

Trial Production of Sound-Embedded Accessible PDF

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Abstract

The purpose of this paper is to introduce sound-embedded accessible PDF. Sound-embedded accessible PDF file is accessible PDF file with embedded sound files corresponding to the text. Accessible PDF documents can be read out by a screen reader using embedded tags. However, Japanese writings are difficult for screen readers because of multiple readings of kanji characters and the weakness of word dividers. Sound-embedded accessible PDF may be a solution to the problem.

1 Introduction

Recently, a lot of electronic documents are published in PDF. PDF is the most widely used format for fixed-layout documents, such as textbooks, magazines, and picture books. However, it is difficult for print disabled people to use PDF file without audio support. Accessible PDF[1] helps them to read a PDF file by screen reader. The correct order of sentences of reading out is specify in Accessible PDF for screen reader. PDF/UA is the international standard of the Accessible PDF technology. Accessible PDF is quite available in Europe and the United States.

Documents in Japanese language are difficult for screen reader to read correctly because of multiple readings of kanji characters and the weakness of word dividers of Japanese writings. Screen reader often misread Japanese documents. This problem is a very important matter for textbooks for children.

This paper proposes “Sound-Embedded Accessible PDF.” Sound-embedded accessible PDF is accessible PDF with embedded sound files corresponding to the text. When a PDF file is displayed using a PDF viewer such as Adobe Reader if a part of text is clicked, then the corresponding embedded sound is reproduced (Figure 1). Sound-embedded accessible PDF file can help the print disabled for reading and understanding documents.

2 Accessible PDF

Accessible PDF is useful for people with disabilities to read electronic contents. Accessible PDF is tagged for logical reading order and semantics. Without tags in PDF, screen reader can not read out logical reading order.

2.1 PDF/UA

PDF/UA (PDF/Universal Accessibility)[2][3], the informal name for ISO 14289-1 is the international standard for accessible PDF technology. PDF/UA ensures accessibility for people with



Figure 1: Sound-Embedded Accessible PDF on Adobe Reader

disabilities who use assistive technology such as screen readers, screen magnifiers, joysticks and other technologies to navigate and read electronic content.

The attentions for PDF/UA are the followings:

- If used, assistive technology is allowed security of document,
- Structured PDF and a tag tree,
- Artifact content (page numbers, running heads, purely decorative images and so on) is tagged “Artifact”,
- Fonts include valid ToUnicode entries,
- Tags use valid semantics,
- Non-text content include alternative text,
- Headings are valid, and
- Language is set.

3 Sound Embedded Accessible PDF

The sound-embedded accessible PDF is accessible PDF with embedded audio files corresponding to the text. When you tap the displayed text using Acrobat Reader[4], corresponding embedded sound is played.

Currently Sound-embedded accessible PDF can be used only on Adobe Reader on Windows 7, or higher and Mac OS X.

3.1 Cleating Sound Embedded Accessible PDF

To create Adobe Illustrator[5], Adobe Acrobat Pro[6] and JUST PDF[7] made by JustSystems corporation. The Creation of sound-embedded accessible PDF is can be divided the following 3 stages,

1. Preparing layers,
2. Embedding sound files, and
3. Setting actions.

The detail of stages are described as follows.

Preparing layers

Sound-embedded accessible PDF uses translucent rectangular objects to highlight text. The translucent rectangular object are arranged on a different layer for each part of text. The layers and the translucent rectangular objects are made by Illustrator (Figure 2).

Layers and rectangular objects are created by the following steps.

1. Open the PDF file by Illustrator.
2. Make a new layer.
3. Select rectangle tool. Make rectangular object on one part of text on the layer created in step 2.
4. Change the opacity and color so that the rectangular object's will be translucent.
5. Repeat step, 2, 3, and 4 for all parts of text.

