Strategic Network Perspectives for Unstable Regions through the Justice System

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ABSTRACT: The use of narrative content analysis (NCA) to mine law and jurisprudence data from the justice system is explored. After describing the NCA method a sample of the leading network science approaches applied to the judicial and legislative branches is reviewed in order to show paths for further development in data collection and network visualization of angle measurements.

KEYWORDS: content analysis, courts, data collection and mining, geometry, legal precedent, legislative networks, measures, methods, military, network visualization, nodes' strength, semantic networks, and spatio-temporal networks.

NARRATIVE CONTENT ANALYSIS

Narrative content analysis is an efficient mining method of the law in its various forms such as codes, regulations and jurisprudence, focusing on how the legislated law compares with its implementation during the intervention. This proposed methodology expands the scope of traditional content analysis conducted on citations by entering into substantive analysis by finding connections between events, actors and objects, responding to the call of understanding the "human terrain".[1] However, previous text content analysis has focused on newspapers, ordinary memoranda, religious declarations, and letters but rarely has it been applied to documents produced throughout the justice system, such as law, regulations, jurisprudence and all other generated in the discovery of a case such as sworn statements, transcripts and pleadings.[2]

Narrative Content Analysis (NCA) codifies through the underlying structure of written norms through the Program for Computer-Assisted Coding of Events (PC-ACE). [3] From early age everybody is exposed to the grammatical elements of narrative with the basic S-A-O structure, subject-action-object (or "semantic triplet") and their respective modifiers. S-A-O is the underlying structural, linguistic properties of a text, including norms. The coding of norms based on the underlying grammatical structure brings to light the structural and factual patterns of existing enemy nodes.

The basic steps to go from documents generated by the justice system to numbers in order to quantify and identify enemy nodes is: 1) Structure the narration of written documents within relational categories of story grammar (subjects related to actions, actions to objects, subjects and objects related to their respective modifiers)-semantic triplet; 2) Store in the computer the textual information structured in the relational format of a story grammar using a relational database system (RDBMS); 3) Divide into subsets the set of words contained in each category of the grammar. For instance, divide all actions into spheres of actions of similar meaning: actions of conflict, of communication, of violence, and so on; 4) rely on the power of the computer to easily manipulate and count the mass of information stored within each category and subcategory generating the numbers; 5) transfer the data to visualization software for social network analysis, such as, *Pajek.*[4]

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[1] Julie Paynter, Ian McCulloh, John Graham, *Application of Confidence Intervals to Text-Based Social Network Construction*, USMA and Major Scott Efflandt, US Army and Major Brian Reed, US Army, *Developing the Warrior-Scholar*, Military Review, (July-August, 2001)

[2] Michael J Bommarito II, Daniel Katz and Jon Zelner, *Law as a Seamless Web? Comparison of Various Network Representations of the United States Supreme Court Corpus (1791-2005)*, electronic copy available at: http://ssrn.com/abstract=1578094 (exploring the extension of case-to-case citation of jurisprudence to the semantic representations of the law. The substantive exploration of the law, I had previously explored it using the method here presented). For previous exploratory network analysis of jurisprudential citations see: James H. Fowler, Timothy R. Johnson, James F. Spriggs II, Sangick Jeon and Paul J. Wahlbeck, *Network Analysis and the Law: Measuring the Legal Importance of Supreme Court Precedents*, available in the Social Science Research Network (constructing a complete network of 28,951 majority opinions written by the U.S. Supreme Court and the cases they cite from 1792 to 2005. Illustrating some basic properties of the network (Degree Centrality, Eigenvector Centrality) and then describing a method for creating importance scores using the data to identify the most important Court precedents at any point in time, yielding dynamic rankings that can be used to predict the future citation behavior of state courts, the U.S. Courts of Appeals, and the U.S. Supreme Court, and these rankings outperform several commonly used alternative measures of case importance.)

[3] ROBERTO FRANZOSI, *QUANTITATIVE NARRATIVE ANALYSIS* (Sage, 2010); Roberto Franzosi, *FROM WORDS TO NUMBERS: NARRATIVE, DATA, AND SOCIAL SCIENCE* (Cambridge, 2004). Roberto Franzosi is the father of narrative content analysis (NCA) methodology and pc-ace (www.pc-ace.com) in the field of sociology.

