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Link analysis software intelligence

Colleen McCue, of Data Mining and Predictive Analysis (Second Edition), 2015Link analytics tools can be used to identify relationships in data. With a limited number of observations, you can even manually make association masters and link charts. As the number of observations increases, automated methods are usually required. These tools can be relatively cheap and can represent the economics of entering data mining. Given this particular benefit, many public security agencies are already using some kind of link analysis tool to analyse their data. There are some limitations to link analysis; However, domain expertise and a good understanding of the concept of connection analysis can help the analyst to interpret the results. Some common pitfalls related to the analysis of links and their legal actions are described in Chapter 3.David Loshin, Abie Reifer, in the use of information to develop the culture of centricity customers, 2013Link analysis is the process of finding links between different entities, such as connecting customers with other customers or customer with products. The link analysis not only establishes a link, but also information on how other variables or attributes can be used to define the type of connection and its strength. In particular, the analysis of links is crucial for mapping and understanding the as discussed in Chapter 5, Looking at various types of relationship and issues, for example:•Closely related customer groups.•Collections of individuals associated with a particular attribute, such as location, purchased products, or other demographic welding.•The speed at which communication flows through a social network.•Which customers are known to have a particular expansion for the use of products.•Which customers have a significant impact on the widest. collection of individuals. Dr. Robert Nisbet... Ken Yale D.D.S., J.D., in the Statistical Analysis and Data Mining Applications (Second Edition), 2018Link analysis provides information about the power of association rules or sequence rules. When they get out, the rules about links or the sequence of items, such as appearing in the transaction database, can be extremely useful for many applications. Apparently, knowing purchase patterns in the direct marketing of special offers can help with real or ready customers (i.e. those who are most likely to purchase certain items according to the rules according to their observed past consumption patterns). However, transaction databases occur in many areas of business, such as banking. In fact, the term link analysis is often used when these techniques are used to extract consecutive or non-compliant association rules to organize complex evidence. It's easy to see how transactions or shopping cart it can be used for cases where individuals participate in certain actions, open accounts, contacts with other specific individuals and so on. The use of the technologies described here for such databases can quickly extract patterns and links between individuals and actions and, for example, reveal the patterns and structure of a secret illegal network. David Loshin, in Business Intelligence (Second Edition), 2013Link analysis is a process of finding and establishing links between entities within a data set, as well as a characteristic of the weight associated with any connection between the two entities. Some examples include analysing records of phone call details to examine connections established at the start of a connection on one phone number to another phone number, determining whether two individuals are connected via social network, or the degree to which similar passengers choose to travel on a particular flight. Not only does this form a link between a pair of entities, but we can use other variables or attributes to define that link. For phone connectivity, some cases include the frequency of calls, the duration of calls, or the times at which these calls are made. Link analysis is useful for analytical applications that rely on graph theory for reasoning. One example is looking for a close-knit group of people. In other words, are there collections of people who are connected together, where the connection between any couple within this set is as strong as the connection between any other couple? The answer to this question could reveal information about the existence of illegal drug rings or perhaps a collection of people who can have a profound impact on each other. Another analysis area for which connection analysis is useful is process optimization. An example may be assessing the allocation of aircraft and pilots (who are trained to fly with certain types of aircraft) on a number of routes carried by an airline. Each flight represents a link within a large graph, and the assignment of pilots to aircraft is guided by the aim of reducing the time of the time of the time and the additional travel time required for the flight crew, as well as any external regulations related to the time the crew can be in the air. The third use is in assessing the viral impact of individuals within the social network. One participant may not necessarily take direct account of a significant number of product purchases, but its recommendation may be followed by a number of individuals within its influential sphere. Brett Shavers, John Bair, in Hiding Behind the Keyboard, 2016Link analysis and social network analysis are methods for visualizing massive amounts of data to search for certain types of information, such as key persons, phone numbers, patterns and events. You can perform link analysis manually using spreadsheets or software designed to organisation of data into something important and easy to understand. One of the more comprehensive analytical tools is IBM's i2 Analyst's Notebook (. I2 Notebook Analyst is a data visualization software application designed to display huge