Computer-Assisted Analysis of Soft Power:
A Proposal for a Natural Language Processing Tool to Assist in the Assessment of Soft Power

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Abstract: For the past twenty years, interest in soft power has increased or decreased depending on time and place; where it has waxed, this is owing to the undeniable importance of soft power for governments and industry, as much as for academics; where it has waned, this is owing primarily to the difficulty of defining what exactly soft power is and how to cultivate or exploit it. Much of the academic literature published on soft power has tried to overcome this difficulty either by choosing solid, incontrovertible, and quantifiable indicators as measures of soft power, or by quantifying vague notions of public opinion through survey data. Either way, the elusiveness of their subject leaves such approaches wanting. How, then, to create a practical tool that can be used by academics, diplomats, marketers, or others who might be interested in measuring and evaluating soft power in the real world? In this paper, we propose a tool that uses common techniques of computational natural language processing to go through large volumes of textual sources and extract glimpses of what people are saying about a topic of interest. In our current study, we use articles from online newspapers as our textual sources, and envision the user to be a diplomat interested in knowing what predominates in the public discourse, as well as what people are saying about "America." The application of this tool can be easily extended to other domains.

 While our tool is by no means a magic wand that takes away all of the mystery from soft power, we feel that its strength and utility to our projected users lies in its non-committal approach -- it aims to reduce an otherwise overwhelming representation of public discourse to something that can be easily digested by a single analyst, though still leaving the actual work of analysis to the user. The biggest impediment we face is acquiring sufficient amounts of clean data for processing. Just for harvesting articles from online newspapers, our methods for scraping the internet are rudimentary and extracting content from an html page is a surprisingly complex project. We feel that, where such impediments can be either overcome or made irrelevant, our tool would prove to be quite valuable in real-world settings.

Introduction

 Arguably, for ages the art of wielding influence over others through sympathy and the evocation of common interest has been known and understood by a wide variety of people -- from diplomats to marketers. Nonetheless, this influence was not really understood to be a palpable entity, nor made a subject of disciplined academic research, until after Joseph Nye gave it the name "soft power" in 1990 (Nye, 1990). Over the twenty years since then, there have been many calls made for governments to factor considerations of soft power into their policy decisions -- and as many dismissals of soft power as anything worth paying attention to. Likewise, there have been many efforts made to give hard edges to soft power -- model it with quantifiable measures and compare countries' relative soft power against

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each other. We loudly applaud recent efforts to favor the cultivation and exploitation of soft power in the realm of international relations; we thus applaud all recent efforts to find solid, incontrovertible indicators of soft power and to grapple with its elusiveness. However, through all of the recent work on this topic, we also find the results a little bit unsatisfying.

This paper describes a software tool designed to provide a satisfactory answer to the need for a practical measure of soft power, without forcing the concept into a structure that is too narrow or too rigid for it to retain its strength and meaning. We will first review some of the recent literature on soft power that provides a context for our proposal. We then describe where in this debate our proposed software tool fits, and where it does not. Next, we describe the software itself and show some of the results of an initial feasibility study. Finally, we leave off with a short discussion of what remains to be done to turn the tool in its current state into a production-quality one. Our proposed system is a novel application of well-studied and thoroughly-developed techniques from computer science to the domain of political science. While the package used for our initial study requires much refinement yet, we feel that its potential value to the debate over soft power, and especially to diplomats and analysts in the field, is tremendous.

Current Literature

As soft power scholars have pointed out, the publication of Nye's *Bound to Lead* (1990) represented a major breakthrough in making space for co-optive power in a public and foreign policy discourse that was hitherto dominated by considerations of coercive power (see Lee, 2009, Kroenig et al., 2010). However, Nye's new idea lacked a solid theoretical structure to frame any debate on it, an omission for which scholars such as Lee and Kroenig et al. tried to make up by proposing their own frameworks. Though these latter have their differences, there does exist a common agreement that soft power is fundamentally based on popular, not official, perceptions. Kroenig et al.'s paper, for example, holds a healthily functioning "marketplace of ideas" as a precondition for the exercise of soft power in any appreciable form. This marketplace, it is emphasized, is a place where ideas can be easily offered with complete integrity and without blockage -- it is most certainly not an organ for the dissemination of tightly-controlled propaganda. Soft power, goes the assumption, works from the bottom up, not from the top down. For a state to exercise soft power, it must address directly the people of a demographic; relying upon the intermediate mechanism of state power simply does not count – especially since soft power is most often used to co-opt state policies through direct appeal to a people.