[4] http://vlado.fmf.uni-lj.si/pub/networks/book

The emphasis on S-A-O is what distinguishes traditional content analysis (CA)[5] from narrative (NCA). NCA is an efficient process of mining justice system documents since every norm, cause of action, prosecution or investigation has somebody/something doing or omitting to do something that causes damages or some other effect regulated on somebody or something. The NCA's steps discussed are: coding scheme, tree graph and re-write rules. The product of these steps is entered into the PC-ACE program and thereafter transferred into *Pajek* or any other available software for graphing, visualization and analysis. These last two steps of the process exceed the objectives of this paper, but are part of my research program.

The application of NCA analysis for PC-ACE begins with the preparation of a coding scheme, tree graph, and application of rewrite (production) rules, which as an example, we do for The Constitution of the United States of America as follows:

Identify categories in a hierarchical form by identifying one main thematic category (or domain) developed through sub-categories (or issues), that we classify as follows:

DOMAIN: Constitution of the United States of America, **Issue:** Preamble, **Issue:** Article I, **Issue:** Article II, **Issue:** Article III, **Issue:** Article IV, **Issue:** Article V, **Issue:** Article VI, **Issue:** Article VII, **Issue:** Amendments

Through the construction of the coding scheme each sentence of The Constitution is coded as belonging to one of the thematic domains and issues. The relationship between the various codes that make up the coding scheme and its structure helps classify that structure to an operative logical language for the computer software PC-ACE. The operative language consist of rewrite rules (or production), as they are known in linguistics (or Backus-Naur normal form (BNF), in computer science it is a metasyntax used to express context-free grammars). The essential rewrite rules are: The symbol → refers to a rewrite rule, where an element to the left of the rule can be rewritten in terms of the elements to its right. The angular brackets < > denote elements that can be further rewritten while "terminal elements," i.e., the words or linguistic expressions found in the text, have no < >. Square brackets [ ] denote optional elements. Plus + stands for complex object (i.e., made up of a set of other objects). The following strings show an example of rewrite rules.

The rewrite rules state that an initial symbol can be rewritten (→) as the string of symbols after the arrow, also called non-terminal symbols. The latter represent syntactic categories or variables; they provide the most general structures of a specific language. General categories are broken up into simpler and simpler units, each represented by a new non-terminal symbol, until they cannot be decomposed any further. The set of terminal symbols constitutes the lexicon of a language. Rewrite rules specify the relations between strings of terminal and non-terminal symbols allowed in the language. This specific type of coding scheme clearly defines the relation among the semantic units the researcher is interested in and makes the coding process less arbitrary or coder-dependent. The coder, in fact, is required to follow each rewriting passage (or production) for each piece of information to be coded. As a consequence, every semantic element coded in the text is marked by a series of categories and subcategories it belongs to. A general format is: **<+domain>→ {<+issue>} followed by <+issue> →{<+sub-issue>} followed by <+sub-issue>→{<+semantic triplet>} followed by <+semantic triplet>→{<subject>}{<action>}[{<object>}].**

This tells us that the initial element of our language (<domain>) can be rewritten (→) as one or more issues (as depicted by the curly brackets {}). These in turn, can be rewritten in one or more issues. Issues are made up of set of semantic triplets. Triplets, are unsurprisingly, made up of the term of one or more subjects with their actions pro or against a set of objects that are optional (as denoted by the square brackets [ ]; the presence or absence of the object depends on the transitivity or intransitivity of the verb that denote the action. This rewrite data is then entered into PC-ACE allowing the frequency distributions, product that can be graphed.

The recompilation and analysis of documents from the justice system should be reliable due to their formality and the nature of its proceedings. This data helps develop models at a micro level, in early stages of

[5] The technique traditionally used in the social sciences to extract a set of characteristics from a text is known as content analysis (CA). In CA each characteristic of a text of interest to an investigator is formalized as a "coding category"-the set of all coding categories known as "coding scheme." The scheme is then systematically applied to a text to extract uniform and standardized information: If a text contains information on any of the coding categories of the coding scheme, the relevant coding category is "ticked off" (a process known as "coding" in content analysis and carried out be a "coder"). Content analysis then turns words into numbers by counting each tick for each category to obtain basic frequency distributions of the occurrence of certain types of information in the texts. (Franzosi, 2004 at 4)

potential terrorist through their conduct record that can then be evaluated at a macro level when they join denser clusters, such as Al-Qaeda.

