigators may spend weeks chasing potential leads, only to come up with nothing.

In some cases, information analysis tools help investigators pick out aberrant activities – for example, producing a list of people who make unusually large cash deposits about the time of a contract murder. Yet most of these tools fall short: with roots in scientific or business-focused analysis, they're designed to answer specific questions well – but if they don't know what they're looking for it's highly unlikely they will stumble upon it.

In other words, they can tell you that a suspect called a certain number from his mobile phone many times, but may not realise the number belongs to a house around the corner from the victim's own home, from where an accomplice was perhaps reporting on the victim's movements. Such correlations may be critical in cracking a mystery, but finding them takes human intuition.

Years ago, John Galloway set out to change all that. Convinced there was more to be gleaned from large sets of data than conventional tools were telling, the adjunct professor of business at the University of Technology, Sydney and chief scientist with Sydney company NetMap Analytics built his PhD around the development of open-ended analysis techniques able to spot relationships that conventional methods couldn't.

It was Galloway's contention that the parameters applied to conventional data analysis necessarily excluded potentially important variables. Their exclusion could make hidden patterns in human behaviour virtually impossible to spot – but it is these correlations that often solve a puzzle. Galloway's research evolved into NetMap, an application that's built NetMap Analytics into a successful supplier of specialised data analysis tools.

NetMap starts a job with no preconceived notions about what it's going to find. It weighs up the relationships between various data sets – for example, phone numbers, addresses and locations of evidence. By visually charting these relationships as lines linking points along the perimeter of a circle, NetMap portrays the relative strengths of relationships and allows investigators to focus their efforts where the strongest links exist.

"Any behaviour that people undertake, as long as it's recorded in a database somewhere, can be analysed for the patterns involved," Galloway says. "If you apply traditional analytical methods, normally you come up with an exception report – [a list of data] outside the rules. But usually you don't know what the rules should be in the first place. Because we don't have parameters, your mind can visually spot strange or unusual patterns that you can't write a rule for."

The Australian Securities and Investments Commission used data correlation in its pursuit of Macquarie Bank executive director Simon Hannes, who made a $2m profit through insider trading on TNT call options in 1996. Investigators fed data into NetMap, then repeated analysis whittled an initial list of 160,000 people down to a short list of just 65 suspects. Further queries reduced this to 17, then two, and finally the software fingered Hannes as the culprit.

The technology was also used to catch backpacker murderer Ivan Milat. Police fed NetMap six data sets of evidence. Starting with everyone in Australia as possible perpetrators, the software narrowed down the possibilities, ultimately closing in on the suspect.

Given its success rate, data mapping seems destined to join fingerprinting, DNA analysis and plain old common sense as indispensable forensic weapons.

“If you look at forensic science worldwide, everyone’s in agreement that being able to crossmatch evidence across different cases is definitely the way to go,” says Chris Lennard, director of operation support for forensic services with the Australian Federal Police. “[The idea is] to try to extract as much intelligence as you can.”