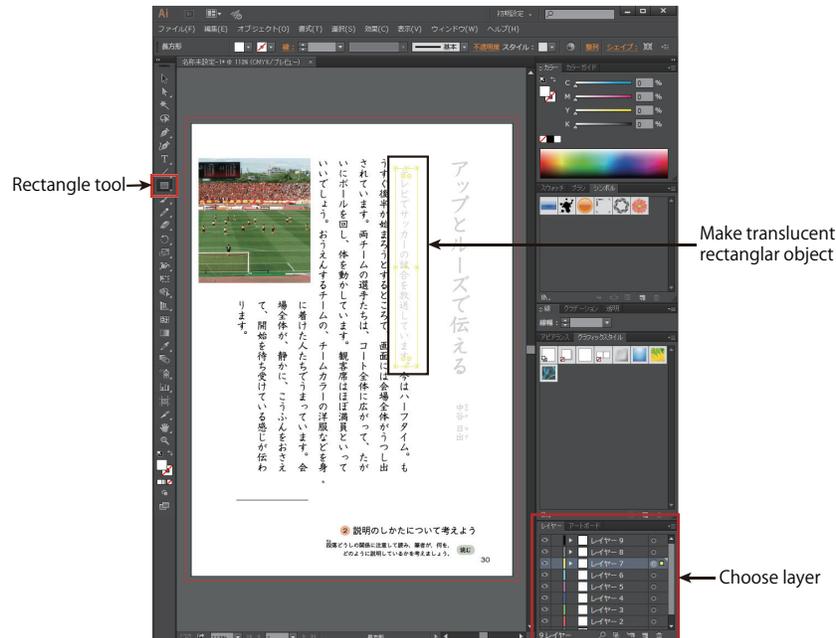


Figure 2: Preparing layers on Illustrator

Embedding sound files

In order to embed sounds to a PDF file, we use JUST PDF. JUST PDF has a sound tool that can make button object with embed a sound file. The buttons can be transparent so that they don't change the look of a document. When a button object is clicked, the embedded sound file can be reproduced (Figure 3).

Button objects with a embedded sound file are created in the following steps:

1. Open the PDF file after the steps of preparing layers by JUST PDF.
2. Select sound tool on tool bar. Specify the size and position of button object, and choose a sound file to embed.
3. Repeat step 2 for all parts of text.

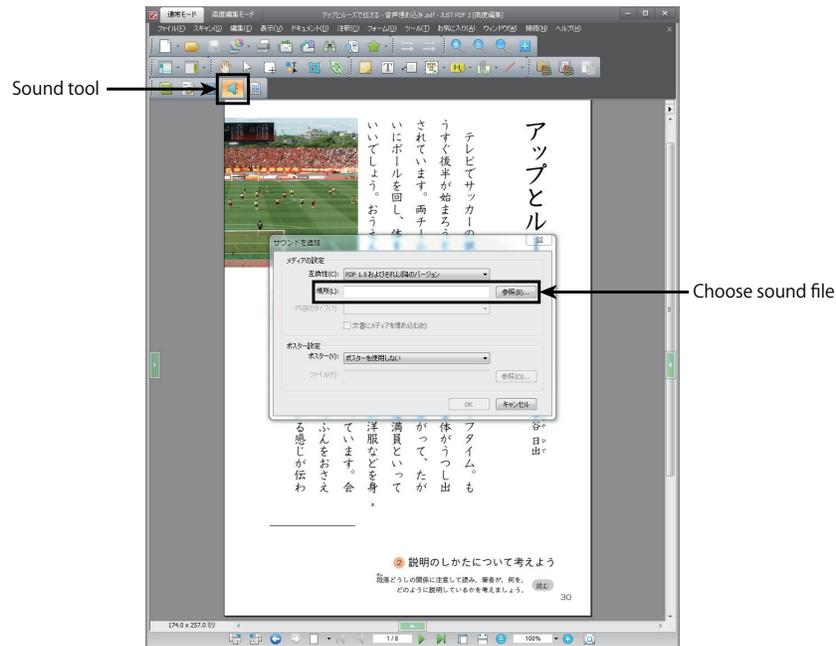


Figure 3: Embedding Sounds on JUST PDF

Setting actions

To set actions we use Adobe Acrobat Pro (Figure 4). The highlight function using layers made by Illustrator is realized as actions of button objects.