One of the primary questions in the debate over soft power is how to gauge the popular perceptions that are one's object of interest. This has generally been done through opinion surveys (Nye, 2004, McClory, 2011), though other measures have also been proposed. The project that has produced multiple publications of "The New Persuaders" over the past several years[2] has had as its motivation to provide a report for the British government that would highlight the policy importance of soft power in order to stave off budget cuts in the area of diplomacy and other soft power instruments. The project's creator, Jonathan McClory, compiles a comparative ranking of countries in terms of their soft power in various sub-categories such as Government, Diplomacy, Culture, etc. (McClory, 2011, 2012). He points out that measurements of soft power, up to his own study, were based primarily upon opinion polls like the Gallup Global Attitudes Survey. For his own ranking, though, he uses 50 metrics that should normally affect popular perception, and should normally contribute to a state's soft power.

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[2] Of which the most recent is "The New Persuaders III: An International Ranking of Soft Power 2012" (McClory, 2012).

For example, to calculate his Diplomacy sub-index, he uses overseas development aid (from OECD and UN Development statistics), travel visa freedom (Henley Visa Restrictions Index), number of cultural missions abroad, the number of Twitter followers of a foreign ministry, and the total number of environmental treaties signed by a country (CIA Fact Book), amongst other measures. One thing to notice about McClory's indicators, though, is that their effect upon foreign populaces is assumed, but never measured or verified. He assumes that cultural missions contribute a certain weight to a state's soft power, but he does not look at opinion surveys to check the actual weight[3].

In her paper "The Strength of a State: Modeling Hard and Soft Power," Allison Nau presents a similar method of measuring soft power by using quantifiable indicators of it (Nau, 2005). Like McClory (2011), Nau (2005) shies away from poll and survey data to base a calculation of soft power on hard numbers. She uses four pre-compiled statistics that, for her, indicate the level of soft power of a country. These indicators are: 1) recorded media exports, 2) newspaper, journal, and magazine exports, 3) the number of internationally dispatched letters, and 4) the number of foreign exchange students hosted by the country of interest. In measuring soft power by such statistics, Both Nau (2005) and McClory (2011) make the job of comparing the soft power of one country to that of another a relatively easy one, assuming that numbers do not lie. However, such an approach tends to treat soft power as a static and monolithic thing. Furthermore, it makes assumptions about the power that certain metrics represent without ever really consulting the people whom these metrics are supposed to influence.

The approach taken by the Chicago Council (Whitney and Shambaugh, 2008) constitutes a modification of the old opinion survey method. The Chicago Council study used the results of survey questionnaires passed out to selected citizens of various Asian nations, but added to this the mitigating input of field experts. Questions posed to the respondents treated of the relative power and intentions of their respective nation's neighbors. The study, then, is based entirely on data that are subjective, subject to extreme trends owing to ignorance on the part of respondents (thus the need for the input of area experts), and whose time of validity is remarkably short. Nonetheless, the Chicago Council was able to turn survey results into very precise numeric measures that they then used to rank countries by soft power. We are skeptical about such a maneuver, which might tend to place soft power within too-strict definitions just as McClory's (2011) and Nau's (2005) studies. While it is questionable how much survey data lend themselves to quantifiable measures, they do have the advantage of bearing the voice of those whom soft power aims to co-opt, and hence can be considered a more direct reflection of soft power and its influence.

Proposed Project

As is evident from the studies presented above, there are as many ideas for how to measure soft power as there are understandings of what it is and attitudes toward the proper role to give it in practical policy-making. For this paper, we use the latest definition of soft power given by Joseph Nye:

> *The ability to affect others through the co-optive means of framing the agenda, persuading, and eliciting positive attraction in order to obtain preferred outcomes… [This] includes intangible factors such as institutions, ideas, values, culture, perceived legitimacy of policies…"* (Nye, 2011, 20-21).

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[3] McClory acknowledges the inherent bias in at least part of his approach -- in his discussion of the Government sub-index, for example, he says that his metrics have a bias toward Western political values (p. 19).

At the same time, we draw attention to the variation in discourse around soft power, and maintain that this variation is not a sign of the evolution of a general academic consensus on the topic so much as it is an indication of the ethereal and intangible nature of the entity itself. Even those who are least excited about soft power do recognize its reality and its importance in international relations (see for example Ford, 2012). What to do, then? To dismiss all discussion of soft power simply because it eludes quantification and fixed boundaries would be to throw the baby out with the bath water. The current submission proposes a tool that would aid a researcher or analyst interested in soft power to process large volumes of textual data -- data that would represent the popular discourse emanating from a particular place at a particular time -- all the while leaving the work of discerning a measure of that power, the presence of elements aiming to manipulate it, and the judgment of how best to exploit it, where it should be -- at the level of intuition or critical debate.

