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Leveraging Speech Analytics to Improve Data Quality in Surveys

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Abstract – With increasing demands for data in this fast-paced world to serve the needs of policymakers, there is a need for data collection methods to also evolve. One of the tools used by the Singapore Ministry of Manpower is the utilisation of speech analytics in our official surveys**.** With the vast amount of data collected via phone interviews, speech analytics offers rich insights from the survey responses captured during these interviews. In terms of data validation, speech analytics allow cross checking of verbal responses against transcribed data to flag out data inconsistences. Through speech analytics, respondent sentiments can also be analysed to provide insights on the level of customer engagement. With this useful knowledge, the Ministry of Manpower can take actionable steps to improve data quality, questionnaire design and respondent engagement.

Keywords**:** Speech analytics, data quality,

1. Introduction

The Singapore Ministry of Manpower is a key government agency responsible for the development and implementation of labour policies. One of the crucial components in policy-formulating is the use of data collected from the official surveys conducted by the Ministry of Manpower. To formulate effective policies, there is a need to provide policy makers with timely and granular data. One of the tools used by Ministry of Manpower is the implementation of speech analytics for conducting its official surveys.

Previously, the Ministry of Manpower uses Computer Assisted Telephone Interviewing (CATI) to facilitate phone interviews and reduce the burden of data entry and coding processes. However, valuable insights from the large amounts of information contained within these phone interviews could be overlooked if not analyzed further. This is where speech analytics comes into play.

2. Speech Analytics

The speech analytics software is integrated to the contact centre's call management system to process recorded phone interviews. During the processing phase, a combination of phonetics, Large Vocabulary Continuous Speech Recognition (LVCSR) and semantic indexing is applied to transcribe speech into text.

Phonetics analysis forms the foundation by breaking down speech into individual phonemes which is useful to identify words or phrases. The function of LVCSR allows the processing of continuous stream of speech into text. With the use of extensive language models and acoustic models, LVCSR can recognise the vast array of words and phrases to enable better transcription accuracy and understanding of the broader context of conversations. Once the speech is converted into text, the application of semantic indexing adds depth by making sense of the spoken interactions to provide a better understanding of the context, intent and sentiments of what was been said in the conversation.

By analyzing this information, the Ministry of Manpower can derive insights to improve data quality, questionnaire design process and respondent engagement.

3. Improving Data Quality

By comparing the transcribed text with the data entered by the enumerators, data inconsistencies can be detected for further review. Through this comparison, several forms of errors can be identified such as the following a) transcription errors

where an enumerator might have misheard the respondent and entered a wrong response b) comprehension issues where the respondent might have misunderstood the question thus providing a wrong response c) data entry error where a correct response was provided during the phone interview but incorrectly entered in the system.

By identifying these discrepancies, the necessary rectifications and improvements can be administered accordingly such as correcting the errors during data processing, identifying patterns of misunderstanding or miscommunications for specific questions and highlighting common mistakes during enumerator training.

4. Enhancing Questionnaire Design

Insights derived from speech analytics can help to improve questionnaire design by analyzing the patterns in responses captured across the surveys and the questions posed by respondents during phone interviews. These valuable insights have helped the Ministry of Manpower to identify the following areas to improve the questionnaire design for its surveys.

S/N	Areas for improvement	Description
1	Question Clarity	Speech analytics can highlight questions that consistently lead to confusion or misinterpretation. For example, if many respondents ask for clarification on a particular question, it may indicate that the wording needs refinement.
2	Response options	Analysis of verbal response can aid in checking if pre-defined response options require further updating.
3	Question order	Examination of how respondents transit between questions helps in designing the survey questions in an intuitive flow.
4	Time allocation	By analyzing the time spent on each question, it allows survey designers to review the questionnaire length and seek to refine the questions to reduce the time to conduce the survey.

These insights enable iterative improvement to be made in survey design, leading to more efficient data collection and a respondent-centric questionnaire.

5. Improving Respondent Engagement

The use of speech analytics helps to play a crucial role in enhancing respondent engagement during surveys. The technology offers real-time sentiment detection through the analysis of vocal cues and linguistics patterns to detect negative emotions or dissatisfaction during the call. At the Ministry of Manpower, this tool is used for immediate intervention where the system will alert the supervisors to assist enumerators to handle the calls with respondent thus reducing potential escalations. Another useful feature is detecting keywords that are negative in nature to highlight potential negative calls. These calls are reviewed and service recovery are handled by supervisors in accordance to service guidelines.

These initiatives help to improve respondent satisfaction and gather valuable feedback to improve the survey processes.

6. Limitations

However, it is important to acknowledge the limitations and challenges when using speech analytics. Some of these areas include accuracy and reliability, particularly with diverse languages and accents; privacy issues related to voice data storage and usage; technical limitations in processing large volumes of audio data; and substantial implementation costs.

7. Conclusion

The implementation of speech analytics in the Ministry of Manpower's survey processes represents a significant advancement in data collection and analysis methodologies. This technology has demonstrated its potential to enhance data quality, improve questionnaire design and boost respondent engagement. By leveraging speech analytics, the Ministry has been able to identify and rectify data inconsistencies, refine survey questions for clarity and relevance and respond proactively to respondent needs and concerns.

Despite the limitations, the potential benefits of speech analytics are significant and has helped the Ministry of Manpower to improve the quality of its official statistics.