In sum, the data generated using direct counting of written norms through narrative content analysis with PC-ACE should then be transferred to the software program *Pajek* for visualization and dynamical network analysis. Once the mapping is done with *Pajek*, work on identifying the key actors and events that should serve as basic elements of any exploratory network analysis of the justice system within the context of military strategy should be performed. Hence two different types of paths are considered: when network analysis is used to study the system as it is in unstable regions and when the military officers mutate into members of the justice system.

SAMPLE OF NETWORK ANALYSIS LITERATURE AS APPLIED TO JUDICIAL AND LEGISLATIVE BRANCHES OF THE JUSTICE SYSTEM

The use of Network Analysis to study Courts and Legislative dynamics is of recent development. Some of the existing papers date from 2005 onward.[6] Relevant literature has analyzed the effect of the Rehnquist Court on Supreme Court precedent, using a network of all Court citations to other Supreme Court cases. Network analysis enables a study of the Court's use of precedent that may not be readily visible, finding that the Rehnquist Court made dramatic alterations in the network of precedent and, in the process, set the stage for a potentially revolutionary change in the makeup of the law following political trends.[7] The importance of precedents was made focusing on densification, clustering and diameter. From that paper I develop the idea that in order to generate data of the justice system (sworn statements, transcripts, minutes), an electronic recording system has to be implemented to facilitate its retrieval. Incentives should be developed for private entities that are specialized in electronic publication of laws, regulations and precedents, such as LexisNexis, Westlaw and Microjuris to get involved in the market of unstable regions and provide the same service to those regions while making available the data for similar network analysis in which identification of certain nodes alter the legal landscape towards their ends.

Other have analyzed the European Court of Human Rights (ECtHR) and found similarities in the way domestic review courts use legal justifications at least in part to convince "lower" (domestic) courts of the legitimacy of its judgments. The ECtHR avoids using country-specific factors to determine the case-law on which it relies but rather cites precedent based on the legal issues in the case, recognizing the commonality of jurist formation. The ECtHR also adopts the traditions of the domestic forum; if it is a Common Law jurisdiction it uses jurisprudence because is more persuasive while if it is a Civil Law jurisdiction it abstains from using jurisprudence and cites more law. In this last jurisprudential approach a citation network analysis based on inward citations (i.e., citations to a case) and outward citations (i.e., citations from a case), used by previous scholars is used. The authors take the analysis further than previous jurisprudential analysis when they make a first attempt on substantively analyzing the ECtHR workload of cases based on the most frequently invoked Articles of the European Convention for the Protection of Human Rights and Fundamental Freedoms of 1950.[8] This paper illustrates the power of network analysis in identifying subtleties justice systems must consider if they are in the process of achieving legitimacy and trust in unstable regions when their local justice system is touched by foreign entities.

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[6] See: Salmon A. Shomade and Roger E. Hartley, *The Application of Network Analysis to the Study of Trial Courts*, http:/ssrn.com/abstract=1433516 (examining the use of network analysis to examine the organizational linkages and structure of trial courts in a state trial court located in a medium size U.S. city); Daniel M. Katz, Josh Gubler, Jon Zelner, Michael Bommarito, Eric Provins & Eitan Ingall, *Reproduction of Hierarchy? A Social Network Analysis of the American Law Professoriate*, http:/ssrn.com/abstract=1352656 (Developing the idea that the social structure of the American law professoriate is an important piece of a broader model of American common law development. Leveraging advances in network science and drawing from available information on the more 7,200 tenure-track professor employed by an ABA accredited institution, they explore the topology of the legal academy including the relative distribution of authority among its institutions. The study draws from social epidemiology literature and provides a computational model for diffusion of their network. The model provides a parsimonious display of the trade off between "idea infectiousness" and structural position.)

