Analysis of Surveys

About this Viewpoint

Analyzing survey responses helps organizations to identify any deficiencies in their products and services and initiate remedial measures. Understanding the drivers for customer satisfaction and loyalty is important for customer retention and helps derive actionable insights to improve existing products and services and business processes. Furthermore, an analysis of survey feedback can help spot emerging trends and enable enterprises to identify new business opportunities and forge ahead of the competition.

Surveys Give a Voice to the Stakeholders

A survey provides a direct, easy and reliable mechanism for business decision makers to understand the pulse of their key business stakeholders (such as employees, consumers/customers and suppliers) i.e., to gather information about key issues, concerns, problems and opportunities. A survey helps in gauging the ground truth, because it provides a voice to otherwise silent stakeholders. Survey responses contain a wealth of potentially useful information. Hence, analyzing survey responses is a challenging and critical task that often needs sophisticated statistical, data mining and text-mining techniques. Insights derived from a survey can be interesting, novel and actionable and can help in designing concrete action plans that lead to improvements in existing products, services, and business processes or even to new business opportunities. Survey responses can also be used to confirm or reject a hypothesis or to support or oppose a particular business decision.

Widespread acceptance of social media (emails, chats, blogs, Twitter and Facebook) has led to the emergence of another, equally valuable channel to understand the sentiments and opinions of stakeholders, particularly customers. Table 1 offers a comparison between the two channels used for gathering information from stakeholders.

<table>
<thead>
<tr>
<th>Specially-designed surveys</th>
<th>Social media data</th>
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<tbody>
<tr>
<td>Periodic</td>
<td>Continuously available</td>
</tr>
<tr>
<td>Structured question-answer format</td>
<td>Unstructured, free-form information</td>
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<tr>
<td>Specific feedback comprising answers to particular questions</td>
<td>Generic comments, sentiments and opinions; a slew of irrelevant text; topic drifts</td>
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<tr>
<td>Respondents are usually authenticated</td>
<td>Commenters are not necessarily authenticated</td>
</tr>
<tr>
<td>Difficult to fake or manipulate</td>
<td>Not so difficult to fake or manipulate for example, using dummy identities</td>
</tr>
<tr>
<td>Easy to understand the demographics of the respondents</td>
<td>Not so easy to understand the demographics of the commenters</td>
</tr>
<tr>
<td>Well-designed sampling methods can be used to select a representative subset of respondents</td>
<td>Commenters are untargeted and tend to be a biased sample (For example, young, tech-savvy individuals)</td>
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<tr>
<td>Designed with a specific goal</td>
<td>No specific goal</td>
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<tr>
<td>Available in a single place</td>
<td>Data is all over the web; gathering it is a challenge</td>
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<tr>
<td>Information available only when the survey is conducted</td>
<td>Available continuously but short-lived; relevance drops rapidly</td>
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<td>Respondents’ feedback is independent (respondents generally do not influence each other)</td>
<td>Since comments are visible to all, ‘herd mentality’ may drown minority opinions</td>
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Table 1: Surveys versus social media data
Types of Surveys

Employee satisfaction surveys: are used to gather information from employees about the quality, nature of work and job satisfaction, work environment, organizational culture, salaries and benefits, supervisors, appraisals, support functions, and internal processes.

Customer satisfaction surveys: are used to gather information from existing customers about products or services, particularly their features, performance, quality, cost and reliability. They are also used to gather information about brand image, customers’ loyalty, suggestions for improvement and incorporating new features.

Market Research Surveys: help discover or evaluate new customer segments, new markets and geographies and ideas for new products or services.

Event-specific surveys: are used to collect information and feedback from participants immediately after an event, such as a training session. Sometimes such surveys are conducted before an event, to enable planning and execution. For example, such a survey can be conducted before launching a new IT system to gather information about requirements and expectations from the end-users.

Channels for Survey Deployments

Different media (or channels) can be used to conduct surveys. In telephonic surveys, an executive contacts the intended person over telephone, asks questions and notes down the answers in a survey form. Person-to-person surveys support similar activities. However, telephonic and manual surveys impose various constraints on the survey process, limiting the effectiveness of the survey. In general, the number of questions cannot be too many nor can they be too specific (for example, requiring respondent to quote specific dates or figures and so on), to avoid losing the respondent’s interest. The number of people covered is limited and the accuracy of responses is often doubtful, due to manual data entry. Lastly, the customer responds to the questions through an intermediary, which may introduce bias and data quality issues in the captured response.

With the advent of computers and the web, overcoming these limitations is easy. Many organizations are moving towards online surveys, where respondents fill up the survey questionnaire over the web or the intranet. The responses are stored in relational databases. Online surveys offer more flexibility and convenience allowing respondents to complete the survey at any suitable time and save partially filled up responses. Finally, online surveys have a much larger reach, much lower data collection costs (avoids manual interviews or data entry) and more reliable data collection (online validations can detect simple errors in responses and prompt the respondent accordingly). Online surveys are now very easy to launch and manage, thanks to collaboration tools such as SharePoint and ready to use online survey tools such as SurveyMonkey, LimeSurvey and SoGoSurvey and many others.