The insight that serves as a point of departure for McClory's (2011) and Nau's (2005) studies – that a discussion of soft power requires something measurable and quantifiable to be sound – is a good one. However, while we recognize that their selection of criteria to be used for measures demonstrates admirable insight, we submit that this approach misses, in a fundamental way, the highly dynamic and intuitive nature of soft power. Below we will discuss how our project is patently distinct from the practice of perception management, but here we re-assert, as other scholars have, that soft power is built upon the collective *perception* of a country. While the convictions and emotions that people establish on their perceptions may reach deep, perception is one of the most capricious and easily-changed of things. Thus, soft power is something that can be (if not should be) measured daily, and with a more subtle understanding than what four numbers, or even fifty, might provide. Public opinion surveys are impractical simply because of the time required to conduct them and compile the results. Additionally, it would require tremendous amounts of work to survey the number of people whose opinions are already posted on various online forums or media. Our approach is to examine soft power as it is perceived at a single instant, based on text data that has all the faults and communicates all the ignorance and bias of publicly-contributed, unedited text. Though the latter characteristic should probably be considered a liability for most applications, it is actually turned into an advantage by the tool proposed here. This research project aims to provide a textual analysis tool that can quickly process textual data produced over a single day and provide a picture of what is happening in that data. Our assumption is that it will likely be to the analyst's advantage to be made aware of the ignorance and bias of the public that writes the raw text input, since these undoubtedly contribute to the soft power of an entity amongst that public.

This approach admittedly leaves the question of how the tool can and should be applied up to the individual user. To be sure, one potential application is in the area of perception management, or more precisely that of propagandizing. In the literature on Information Warfare, there is much discussion of perception management (see for example chapter 5 of Denning, 1999). Generally, the term refers to such unpalatable activities as lying, distortion, hoaxing, social engineering, defamation, scams, spam, censorship, and propagandizing. While a tool to measure soft power would certainly prove valuable to someone interested in practicing perception management, since it would provide a means to gauge the success of a perception management campaign, the result of this research project is not meant to be a component part of a perception management toolbox. While we regret that such an application of the proposed tool is easily conceivable, we also feel that its potential for good far outweighs its potential for nefarious activity.

Another approach to perception management that interested parties might wish to take is that of opposing it. A text analysis tool could be conceptualized to locate amongst large sets of text data instances of text that appear to deliberately shape public perception through one of the nefarious

means mentioned above. However, the intent of our tool is not to identify individual text items from a corpus. Rather it is the opposite -- to generalize from the particular. That is, we wish to distill a compact and manageable glimpse of public discourse from a large set of textual data. Our goal is to help the researcher obtain a small idea from a large amount of raw data.

NLP Tool

The project we propose is the development of a tool that will use natural language processing techniques on textual resources to give political science and diplomatic analysts a feel for a country's soft power, at a grassroots level, by giving them a quick glance over voluminous text data. By using tools that come packaged in the open-source Natural Language Toolkit (Bird et al., 2009), it will be able to gather and present several useful views into large amounts of data:

1 *token counts*: in NLP parlance, a token is any individuated piece of linguistic data. In most cases, a token is what one would normally call a word, but sometimes can be a punctuation mark or other atomic instance of text. The NLTK can easily count the number of occurrences of a single token.

2 *concordances*: a concordance shows the immediate context of a selected token. If, for example, we are interested in the context in which the word 'China' occurs, a concordance will show us all of the occurrences of 'China' in the text and the 40 characters (adjustable according to need) on either side of them. This can give the researcher an idea of what people are saying about China without having to read the entirety of the corpus.

3 *collocations*: a collocation is a frequently-occurring combination of multiple tokens. The NLTK can search for the most common collocations of 2, 3, or more words in a given corpus. If something like "American aid" shows up in the collocation list, then this would be a strong indication that most mentions of "American" are in the phrase "American aid."

4 *neighboring nouns*: using the NLTK part of speech tagger, we can construct a simple program to search for the most frequent nouns that occur within a few tokens of a selected word. This would give the researcher an indication of what ideas are commonly associated with their subject of interest.

5 *neighboring adjectives*: using the same technique described in (4), a count of the adjectives appearing in the vicinity of a chosen word can be made. Such a task can lead later, with the addition of a training set and probabilistic model, to a measure of the positive or negative feelings that are associated with the entity in question.

