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Behavior-Triggered Answer Reconfirmation for Spam Detection in Online Surveys

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Abstract

This paper describes a survey system that can validate responses received in an online survey. The survey system can deem an answer to a survey in progress as likely unreliable and dynamically add a verification question. The survey system can deem an answer as likely unreliable in several ways, including receiving the answer too quickly or receiving an answer inconsistent with what is known about the user. A spammy answer can come from a user clicking through the survey without considering the question, or by a web robot configured to click through the survey to access an online document or a web application. If the survey system receives an answer that it deems likely unreliable, it can present the user with a verification question that is similar to the original question, but with the answers presented differently. If the answer to the verification question is consistent with the original answer, the survey system can deem the response as non-spammy and continue accordingly. If the answer is inconsistent with the original answer, the survey system can deem the response as spammy and take appropriate action.

Description

Online surveys have been the de facto data collection tools for businesses to conduct market research and build out data products. However, spammy survey responses plague these products. For example, analyses showed that for typical single-choice survey questions, users tend to select the first and last answers in the list of choices much more often than the other answers. Validation against user panels has also shown that answers submitted too quickly or slowly tended to be less trustworthy than answers received within 2-6 seconds after a survey question was shown. Spammy survey responses can also be given by an internet bot or web robot configured to click through surveys to gain access to an online document or web application. The survey system described in this paper aims to detect and reduce spammy survey responses by dynamically rearranging the survey answers and asking the user to confirm their choice when the response is deemed unreliable. If the user fails to re-identify the same response that they initially
submitted, the response can be considered spammy.

The survey system can detect a likely unreliable in a variety of ways. For example, a response can be deemed unreliable if it is the first or last choice in a list, or if the user clicked the answer too quickly (e.g., in less than 2 seconds). The survey system can also be made more sophisticated by learning from a user's past behavior.

If the received first responses are considered to be reliable, the survey can proceed without reconfirmation.

The survey system collects a user’s response(s) to a question following the steps shown below in Figure 1.

![Figure 1: Steps for performing behavior-triggered answer confirmation](image)

1. The survey system presents a question to the user. For single choice or multiple choice questions, the list of answers will be presented to the user in the specified order.

2. The survey system receives a response to the question. The response will be recorded and stored by the system.
3. The survey system determines whether the user’s response is likely unreliable based on the following factors:
   a. How much time the user took to submit the response after the survey question is viewable to the user.
   b. What answer did the user select or enter. Is the answer that the user select the first or last item in the list of choices.
   c. Known profile information about the user’s, such as their age, gender, income, etc.
   d. The user’s response history, including information such as how many questions did the user answer; how many time did he trigger reconfirmation for the last N questions; how spammy was the user in the past.

The survey system can compute a reliability score of the user’s first response based on these factors. The score can be computed either based on a set of rules or a machine learned model trained from past surveys on user panels.

4. If the reliability score of the user’s first response is higher than some predetermined threshold, the survey system will deem the response reliable and the user can proceed to the next question of the survey. Otherwise, the survey system will deem the response unreliable and the reconfirmation workflow will be triggered.

5. The survey system can activate the answer reconfirmation workflow. The survey system presents the user with the same question with rearranged or transformed answer choices and prompts the user to select their answer(s) again. The answer transformation can be done in a variety of ways, such as random shuffling or rotation, such that the answer(s) the user submitted in step 2 are as far apart as possible to their new positions.

6. The survey system receives the user’s response again. The survey system can compare the new response to the original response recorded in step 2. If they are different, the system will label both responses as spammy.

**Examples**

The following three examples illustrate the survey system confirming a single choice
answer, a multiple choice answer, and an open-ended answer, respectively.

**Figure 2: Single choice question example**

Figure 2 is an example of confirmation of a single choice answer. The survey system initially presents the question with answers arranged in order of increasing range, as shown in the left tile. The survey system receives the user’s answer in the middle tile—the user has selected the first answer.

The survey system may deem this answer likely unreliable. Perhaps the answer was received too quickly, or conflicts with known information about the user. The survey system presents the question again, but with the answer order shuffled, as shown in the right tile. The survey system can receive the user’s answer again. If the answers do not match, the survey system can deem the response spammy and take appropriate action.
Figure 3: Multiple choice question example

Figure 2 is an example of confirmation of a multiple choice answer. The survey system initially presents the question with answers arranged in a certain order, as shown in the left tile. The survey system receives the user’s answer in the middle tile—the user has selected the first answer.

The survey system may deem this answer likely unreliable. Perhaps the answer was received too quickly, or conflicts with known information about the user. The survey system presents the question again, but with the answer order shuffled, as shown in the right tile. The survey system can receive the user’s answer again. If the answers do not match, the survey system can deem the response spammy and take appropriate action.

![Multiple choice question example](image)

Figure 4: Open-ended question example

Figure 4 is an example of confirmation of an open-ended choice answer. The survey system initially presents the question and accepts an answer entered into the answer field, as shown in the left tile. The survey system receives the user’s answer in the middle tile—the user has entered a number.

The survey system may deem this answer likely unreliable. Perhaps the answer was received too quickly, or conflicts with known information about the user, or is nonsensical based on the question; i.e., a letter answer to a quantitative question. The survey system presents the question again, but with multiple choice answers rather than an answer field, as shown in the right tile. The survey system can receive the user’s answer again. If the answers do not match, the survey system can deem the response spammy and take appropriate action.
Advantages

This survey system overcomes the limitations of alternative techniques:

1. Unlike simply randomizing the answer when a question is first shown, the method can detect and help to eliminate spammy responses.

2. Unlike asking extra validation questions, the methods avoids the time-consuming phase of designing validation questions. It does not increase the payload of the survey system, nor does it increase the workload of users since they don't need to spend time reading extra questions. It provides a low-cost mechanism to determine the validity of individual answers.

3. Unlike blindly discarding responses that are received too quickly or too slowly, the method offers a chance (both for the user and the surveyor) to quickly verify a response, reducing data loss while retaining the ability to weed out truly spammy answers.

4. Unlike enforcing a minimum wait period, the user is still in full control of the pacing of the survey. They can quickly proceed to the next step by reconfirming their answer at no delay.