[7] Frank B. Cross, Thomas A. Smith, Antonio Tomarchio, *The Reagan Revolution in the Network of Law*, Available at SSRN: http://ssrn.com/abstract=909217 (June 2006)

[8] Yonatan Lupu and Erik Voeten, *The Role of Precedent at the European Court of Human Rights: A Network Analysis of Case Citations*, http://ssrn.com/abstact=1549947 (May 14, 2010)

Thus, in the case of unstable regions of Civil Law tradition it is important to analyze their legislative process because they rely more on the law and it is the law that gives legitimacy to their legal analysis. In the legislative arena network analysis has been applied to the structure of Congress from 1973-2004.[9] Members of Congress were treated as directly linked if they had cosponsored a bill together. They then constructed explicit networks of each year using data from all forms of legislation, including resolutions, public and private bills, and amendments. As a result of this analysis the paper concludes that Congress exemplifies the characteristics of a "small world" network and that the varying "small world" properties during this time period are strongly related to the number of important bills passed. "Small World" has been defined as a network structure graphed with nodes and links that exhibit both high levels of local clustering and a short average path length between nodes. The identification of these nodes helps identify their interest and how that "small world" legislates in furtherance of those interests.

In the visualization of a Code recent formalizations representing the United States Code as the union of a hierarchical network and a citation network over nodes containing the language of the Code have been created[10] reflecting the fact that the Code is a hierarchically organized document containing language and explicit citations between provisions. In addition, measurements of the Code as codified on October 2008, November 2009, and March 2010 are performed. With these measures characterizations of the actual changes in the Code over time are found supporting that in the recent past, the Code has grown in its amount of structure, interdependence, and language. This structural analysis is similar to one I previously made[11] from which we can infer and identify social dynamics of the justice system in favor or against particular objectives. These social network analysis tools are ideal in Civil Law jurisdictions that substantially rely on Codes and written law in order to identify enemies.

From the network methods, measurements and visualization techniques used in the works previously cited I have noticed a common omission that has been generalized within the field of network science; the measurement of angles and their visual representation in triadic dynamics as networks get larger.[12] The classic network graph relies on representing the various measurements through the size, form, color and distance of nodes and directed or undirected edges. However, classical network graphs loose a spatial-time sequence dimension that triadic relations represented through their angle measurement based on power or strength of things being measured generate. The entanglement of different triangles keeping the strength of nodes based on angle measurements produce rigorous, faithful and holistic structural models and maps that depict contraints of nodes and their relations. Angle measurement graphs by network scientist would compare to an engineer, architect and/or artist creating a sculpture using the virtues of triangles.[13]

MILITARY APPLICATION PROPOSAL

In the absence of direct combat between military clusters in populated regions, the ARMY should supplement its resources and efficiency through the existing justice system structure of the region in conflict. The justice system of all regions of the World have the leading role of preserving order and control of their **"**natural and juridical persons**"** (hereinafter "nodes"). The justice system has historically enjoyed of such

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[9] Wendy K. Tam Cho and James H. Fowler, *Legislative Success in a Small World, Social Network Analysis and the Dynamics of Congressional Legislation*, Available at SSRN: http://ssrn.com/abstract=1007966 (January 1, 2007)

[10] Michael J. Bommarito II and Daniel M. Katz, *A Mathematical Approach to the Study of the United States Code*, http://ssrn.com/abstract=1578094 (March 25, 2010).

[11] Orlando I. Martinez-Garcia, *The Person in Law, the Number in Math: Improved Analysis of the Subject as Foundation for a Nouveau Regime*, The American University Washington College of Law, Journal of Gender, Social Policy and the Law, Volume 19 (in process publication) and Orlando I. Martinez-Garcia, *The Pseudoscientific Nature of the Justice System and the Paths Towards Scientific Knowledge Processes that Lead to Universal Justice Patterns* (unpublished manuscript), available at http://papers.ssrn.com/so13/papers.cfm?abstract_id=1104522 (October 1, 2007)

[12] A week before the workshop I consulted with Vlado Batagelj this method and he confirmed that he had not seen network visualizations based on angle measurements even though he has implemented in Pajek software triangles for short cycle connectivity. *See* V. Batagelj, M. Zaversnik, *Short cycle connectivity*, Discrete Mathematics 307 (2007) 310-318. During the workshop I asked participants, such as: John M. Graham, Chris Arney, Zhen Wen, Dashun Wang, John James, Henry Hexmoor, Paul Stanton, Lynndee Kemmet, Mark Thomas, Guenther Kress, Josh Lospinoso, Stu Card and others present about this approach for feedback and all confirmed the novelty of it as proposed within network science.

