Chapter 11
Beyond Surface Relations: Using Maltego Radium® to Analyze Electronic Connectivity and Hidden Ties in the Internet Understructure

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ABSTRACT

On the surface spaces of the WWW and Internet, organizations and individuals have long created a public face to emphasize their respective brands, showcase their credibility, and interact with others in often very public ways. These surface spaces include Websites, social media platforms, virtual worlds, interactive game spaces, content sharing sites, social networking sites, microblogging sites, wikis, blogs (Web logs), collaborative work sites, and email systems. Beneath the glittering surfaces are electronic understructures, which enable the mapping of networks (based on physical location or organization or URL), the tracking of inter-personal relationships between various accounts, the geolocation of various electronic data to the analog physical world, the de-anonymizing of aliases (to disallow pseudonymity), and the tracking of people to their contact information (digital and physical). Maltego Radium is a penetration testing tool that enables such crawls of publicly available information or Open-Source Intelligence (OSINT) to identify and describe electronic network structures for a range of applications. Further, this information is represented in a number of interactive node-link diagrams in both 2D and 3D for further insights. There is also an export capability for full reportage of the extracted information. This chapter introduces the tool and identifies some practical ways this has been used to “package” fresh understandings for enhanced awareness and decision-making in a higher education context.

INTRODUCTION

Like the stitching on the back of a piece of embroidery, the understructure of electronic spaces, interrelationships between accounts, and other types of electronic information show something about the embroiderer, his or her interests, his or her skill sets, and his or her influences—in a way that complements surface information. The understructure presents insights on the patterning of interrelationships; it may suggest other threads to follow in learning more about the entities online. The understructure then offers yet another layer of publicly available information, all sent “in the clear,” to help people understand, analyze, and make decisions. In game theory, in
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asymmetric information situations, not knowing is a “dominated strategy.” There are no benefits to maintaining blind spots, particularly if the information is fairly easily available.

For example, an emergent network may be analyzed by conducting a hashtag search of a particular trending topic on a microblogging site to find out who (which accounts) is busy Tweeting about this issue. To understand an individual on Facebook, it may help to extract the data of his or her social network to better understand the depth of inter-relationships. To probe an organization with a strong online presence, it may help to map its network to find out where it is situated, who some of its main staff are (and their contact information), and its basic network structure.

The art of studying this electronic understructure involves the analysis of trace and other data in order to extrapolate details and draw some initial conclusions about interrelationships and network structures. Electronic spaces offer empirical *in vivo* (in-field or “in the body”) relational information (based on actual links, actual connections, and actual relationships based on electronic documentation) that is behavior- and action-based and not hypothetical or professed details only. These are often considered self-organizing networks that just emerged from interested parties; others are formal creations that are curated and maintained by leaders. In a sense, this information is about “light leakage” or “behavior leakage,” the unintended release of information that is a byproduct of common (and even unthinking) interactions. The concept here is that any communication reveals something about the communicator especially for astute observers. Finally, another assumption of this approach is the “cyber-physical confluence,” the space where the cyber and the real intersect (Arnaboldi, Guazzini, & Passarella, 2013, p. 1). This concept suggests that there is some connectivity between cyberspace and the physical world.

Some research has borne out that more than half of profiles in social networking sites align with real-world features of individuals, and digital information on the Social Web is often credible (Rowe, 2010). Other researchers have probed microbloggers’ and bloggers’ psychological profiles and personalities based on the contents of their messages. What individuals do and do not disclose about themselves may also be revelatory—by inference. Chen (2013) found that extroversion was a key personality trait in those who self-revealed on social networking sites.

Further, online engagements with others have had salutary psychological and social benefits: “Intensity of Facebook use in year one strongly predicted bridging social capital outcomes in year two, even after controlling for measures of self-esteem and satisfaction with life,” observe Steinfield, Ellison, and Lampe (2008, p. 434). These researchers observe that students with lower self-esteem may be empowered to form and interact in the “large, heterogeneous networks that are sources of bridging social capital” (2008, p. 434). Other researchers found positive effects of social networking on college students learning:

> **Online social networking not only directly influences university students’ learning outcomes, but also helps the students attain social acceptance from others and adapt to university culture, both of which play prominent roles in improving their learning outcomes** (Yu, Tian, Vogel, & Kwok, 2010, p. 1494).

Other researchers have found that learners who are more central to a network tend to be more likely to ask for help and to be targeted by peers in their help-seeking; further, more central students in a social network tend to “have better learning achievement” (Lin & Lai, 2013, p. 40). Researchers have been focusing on the post-adoption usage of the social networking sites (SNSes) by learners for continuing benefits and potential future connections with professional colleagues.

People’s sense of self is reliant in part on their social identities. In-group and out-group dynamics may have an impact on how various individuals