An important note to make is that our tool is intended to give a researcher a *feel* for soft power rather than a hard measure of it. Our use of this vague term is intentional. Our position is that quantifiable models and statistical rankings of soft power will always leave something to be desired. Some of the studies we have seen above use indirect indicators of soft power such as media exports and postal exchanges to build their models (eg. Nau's, 2005); such an approach assumes a great deal about the content of what is being shared as well as its reception with the host audience. While such assumptions are not without reason, they are too strong for the resulting models to be air-tight. Similarly, other models use very subjective measures of soft power such as questionnaires filled out by selected respondents in various countries, combined with the opinions of experts (eg. Whitney & Shambaugh's, 2008). Such an approach is much closer to ours in how it measures soft power, yet this one in particular still suffers from the weakness of making a static entity of something as dynamic as public opinion. Both of these, however, limit the freedom of the researcher to interpret what s/he sees

and act upon it according to his or her own understanding. Rather, they impose upon the researcher a system, whose rules and measures ultimately lead to a single number that can be compared against other single numbers. It is not without good reason, then, that some analysts are less eager to embrace soft power as a basis for policy- and decision-making. Ford, for example, makes the point "It is less clear, however, what to make of 'soft power' from the perspective of a US policymaker, whose natural inclination will presumably be to ask what he or she can do with all this 'power'" (Ford, 2012).

Our tool aims to overcome this weakness by being unbinding. It should serve the needs of the soft power analyst without binding them with assumptions or any given framework of interpretation. It should be applicable to a wide variety of text data, from a wide variety of settings -- from Facebook and Twitter posts, to newspaper articles, to official government statements and memos. The current and future needs of the soft power analysts are, in our estimation, exactly the same as the past needs of the propagandist, minister of safety, and diplomatic attaché before they had the term 'soft power' to label the stuff of their trade -- to have their finger on the pulse of popular opinion. For this reason, we would shy away from limiting the scope of the analyst's interest by imposing an awkward framework, and instead offer them a tool that can be used as an all-purpose window into popular discourse.

Empirical Results

To get and to give an idea of what the proposed tool might produce, the team members have put together a proof of concept (POC) model of what they ultimately envision. The POC model uses primarily routines and classes from the Natural Language Toolkit (Bird and Roper, 2009), with a few routines added by the current researchers to handle specific tasks. We used a very simple and unrefined web scraping tool and text extraction tool to gather articles from online newspaper publications and extract content from all the HTML dross. Though we were able to gather several thousands of articles from selected newspapers from Africa and several tens of thousands of articles from selected newspapers from Asia, our POC model could not efficiently process all of the text data from all of the articles from an entire continent. Instead, we backed off to examining just the articles gathered from one newspaper (chinanationalnews.com). Our sweep of articles was done in early March of 2013. At this time, Pope Benedict XVI had announced his intentions to retire and many news organizations (including Chinese ones) carried stories about the transition and speculation on the visions forward of the Vatican. This fact will be evident in the examples we give below, which are pulled from the results of running the five elementary functions discussed above on text gathered from one online newspaper source:

1. Token Counts

    >>> obj.count('America')
    156
    >>> obj.count('American')
    21

2. Concordances

    >>> obj.concordance('America')
    Displaying 25 of 156 matches:
    up of Catholic women from Britain , *America* and Australia gathered in Rome to p
     es of left-wing allies around Latin *America* , from Cuba to Bolivia . One of the
    >>> obj.concordance('American')
    Displaying 21 of 21 matches:
     s and tedium of flying . Stay tuned *American* Airlines and US Airways expect thei

ER , a peer-reviewed journal of the *American* Cancer Society , Xinhua reported .

3. Collocations

```
>>> obj.collocations()
Building collocations list…
dying every; every day; hotel reviews; XML RSS; RSS feeds; news headlines;
emailed China; China news; Chinese news; Sistine Chapel; contracted wire;
radio stations; Ram Singh; North Korea; financial markets; however strive;
nuclear power; public broadcasters; sources comprising; top several
```

Note: The weakness of the web scraping and content extraction tools we used is evident in the appearance of "XML RSS" and "RSS feeds" above. One of the tasks for this project is to refine the collection of text content for processing.