[13] http://images.travelpod.com/users/lroff/world_2006-2007.1144822920.15-big-blue-bear-art.jpg (Lawrence Argent's 40-feet high Blue Bear, "I see What You Mean", 10,000 pound bear made up of 4,000 interlocking triangles.)

success in keeping order throughout the World, which at the present, with all its flaws, continues to be the most widely used peace keeping system. Justice systems handle the problems of nodes of a region in critical moments through nodes that intervene and gain access to data that otherwise would not be available. Hence the nodes that integrate a justice system constitute an efficient and diplomatic form of force, influence and data collection that should be preserved and shared for security and/or military purposes. It is my proposal that the Network Science Center of the United States Military Academy (USMA) work towards improving its intelligence of the justice system of occupied regions in conflict and/or interest in order to map their structure for the advancement of universal goals through "Warrior-Scholar"[14] cadets and other affiliated entities such as, the National Military Academy of Afghanistan[15] (NMAA). The ideal "Warrior-Scholar" nodes, who will participate as members of the justice system should have a sociological understanding of the culture combined with solid investigative and legal formation.

I suggest the ARMY take advantage of the infrastructure that generally exists in justice systems of unstable regions for the following reasons: First, it is more efficient to use existing infrastructure than creating new ones. In case, the existing facilities do not have adequate security, improvements would be justified but such cost could be shared with the local and tribal support (services and taxes), reducing the investment of ARMY resources. Second, the justice system has historically implemented techniques focused on collection of reliable data through agents, police officers, direct and cross examinations and discovery proceedings that no other entity has. Third, the infrastructure offers a more secured environment for the nodes in unstable regions because judges, prosecutors, police and undercover agents all need to be protected with firearms. The buildings of existing justice systems have designs that procure a secure working and operating space for nodes on their premises, including nodes that appear as victims, accused and witnesses. Fourth, communities have grown accustomed to the protection justice system forums and personnel enjoy within internal affairs and consider it less intrusive and are more likely to trust it when substituting existing nodes with USMA or affiliated nodes. Thus, the mutation of justice system nodes within the customary course of the existing justice system diminishes the appearance of military presence that halts tribal and/or locality dynamics free flow of reliable information.

Once USMA nodes are working within the justice system of the unstable region, they should exercise the dual role of knowing how to handle traditional conflict within that region but also gather data of potential and existing enemy nodes. For example, USMA nodes in the justice system could ask lawyers or make list of nodes that serve a particular business unit to list the clients they have advised during the past years and the estimated hours of service. Using network software we can then color each type of node according to their levels and the angle measurement previously proposed. Once all the legal support is mapped out, the legal service dynamic would be much more apparent. The combination of lawyer and client data would add rich detail to the lines and angles between nodes of clients and lawyers.

In this process, the role of social network analysis has a fundamental role at the *pre* and *post* USMA node integration to the justice system.[16] The *pre* USMA network analysis should map the existing justice system with the nodes and links that constitute it with its outside participants while the *post* USMA network analysis should focus on mapping the nodes of the outside participants that are being processed through the system, such as: victims, aggressors, plaintiffs, defendants, etc. Under both stages of network analysis I have proposed using narrative content analysis and a new graphing approach to node dynamic based on angle measurement.

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[14] Major Scott Efflandt, US Army; and Major Brian Reed, US Army, *Developing the Warrior-Scholar*, MILITARY REVIEW at 82 (July-August 2001)

[15] John R. James, *Tribal and Locality Dynamics in Afghanistan: A view from the National Military Academy of Afghanistan*, United States Military Academy, Network Science Center 2009.12.1.

[16] Brian Reed, *A Social Network Approach to Understanding an Insurgency*, Parameters at 19, (Summer 2007); Ian McCulloch, Kathleen Carley, Matthew Webb, *Social Network Monitoring of Al-Qaeda*, ISBN 978-1-934808-00-9 (October 2007)