amounts of data using an analytic chart of connections, graphs, and different displays. The open source option for i2 Analyst Notebook for visualization is NodeXL (. NodeXL is used to graphically record network data in Microsoft Excel with built-in links to multiple social networks, including Twitter, Flickr, and more. Figure 10.2 shows one example of the Twitter graph network (World Heritage) using nodeXL.Figure 10.2. nodeXL (. Regardless of the tool used, the goal is to identify links, conversations, events, and patterns. In many cases, data graphing is visually required to separate data into individual impressions. Social media accounts and phone calls can quickly turn a graph into an incomprehensible display of lines and numbers. Connections can also differ drastically between communication methods used for combined visual inecoris. It is better to create visual impressions that make it easier to represent a particular way of communicating (for example) or displaying associations. Communications metadata is the preferred primary data set in these types of visualization over content, because it is sometimes easier to determine key contact points through metadata when data sets are large. The main concept of visualization of communications is determining who contacts whom, how often, when and how long When several communication methods are detected, it is reasonable to assume that each device and method is used for communication, as well as that any conversation on any device or method is not a perfect conversation. For example, Figure 10.3 shows Alice with three email accounts, one phone and one chat account. Bob is shown with one chat account, one group chat and three mobile phones. Of these, communications were discovered through two chat accounts, two email accounts and two cell phones. You can continue your conversation with your mobile phone later in a chat or email. You can also continue the conversation face-to-face or other unknown means. It is a collection of as many communication devices and channels as possible to help bridge the whole conversations. Figure 10.3. Electronic means of communication. Although Figure 10.3 is a simple representation, it shows that one person may have several different types of electronic communication with other suspects in an easy way. Simple visualizations also transmit information in a way that is easier to decipher. When comparing Figure 10.2 with Figure 10.3, Figure 10.2 visual displays a huge amount of information that can create visual inflatability or overload of information, where Figure 10.3 takes one important element out of a number of elements and creates an easier understanding of the visual. With several key elements (phone calls, emails, and so on), many individual key visual elements will be useful for displaying large images as well as smaller but equally important key elements. The creation of visually specific incoming and outgoing phone calls is visible in Fig. 10.4. In this case, John Q is a focused suspect in the visual, but he may or may not be the primary suspect. However, the total number of incoming and outgoing calls by number is easily visible in visual display. When multiple phones are used by multiple suspects, this type of visual requires a separate chart for each phone for each person, which will quickly overwhelm the predicted effect of using visual assistance. Figure 10.4. Visual analysis of the phone. Keep in mind that certain types of communication, such as mobile phones, are discarded and often replaced with new devices, each turning to different suspects to barrier communications. Some content may also be encrypted and offline, but metadata (dates, times, length, and so on) will be available through call details, billing history, and physical device analysis. When suspects often change cell phones, they effectively visually combine all the mobile phones of all suspects to display the total number of calls between persons without the need to show each particular phone number used. Figure 10.5 shows an example of an example of an illustration of phone calls between a key suspect based on a person rather than a device used. This type of vision eliminates the confusion seen in Pictures 10.4, when multiple phones are used by more than one person. Figure 10.5. Visual analysis of the phone. Jeremy Faircloth, in Penetration Tester's Open Source Toolkit (Fourth Edition), 2017Link analysis is a way to automate web surfing to save us time. Based on all dns domains that have a website (www.fake-inc.com), we use web crawlers and search engines to rent all HTTP links to and from this site online. The connection, either to the starting location or from the starting point, forms a pair, and the analysis of the most exuding couples will often reveal something about real-world relationships with different domain names. Full studies on the subject are available online, as well as one or two freeware or open source tools trying to help automate analysis. We will search some of these tools later in this chapter. These tools typically use some form of statistical balancing algorithm to count down which websites have the strongest relationships with the target site. The reason is obvious that if there is a strong connection between the two parties in the digital world, there may be a strong both organisations in physical physical Exiting this type of analysis is a list of additional domain names that have a statistically strong connection to your target and on which you can perform additional reconnaissance. However, you should bear in mind that automating this type of analysis is not completely foolish. As a good example, many news outlets such as fark.com or gizmodo.com back to the original news feed. This could be anything from a small-site website to major news outlets like CNN or MSNBC. Even major news outlets will occasionally have links back to news outlets that refer to some of the more unusual stories they've