

SmartEDU: A platform for generating education-support materials

Maria João Costa

Instituto Pedro Nunes, LIS

Portugal

mcosta@ipn.pt

Bruno Caceiro

Mindflow

Portugal

bruno.caceiro@mindflow.pt

Renato Matos

CISUC, DEI, University of Coimbra

Portugal

renatomiguelpmatos@gmail.com

Alcides Marques

Mindflow

Portugal

alcides.marques@mindflow.pt

Hugo Amaro

Instituto Pedro Nunes, LIS

Portugal

hamaro@ipn.pt

Hugo Gonçalo Oliveira

CISUC, DEI, University of Coimbra

Portugal

hroliv@dei.uc.pt

Abstract—With technology taking a more prevalent role in our daily activities, new opportunities and challenges emerge. New technological tools have been successfully used in the educational context for some time now, facilitating teachers, educators, and trainers in the transmission of knowledge. However, there are still tasks that can take advantage of these developments, as is the case with the creation of multiple-choice questions and slide presentations. Artificial Intelligence, in general, and Machine Learning and Natural Language Processing, in particular, can be used to automatically generate initial versions of slide decks and of natural language questions. Instead of creating them from scratch, teachers and trainers will only have to perform minor editions, and save time for other tasks. This document presents the platform SmartEDU, which allows users to generate multiple-choice questions and drafts of slide presentations from any text.

Index Terms—Natural Language Processing, Question Generation, Presentation Generation

I. INTRODUCTION

More and more domains can leverage on technology for increasing efficiency. This is the case of education, where teachers and trainers generally resort to handcrafted supporting materials. This includes tests with their questions, for evaluation, and slide decks, for presenting specific topics. While there is a good, widely used selection of tools to create slideshows, like Microsoft PowerPoint¹, Prezi², etc, they only help in making aesthetically appealing slides with the use of themes or templates, whereas adding contents is up to the author of the presentation. However, that takes a lot of time because it entails reading through several documents, summarizing and restructuring their contents.

We present SmartEDU, a platform for speeding up the production of education materials. Without regard to language limitations, it is possible to use any textual file (such as plain text, PDFs, or Word documents) for: (i) producing a list of multiple-choice questions, each consisting of a natural language question and four options, one correct (according to the input document) and three incorrect (distractors), obtained from the document or from external sources; (ii) producing

slide drafts, i.e., Powerpoint documents where relevant contents from the input document are organized in slides. It's important to note that there aren't any presentation templates proposed in this process, as the presentations only focus on the text and not on the aesthetics. In any case, the user may further review and edit the generated results, e.g., towards the final production of a test / quiz, or of a slide presentation. By leveraging on SmartEDU, teachers and trainers can save up time, which they can dedicate, for instance, to the students.

In this paper, we will delve into the algorithms behind the generation of questions, answers, and slides (section II), and then demonstrate the SmartEDU platform (section III) and its interface for creating, storing, and editing multiple generations of slides and quizzes effortlessly. We also highlight the key features of the platform and showcase its ease of use, making content creation simpler and faster.

II. APPROACH

SmartEDU is based on two algorithms, one for generating questions and answers, another for generating slides, from any textual document. Both of them rely strongly on models for Natural Language Processing (NLP) based on the transformer architecture [1].

The generation of multiple-choice questions involves the generation of three outputs: the correct answer, which can be any named entity in the input document, identified automatically with the spaCy³ toolkit; the question, generated with a transformer model⁴ and incorrect answers (distractors), generated with the help of a pre-trained GloVe [2] model, where words are represented in a semantic space. More precisely, for each token in the correct answer, similar words are obtained from GloVe, and distractors result from replacing the original token with those returned.

Slide generation encompasses the following steps: automatic text summarization, again, using a transformer model fine-tuned for this purpose [3]; organization of the sentences of the

¹<https://www.microsoft.com/microsoft-365/powerpoint>

²<https://prezi.com>

³<https://spacy.io/>

⁴<https://huggingface.co/mrm8488/t5-base-finetuned-question-generation-ap>

Overview

- The name is an acronym for the four components the technique examines .
- Strengths and weaknesses are usually considered internal, while opportunities and threats are external .
- The degree to which the internal strengths of the firm matches with the external opportunities is expressed by the concept of strategic fit .

Fig. 1. An example of some slides from the presentation draft generated with Distillbart for the Wikipedia article “SWOT analysis” (https://en.wikipedia.org/wiki/SWOT_analysis), as of June 2022.

resulting summary into topics discovered automatically with the LDA algorithm [4]; slide composition, where slides are created for its discovered topic and contain the related text. Slide titles are generated with a transformer model [5] fine-tuned for, given the contents of a Wikipedia section, produce its title. A human evaluation of the generated presentations was conducted, and the majority concurred that the slides were generally of good quality and served as a good basis for the creation of the final presentations.

III. DEMO

This section presents a walkthrough of the SmartEDU platform. After logging in, the Home Page appears. It provides a set of folders created by the user, and inside can have a number of presentations and questions. In order to generate them, there is the button “Generate” that shows a pop-up with both options.

When the option for generating questions is selected, a screen appears with several fields to populate (see, e.g., figure 2). These include the title (for organization purposes), text, number of questions, and language. Following the insertion of all the data, the algorithm described in section II returns a list of questions and answers. The user may then edit the results and export them as an Excel file.

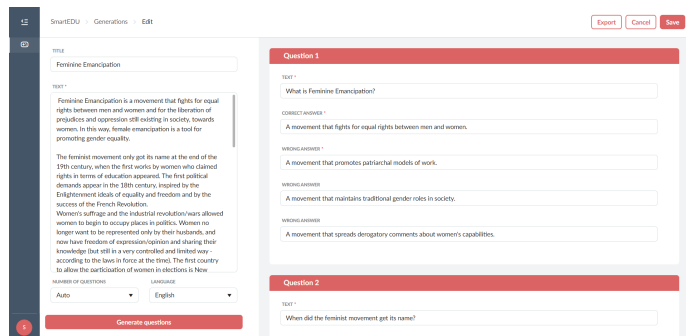


Fig. 2. Screen for generation of questions and answers

On the other hand, for generating presentations it is only necessary to have a text and a title.

The resulting presentation will then be available for download on the platform. An illustration of a slide presentation can be found in Figure 1. However, both this process and the generation of questions may take some time depending on the size of the text being processed. So, this platform does not oblige the user to stay on the screen while the request

Use

- SWOT analysis has been used at different levels of analysis in many arenas, not just in profit-seeking organizations .
- Examples include non-profit organizations, governmental units, and individuals .
- Analysis may also be used in pre-crisis planning and preventive crisis management .
- SWOT can be used to build organizational or personal strategy .

is being processed. As we can see from figure 3, the folder keeps the several requests made with information about their id (number of request), title, status (processing, completed), type (presentation or question), and generated date.

ID	Title	Status	Type	Generated Date
85	Feminine Emancipation	Completed	Question	20/01/2023 12:33
86	Forma 1	Processing	Presentation	20/01/2023 12:33

Fig. 3. Folder showing the requested generations

IV. CONCLUSION

We have presented the SmartEDU platform, which can generate multiple-choice questions and presentation drafts from any textual document. This can be a valuable tool for educators, trainers, and presenters looking to generate multiple-choice questions and presentations quickly and with minimal effort. While the generated results may not completely finished, they serve as a starting point for content creation. With its intuitive user interface and ability to save and edit multiple generations of content, the platform empowers users to create engaging and informative materials with ease.

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