4. Neighboring Nouns

```
l = obj.close_nouns('America').items()
('women', 248)
('Rome', 238)
('smoke', 238)
('pink', 238)
('America', 156)
('Catholic', 119)
('group', 119)
('exclusion', 119)
('sky', 119)
('priesthood', 119)
```

5. Neighboring Adjectives

```
l = obj.close_adjectives('America').items()
('different', 119)
('black', 119)
('white', 119)
('crucial', 37)
('other', 37)
('left-wing', 37)
('early', 11)
('journal', 10)
```

Results such as these of course beg the question of interpretation. What might these findings tell an analyst? While we feel strongly that this question is wide open – indeed, the very intent of our approach was not to impose an interpretive framework upon the public discourse we examine, since this has been the primary weakness we observed in other approaches to soft power – we shall offer here some preliminary thoughts for reflection. A *token count* is an easy way simply to see how active a public discourse is around a given word, concept, or idea. Undoubtedly, marketing executives have very precise notions of how much talk about a company's product is a good thing, and how much is cause for consternation; token counts could serve as a baseline measure for such a notion. A *concordance* will give a slightly deeper understanding of this discourse. For every appearance of a token in a text corpus there will be a line in the concordance, thus the analyst will have a concise resumé before him/her of the nature of that discourse. A conceivable added feature to this tool is a pointer (or clickable link) back to the original article. We may be indifferent to mentions of 'Latin America,' but a reference to American, British, and Australian Catholics in one line may pique our interest and we may want to look at the entire entry! *Collocations* may provide a way to see what topics people are talking about at any given time. From the results above, we see that the Sistine Chapel, North Korea, and nuclear power

were topics of great interest to readers of chinanationalnews.com on the day of our search. If we are instead interested in a specific concept, the results of collocations can be filtered to see in what phrases that concept appears. The *neighboring nouns/adjectives* feature is one with which we are experimenting to expand the range of associated nouns and adjectives from just those appearing in collocation with our target concept. The results presented above show the strong association of church themes with the concept 'America,' a sign of the importance of the papal selection to the United States (at least in the view of chinanationalnews).

It is important to note that the software tool proposed in this paper does not automate the redaction of diplomatic cables, no more than it dictates a conceptual framework for the measurement of soft power. Brain work still needs to be done by an analyst after the results are returned. Nonetheless, the tool does offer the analyst a means to tackle large amounts of textual data very quickly, as well as a means to produce certain baseline numbers as a basis for discussion. In doing so, it removes the time and expense of conducting opinion surveys from the analysis of soft power, and returns the measure of soft power to where it should be – the thoughts and opinions of people – from the indirect and questionable reflection of government data.

Areas for improvement

The preceding results obtained by the POC tool show that there are four primary areas for further work and improvement. The first of these is the collection of raw data. For the study to date, we have relied upon a rudimentary web scraper and html cleaner, whose weaknesses are apparent in the number of duplicate texts found, the presence of advertising text in the middle of news content, and in the presence of html code. While we anticipate that raw text data will come from any variety of sources (Facebook posts, Twitter posts, blogs, comments on public forums, etc.), we also expect the ability of any tool to retrieve automatically available texts from public sources to be an important feature. In such a case as our test study, where text was taken from online newspaper content, the development of a good web crawler and html scrubber, that can discern between content of likely interest and duplicate or dated material, can clean retrieved pages of advertising text, and can extract only article text from messy html, will be important goals.

A second area of interest will be the refinement of the part-of-speech tagging and noun/verb phrase chunking processes. These processes are ones that have not been perfected by computer scientists, and likely represent a never-ending challenge. Promising work has been done by tailoring taggers and chunkers to domain-specific text, and we expect that improvements can likewise be made by training the NLTK models on language coming from the regions under study.

A third area will be the incorporation of statistical software packages to relate quantifiable data in a meaningful and graphical way. Open-source packages such as R, or Python's matplotlib, can produce publication-quality charts from statistical data. Applying such capabilities to the results of token counts, collocations, near-nouns, or near-adjectives, would make such numeric results more approachable for non-technical users.

Finally, it should be a necessary modification to the current software to free it from the relatively restricted memory space within which we have worked. In spite of the growing availability and decreasing cost of machines with 8 GB of memory or more, we expect that the amount of data needing to be processed will always quickly outstrip the hardware capabilities of any machine. Transposing the same facilities demonstrated in the POC to a similar model working from persistent storage (such as a relational database) will give users much greater latitude to work with extremely large data sets.

It may be noted that the current model uses English language sources. NLP, however, is definitely not limited to English. The authors are personally familiar with Spanish, French, and Chinese; the techniques under discussion here can easily be ported to these languages with little high-level modification.

Conclusion

In this paper we presented a semi-automated text analysis tool to support soft-power analysis. Our aim has been to gather and package, in a succinct format, raw textual material for the human analyst that would otherwise be unwieldy. Our decision not to fully automate the text analysis step is intentional. Rather than adopt a particular model for soft power evaluation, our tool provides relevant data in a form that is malleable, easy to use, and meaningful to the human analyst. Based on our empirical results, we are confident that a tool with better source collection methods and more efficient computational capabilities will be every bit as valuable to prospective users as we anticipate.

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