captured, building a strong connection between news coverage and big news. This would statistically show that there is a strong link between websites and thus potentially businesses, in which case this would be an inaccurate assumption. Bhaskar Mukherjee, of Scholarly Communication and Library and Information Services, 2010Convidably, analysis of web links was the premise as the successor to citation analysis. It was later observed that the website could be linked (inlinks) from different websites or different web content. Links can come from journal articles, conference articles, research reports, etc., as well as personal websites of authors, web lifesas and simply from a website. In terms of citation analysis, it is not fair to consider all such links to measure the impact of learning. It is therefore necessary to compare links for formal reasons for inlinks for informal reasons. Google and AltaVista are two widely used web link monitoring tools. However, the newly emerged Google Scholar mostly extracts online quotes from scientific sources rather than fewer scholars of sources. As mentioned on the Google:Google Scholar website, it has increased the global visibility and accessibility of [content]. [They] work with scientific information publishers to index peer-reviewed documents, tes, preprints, abstracts and technical reports from all research disciplines and make them search on Google Scholar.In Google Scholar.In add-on, Google Scholar's Cited by, Group of or Related sites are currently widely used for statistical analysis of web results. Colleen McCue, in Data Mining and Predictive Analysis , 2015Uneven distribution may also create errors in the interpretation of the results of the link analysis that is addressed in Chapter 3. In short, link analysis can be a great way to show relationships between individuals, entities, events, or almost any variable that could be considered in crime and intelligence analysis. Some new software tools are particularly valuable because actual photos of individuals or interest items can be inserted directly into the chart, which results in visually strong visualizations charts, associations, or events. However, the analysis of links is often used in an effort to highlight the relative strength of relationships. For example, if Bob calls Joe 15 times, but Joe calls Paul 52 times, we can assume that the relationship between Joe and Paul is stronger than the relationship between Joe and Bob based on the relative difference in the amount of contact between and between these individuals (Figure 1.2). Figure 1.2. In addition to superficial relationships between individuals or events, the relative strength of the relationship may also be relied on based on relative differences in the amount of contact. These programs often allow the user to set thresholds for the strength of connections; however, this can provide a false sense of security. For example, in Figure 1.3, Paul seems to have a stronger relationship with Pete compared to his relationship with Joe, which is based on relative levels of contact. On the other hand, Bob seems to have relatively similar relationships with Joe and Pete based on relatively equal levels of contact as shown in the link chart. However, an overview of the associated link matrix indicates that this may not be true (Figure 1.4). In fact, the number of contacts shows that Paul and Bob had contact with Pete almost twice as much as Joe. The ratio is slightly drawn in the analytic link chart (Figure 1.2) because the relative activity levels associated with Bob were much higher than those associated with Paul. As a result, the settings used in the connection analysis plot a visual representation of the relative strength of those relationships. For example, in this particular

situation it may be that weak links involve 10 associations or less, while strong connections require 20 associations or more. Unfortunately, unequal distributions may pitt the relative importance of some associations. In this case, both Paul and Bob had similar relationships with Pete and Joe; Ratio 2-1. However, this difference in Paul was increased because it was associated with a lower overall frequency of contact. This allowed him to reveal the difference in his contact with Pete and Joe. On the other hand, the same relative difference in the number of contacts Pete and Joe had with Bob was obscured by the increased number of contacts in general. Figure 1.3. Examining this connection chart shows that Paul has a stronger relationship with Pete compared to his relationship with Joe, while Bob seems to have relatively similar relationships with both Joe and Pete, based on relatively equal levels of contact. These apparent differences in relationships are based on differences in connection strength, illustrated by the relative differences in rows in the link chart. Figure 1.4. This simple association matrix the number of contacts between a group of individuals and highlights errors in the linked connection chart shown in Figure 1.3.Signal problems to noise like this can be particularly difficult for at least two reasons. First, they can increase differences in rarer events. Because it takes less to show the difference, it is relatively easy to cross any thresholds set by the user or the software preset. Secondly, you can obscure differences in events associated with higher frequencies. This is particularly true when comparing relationships at the same time, which are related to very different levels of activity. If the thresholds are not carefully defined by understanding relative frequencies, some associace can be increased, while other relationships may be obscured. Various mechanisms are available to address this potential confusion, including the use of percentages or relationships discussed in Chapter 5; however, the key to addressing this issue is to raise awareness and caution in interpreting these types of results. Browse Journals & Books Books