The Actions are set in the following steps:

1. Open the PDF file after the steps of embedding sound files by Adobe Acrobat Pro.
2. Choose "Select Object Tool" on rich media tool. Select a button object with an embedded sound file.
3. Choose "Layers Tool" on the sidebar. Select layers to set to visible when the button object is clicked.
4. Open properties of multimedia and set action when the mouse button is released.
5. Set initial condition of layers. Set all layers with translucent rectangular objects to be invisible.

6. Open properties of multimedia. Set action when the focus is removed.
7. Repeat step 2, 3, 4, 5, and 6 for all button objects.

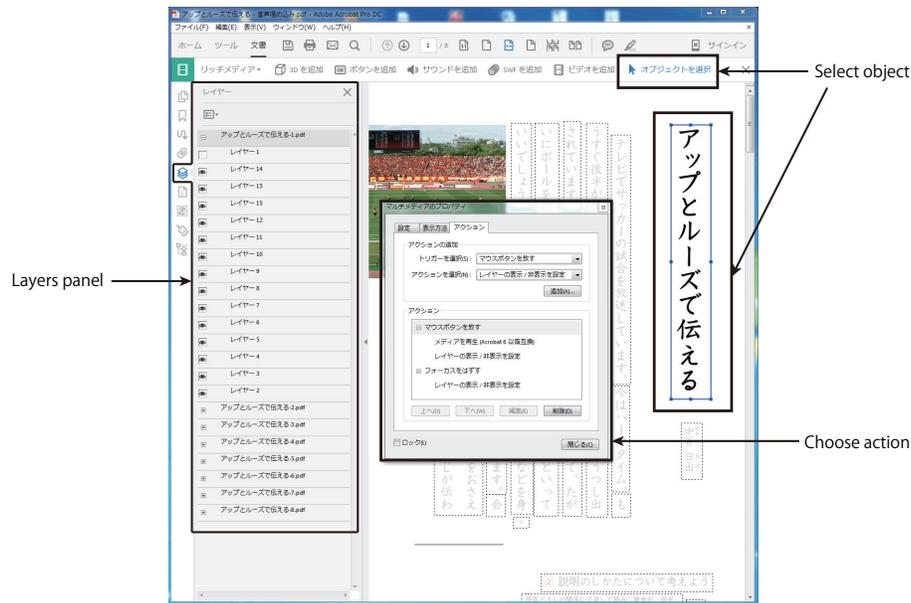


Figure 4: Setting Actions on Acrobat Pro

4 Evaluation of Sound-embedded accessible PDF

The usability of sound-embedded accessible PDF was checked by asking three dyslexic elementary school students. They are in the 5th grade and have difficulty of reading. A tablet PC, Surface Pro 3 (Microsoft corporation, Windows 8.1) was prepared. Sound-embedded accessible PDF of a part of textbooks in Japanese language published by Mitumura Tosho Publishing Co.,Ltd was installed on the PC. Acrobat Reader DC (Adobe Systems Incorporated) was used to read the PDF. One week after they started using sound-embedded accessible PDF, they were asked about the following questions:

1. Could you read displayed sentences easily?
2. Could you change pages easily?
3. Could you select sentence easily?
4. How do you think the highlight function?

The answer were chosen from “very easy”, “easy”, “fair”, “difficult” and “very difficult”.

For Question 1, two students answered “easy” and one “fair”. For Question 2, all three answered “very easy”. For Question 3, two students answered “very easy” and one “easy”. For Question 4, all three answered “very good”.

5 Conclusion and future works

Sound-embedded accessible PDF can help to understand correctly the text on a PDF file. Highlighting the text can help reader to read a document. These functions of Sound-embedded accessible PDF can support print disabled. However, sound-embedded accessible PDF has some assignments to solve. First, sound-embedded accessible PDF can be used with only Adobe Acrobat Reader. Second, a sound in the PDF file can't be paused or stopped. Last, it takes a long time to create a sound-embedded accessible PDF file.

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