Analysis of Survey Responses

Once the survey responses are collected and the survey is closed, the next task is to analyze the responses and decide the future course of action. There are several challenges in the analysis of survey responses including large data volumes, complex data and the need to define specific goals for analysis. Another challenge is to design and apply appropriate techniques for specific analysis of textual responses. Combining results of analysis of structured and textual data can be difficult.

The analysis of a customer satisfaction survey related to a particular product/service typically focuses on the following:

(i) What are the major areas of concern (or unhappiness)?

(ii) How does the ‘unhappiness’ vary across customer and product attributes (for example, across age, gender and geographies or across product features, configuration options and usage)? Are there any unusual variations; for example, are there any subsets of customers in specific age-groups, in specific geographies which are ‘unusually’ more unhappy with a particular product’s features, configuration options or usage?

(iii) Are there any inter-relationships among areas of concerns?

(iv) Can ‘unusually’ unhappy customers be partitioned into subgroups (or subsets) such that those within each subset share common characteristics?

(v) What are good predictors of customer unhappiness?
(vi) Identify ‘interesting’ subsets of unhappy customers.

(vii) What are the root causes of customer unhappiness?

(viii) Perform what-if (or impact) analysis to judge how specific changes in responses will affect overall customer satisfaction. For example, how will a 10% satisfaction increase in a particular product feature affect the overall satisfaction level?

(ix) If the goal is to achieve a specified increase in customer satisfaction, what are the optimal ways?

Similar questions can be asked about ‘happy’ customers.

Survey responses are usually analyzed in an interactive and exploratory manner. The analysis can be broadly divided into various phases:

(a) Basic (or exploratory) analysis: This stage involves the preparation of a number of simple reports and charts to summarize the basic facts garnered from survey responses. The goal here is to get a detailed and deeper understanding of the current status of stakeholders’ needs, concerns and behavior. Techniques such as slice-and-dice can be used to explore interesting areas more closely.

(b) Satisfaction Index: Computing a satisfaction index (SI) is important for the analysis of survey responses.

(c) Data mining and text mining: Data mining techniques can be used to derive interesting, novel and actionable insights from the data, without supervision. Text mining techniques can be used to derive similar insights from textual responses.

(d) Goal-driven statistical analysis: In this stage, specific statistical analysis is done to meet the stated business goal of the survey; for example, confirm/reject a hypothesis or support/oppose a particular business decision.

(e) Action planning: The final stage where a suitable future course of action is designed for achieving specific improvements based on the findings and insights gained in earlier phases.

Statistical techniques including correlation analysis, regression modeling and analysis of variance (ANOVA), probability density models, factor analysis, principal components analysis and CHAID along with visualization techniques such as multi-dimensional scaling can be used for more detailed analysis of responses and respondents.

Subgroup Discovery: Suppose a subgroup F comprises respondents satisfying specific criteria related to age, income and call volume and suppose also that F contains 83% unhappy respondents whereas only 34% respondents are unhappy in the set of remaining respondents (or in any randomly chosen subset of comparable size). Then clearly F is interesting and if such an interesting subgroup is large and coherent enough, designing special targeted programs can help reduce their unhappiness.

Predictive Models: Supervised learning considers a training dataset of records (for example, employees satisfying specific criteria related to age, gender, designations, location and experience along with a class label for each record (such as happy or unhappy). The well-known statistical classification problem consists of discovering rules which generalize the given labeled examples. These rules can then be used to predict the class label for unseen examples.

Root-Cause Analysis: An analysis of survey responses includes identifying subsets of unhappy respondents and the root cause for their unhappiness.

Text clustering: The responses (or sentences in them) could be grouped using text clustering techniques into clusters, such that each cluster indicates a coherent response. For example, responses to the question “Why would you recommend our company to others?” could be automatically grouped into three clusters—each cluster described by keywords such as helpful staff, well-known brand and excellent service.

Sentiment Analysis: Sentiment analysis techniques can be used to assign a sentiment level to each response; (+, 0, –). Aggregating sentiments respondent-wise or question-wise and then testing for correlation between the overall sentiment and overall Satisfaction Index (SI) for the respondents i.e., is overall sentiment a good predictor of the overall SI?

Discovering actionable suggestions: Textual responses sometimes contain very specific and actionable suggestions, for e.g., Please provide the facility to leave a message for the support executive. Such specific suggestions can directly help in addressing specific issues and thereby improve satisfaction. Text-mining techniques identify such important suggestions from a given set of textual responses.
Conclusion

With the advent of the Internet, it has become easy to launch surveys and collect the ‘ground truth’ directly from key stakeholders. Using various statistical, data mining and text-mining techniques for analyzing survey responses, organizations can derive actionable insights. These insights can help improve existing products, services, and business processes and identify new business opportunities.

About Author

Girish Keshav Palshikar

Girish Keshav Palshikar holds an M.Sc. in Physics from the Indian Institute of Technology, Bombay and an M.S. in Computer Science and Engineering from the Indian Institute of Technology, Chennai. Since 1992, Girish has worked with the Tata Research Development and Design Centre (TRDDC), India, where he is now a principal scientist and leads the Machine Learning R&D Group. He was recently awarded the title of TCS Distinguished Scientist. Girish has published about 75 papers in international journals and conferences and is a visiting Lecturer of Computer Science at the University of Pune.

References

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