

교과서와 AI 웹앱을 활용한 효과적인 교육방식

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Effective teaching using textbooks and AI web apps

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● 요약 ●

Images in the textbooks influence the learning process. Students often see pictures before reading the text and these pictures can enhance the power of imagination of the students. The findings of some researches show that the images in textbooks can increase students' creativity. However, when learning major subjects, reading a textbook or looking at a picture alone may not be enough to understand the topics and completely realize the concepts. Studies show that viewers remember 95% of a message when watching a video than reading a text. If we can combine textbooks and videos, this teaching method is fantastic. The "TEXT + IMAGE + VIDEO (Animation)" concept could be more beneficial than ordinary ones. We tried to give our solution by using machine learning Image Classification. This paper covers the features, approaches and detailed objectives of our project. For now, we have developed the prototype of this project as a web app and it only works when accessed via smartphone. Once you have accessed the web app through your smartphone, the web app asks for access to use the camera. Suppose you bring your smartphone's camera closer to the picture in the textbook. It will then display the video related to the photo below.

키워드: 교과서(Textbook), 비디오(Video), 웹앱(Web app) 기계학습(Machine Learning, ML)

I. Introduction

AI permeates our daily lives, and we can see proof of this in every one of our technologies. You can use our technology as a helpful tool in every aspect of education. For example, this kind of web apps can be of great practical help in learning traffic rules and signs. By scanning the mark on the textbook, learners can be introduced with small animations of what the mark means, what actions can occur, and what to do in some situations. In addition, I think this product is beneficial not only in textbooks but also in newspapers and magazines. It helps to revive the contents and deliver them effectively to the reader. For example, by scanning a photo of the football player who led his team to victory, you can watch a small

video of how he scored.

II. Related works

Marta M. Koć-Januchta[1] adds digital education to science learning for their students, they used an e-book to add a limited question-answering section to learning for four days. In this regard, while students revealed that the AI-based feature of suggesting questions based on highlighting was very helpful for learning, they communicated various ideas for future development of the books that expressed the need for a more personalized learning and feedback during the learning process.

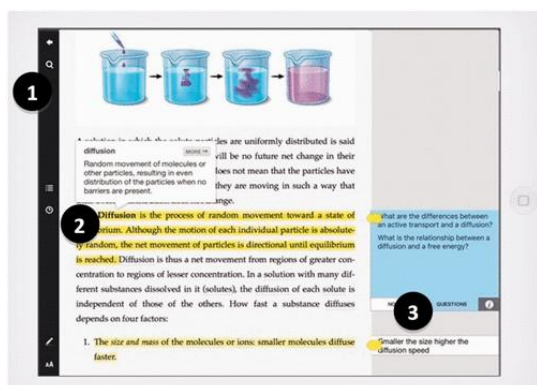


Fig. 1. Screenshot of the Interface of the AI Version of the Book Showing AI-Based Opportunities to Ask Questions (1) and Receive Suggested Questions From Pop-Up Definitions (2) or Based on Text Highlighting (3)[1].

Kaleb Bassett[2] hypothesized that more students would watch the videos than read the textbook and that both types of preparation would positively affect exam performance. The results suggest that students can be motivated to engage with the material by reading or watching videos and that a variety of learning materials may better engage students than use of only one medium. In addition, education using video shows effective results in medical classes[3, 4].

Other people have done some similar work. For example, a Live Portrait is a photograph or image that has been linked to a video. As well as, another work is LifePrint, which has launched a wireless portable printer and companion application, designed to print and share photos enhanced with augmented reality technology. Also, it has application and uses the LifePrint app (iOS and Android) to create, share, and view these prints. However, still, I haven't come across any exactly the same project.

III. The Proposed new textbook

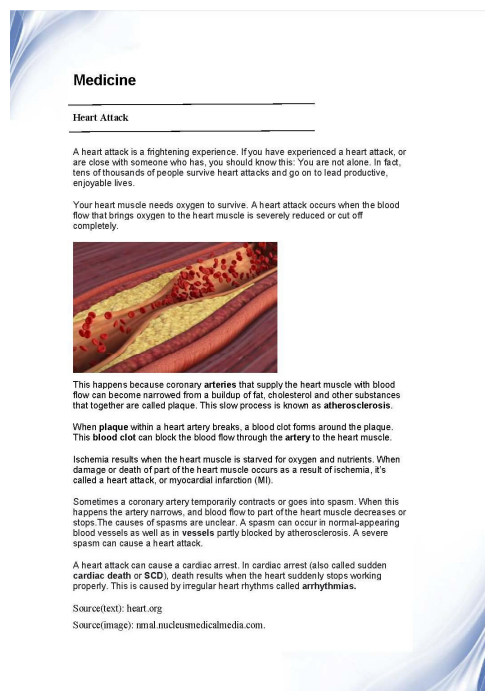
We created a simple textbook and a web app that recognizes pictures contained within the textbook. The textbook starts by taking a picture of the QR code on the textbook's cover with a smartphone. The QR code was composed as shown in (Fig. 2), and the book's contents were composed of different themes as shown in (Fig. 3). We made a total of five labels have been used. So we use Astronomy, Chemistry, Biology, Physics and Medicine as labels and also as dataset names.



