

of text, their algorithms automatically acquire hundreds of thousands of items of world knowledge and use them to produce significantly enhanced repositories for WordNet. **WordNet** is a laboriously hand-coded database of English words, their definitions, sets of synonyms, and various semantic relations between synonym sets. It is a major resource for NLP applications, but it has proven to be very expensive to build and maintain manually. By automatically inducing knowledge into WordNet, the potential exists to make WordNet an even greater and more comprehensive resource for NLP at a fraction of the cost. One prominent area where the benefits of NLP and WordNet are already being harvested is in customer relationship management (CRM). Broadly speaking, the goal of CRM is to maximize customer value by better understanding and effectively responding to their actual and perceived needs. An important area of CRM, where NLP is making a significant impact, is sentiment analysis. **Sentiment analysis** is a technique used to detect favorable and unfavorable opinions toward specific products and services using a large number of textual data sources (customer feedback in the form of Web postings). A detailed coverage of sentiment analysis and WordNet is given in Section 5.6.

Text mining is also used in assessing public opinions. Application Case 5.2 provides an example where text mining is used to anticipate and address public complaints in Hong Kong.

Application Case 5.2

Text Mining Improves Hong Kong Government's Ability to Anticipate and Address Public Complaints

The 1823 Call Centre of the Hong Kong government's Efficiency Unit acts as a single point of contact for handling public inquiries and complaints on behalf of many government departments. 1823 operates round-the-clock, including during Sundays and public holidays. Each year, it answers about 2.65 million calls and 98,000 e-mails, including inquiries, suggestions, and complaints. "Having received so many calls and e-mails, we gather substantial volumes of data. The next step is to make sense of the data," says the Efficiency Unit's assistant director, W. F. Yuk. "Now, with SAS text mining technologies, we can obtain deep insights through uncovering the hidden relationship between words and sentences of complaints information, spot emerging trends and public concerns, and produce high-quality complaints intelligence for the departments we serve."

Building a "Complaints Intelligence System"

The Efficiency Unit aims to be the preferred consulting partner for all government bureaus and departments and to advance the delivery of world-class

public services to the people of Hong Kong. The Unit launched the 1823 Call Centre in 2001. One of 1823's main functions is handling complaints—10 percent of the calls received last year were complaints. The Efficiency Unit recognized that there are social messages hidden in the complaints data, which provides important feedback on public service and highlights opportunities for service improvement. Rather than simply handling calls and e-mails, the Unit seeks to use the complaints information collected to gain a better understanding of daily issues for the public.

"We previously compiled some reports on complaint statistics for reference by government departments," says Yuk. "However, through 'eyeball' observations, it was absolutely impossible to effectively reveal new or more complex potential public issues and identify their root causes, as most of the complaints were recorded in unstructured textual format," says Yuk. Aiming to build a platform, called the Complaints Intelligence System, the Unit required a robust and powerful suite of text-processing and mining solutions that could uncover the trends, patterns, and relationships inherent in the complaints.

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Application Case 5.2 (Continued)

Uncovering Root Causes of Issues from Unstructured Data

The Efficiency Unit chose to deploy SAS Text Miner, which can access and analyze various text formats, including e-mails received by the 1823 Call Centre. “The solution consolidates all information and uncovers hidden relationships through statistical modeling analyses,” says Yuk. “It helps us understand hidden social issues so that government departments can discover them before they become serious, and thus seize the opportunities for service improvement.”

Equipped with text analytics, the departments can better understand underlying issues and quickly respond even as situations evolve. Senior management can access accurate, up-to-date information from the Complaints Intelligence System.

Performance Reports at Fingertips

With the platform for SAS Business Analytics in place, the Efficiency Unit gets a boost from the system’s ability to instantly generate reports. For instance, it previously took a week to compile reports on key performance indicators such as abandoned call rate, customer satisfaction rate, and first-time resolution rate. Now, these reports can be created at the click of a mouse through performance dashboards, as all complaints information is consolidated into the Complaints Intelligence System. This enables effective monitoring of the 1823 Call Centre’s operations and service quality.

Strong Language Capabilities, Customized Services

Of particular importance in Hong Kong, SAS Text Miner has strong language capabilities—supporting English and traditional and simplified Chinese—and can perform automated spelling correction. The solution is also aided by the SAS capability of developing customized lists of synonyms such as the full and short forms of different government

departments and parsing Chinese text for similar or identical terms whose meanings and connotations change, often dramatically, depending on the context in which they are used. “Also, throughout this 4-month project, SAS has proved to be our trusted partner,” said Yuk. “We are satisfied with the comprehensive support provided by the SAS Hong Kong team.”

Informed Decisions Develop Smart Strategies

“Using SAS Text Miner, 1823 can quickly discover the correlations among some key words in the complaints,” says Yuk. “For instance, we can spot districts with frequent complaints received concerning public health issues such as dead birds found in residential areas. We can then inform relevant government departments and property management companies, so that they can allocate adequate resources to step up cleaning work to avoid spread of potential pandemics.”

“The public’s views are of course extremely important to the government. By decoding the ‘messages’ through statistical and root-cause analyses of complaints data, the government can better understand the voice of the people, and help government departments improve service delivery, make informed decisions, and develop smart strategies. This in turn helps boost public satisfaction with the government, and build a quality city,” said W. F. Yuk, Assistant Director, Hong Kong Efficiency Unit.

QUESTIONS FOR DISCUSSION

1. How did the Hong Kong government use text mining to better serve its constituents?
2. What were the challenges, the proposed solution, and the obtained results?

Sources: SAS Institute, Customer Success Stories, sas.com/success/pdf/hongkongeu.pdf (accessed February 2013); and enterpriseinnovation.net/whitepaper/text-mining-improves-hong-kong-governments-ability-anticipate-and-address-public.