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A Web-Based Questionnaire Builder to Facilitate form Management for the Electronic Data Capture with REDCap

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Abstract. REDCap, a popular platform for building surveys for electronic data capture, offers two methods for creating questionnaires: an interactive web interface to modify single questions and an upload method to import entire questionnaires. Both methods present limitations in terms of usability and time needed for different tasks. We propose a browser-based web application to design and manage REDCap questionnaires using a What-You-See-Is-What-You-Get approach. The application provides a user-friendly interface for a comprehensive overview of all imported questionnaires, and three distinct views cater to different aspects of the questionnaire design process. The questionnaires can be imported and exported through the REDCap CSV format and thus integrate seamlessly into its environment. REDCapQB represents a significant advancement in questionnaire design and management, offering researchers a powerful and user-friendly tool for electronic data capture in translational research studies within the REDCap ecosystem.

Keywords. electronic data capture, questionnaire, REDCap

1. Introduction

REDCap is an Electronic Data Capture application for compiling, managing, and conducting online surveys [1]. Through field validation, branching and skip logic, and preventing missing data codes during data entry a higher data quality is achieved. There are two options to develop surveys in REDCap: The Online Designer offers context information, but questions must be created individually, which makes the process time-consuming. The second option is to import a survey from a zipped CSV file. The questionnaire can be designed by using a text or spreadsheet editor to generate the items in a CSV table, but entries are not validated, and mistakes are only recognizable after the survey is imported into REDCap. For our use cases, we require the advantages of both methods and the option to switch seamlessly. Also, we need to shift from a technical perspective of creating questionnaires to simply writing questions and expected answers.

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2. Methods

We created a web application that operates within the user's web browser, without the need for a server backend for data processing. It leverages Angular [2], an open-source framework for building single-page web applications written in TypeScript[2]. The user interface is created using Bootstrap[3] version 5, a well-established CSS framework. Questionnaires are loaded from the raw CSV data into a formalized internal structure representing sections, questions, and attributes. Changes made within a view of the application are reflected in the underlying data model, ensuring consistency.

3. Results

Our web application provides an overview of imported questionnaires and allows their modification and composition through three different views. The *Structure View* presents a high-level overview of the questionnaire layout, including individual sections. The *Form View* presents the questionnaire in a tabular format, similar to the CSV file exported from REDCap, but in a condensed and organized representation. The *Questionnaire View*, designed with a What-You-See-Is-What-You-Get (WYSIWYG) approach, displays the questionnaire as participants experience it. Once a questionnaire is finalized, it can be exported as a CSV file maintaining the same structure as the REDCap export.

4. Discussion and Conclusions

Integration of our application as a plugin for REDCap would improve the questionnaire design workflow. Also, the integration with the extensive library of questionnaires available through the REDCap consortium would encourage user contributions and further developments towards a publicly and freely available library of questionnaires.

We propose a novel and effective web application supporting the questionnaire design with a WYSIWYG approach entirely within the user's web browser. It combines a user-friendly web interface with a powerful table-like interface, offering a middle ground suitable for both novice and advanced REDCap users. It simplifies the process through the effortless import of existing questionnaires from REDCap in CSV format, eliminating the manual definition of data fields and ensuring consistency.

References

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