Fig. 2. QR code on the textbook's cover

The web app has a simple look and is easy to use. The display consists of 3 sections: Camera, Video and Label. Once the image is detected with high accuracy, a video-linked image is automatically displayed in the Video Section. Videos are automatically updated when a new image is detected. The label Section is used to display the class label of the defined image. We have identified the appropriate subject names for the image as a label.

We used CNN to classify images in textbooks and made them access links to videos related to images and play the video. Our image recognition AI model detects specific images very accurately, despite being trained on very small data sets. This product will only display video when the image detection rate reaches 95%.



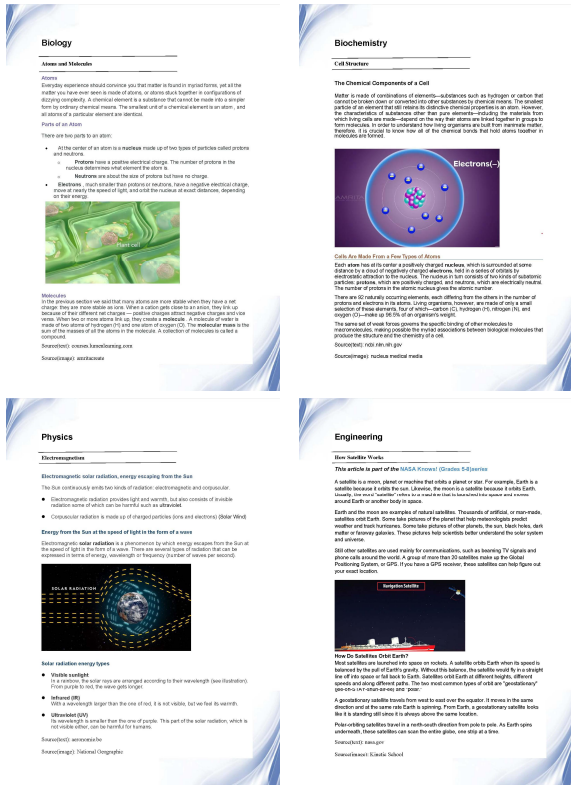


Fig. 3. Sample textbooks made by ourself

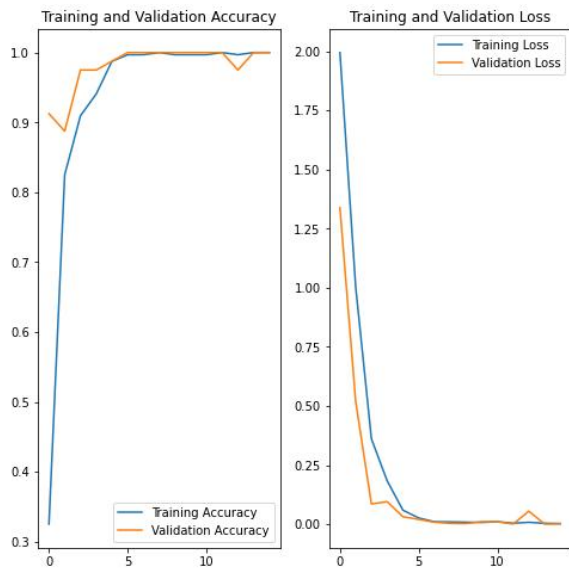


Fig. 4. Training result graph by images

IV. Conclusions

We participated in various classes, but we wanted to compensate for the shortcomings of textbooks every time. Through the capstone design class held by the university, the existing textbook was implemented as a model for the next generation textbook.

We hope that the project will contribute to the quality of students' education in the future. Even if we discover errors in the implementation process, we will eliminate them.

Our results can be accessed via the address follow: "https://github.com/sobirjonhabibullaev/envision.git".

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