

Making PDFs with Animation and Lecture Video for Beginner

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Abstract: Animations and visualized lecture video with audio have become most valuable contents in online instruction. Having the necessary skill sets to produce those contents is not an easy task, especially for instructors who are going to teach online course first time. This article shows detailed how-to tutorials for someone who is novice or never used LaTeX before to produce PDFs including animation and paper-pencil style lecture videos with voice (using smartpen) as instructional tools.

Key-Words: Animation in pdf, IrfanView, ShareLaTeX, smartpen note, \LaTeX

1 Introduction

Many researches have been done on using animation and lecture videos in teaching. For instance, Milovanovic, et.al. [13] shows students learned with multimedia showed better theoretical, practical and visual knowledge, and they were highly interested in learning with multimedia. Another research [21] shows that students learn better with animations since the animation engages them in learning. Akpinar [1] found that the interactive animations used as presentation tools were more effective on the students understanding of course concepts. Aksoy [2] also found the similar result that animation is more effective than traditional teaching methods in terms of enhancing students achievement. In some researches like [7] they found that animation does not improve understanding across all conditions, but students show evidence of higher levels of understanding.

It is clear that including animations and videos in lecture would be beneficial to students learning, and providing teaching modules with visualization and animation of better quality are demanded more than ever. Instructors are urged to provide visualized teaching modules for their students. The demand of having the ability to produce such modules according to own pedagogy has increased dramatically in teaching field. One major problem is that most instructors are novice to production of such materials. As stated in a recent study [4] instructors depend on their universities to provide the video capture infrastructure, and should work with the campus information technology personnel to produce lecture videos.

There are some ways to produce such materials

with minimal knowledge of media production. In this article we focus on embedding animation and lecture video into PDF file which is one of best formats for teaching module since it is easy to share and can be viewable in any computer with a PDF reader such as Acrobat Reader. It is known that embedding an animation in a pdf file is impossible without using some high-end commercial programs. However, there is a way to produce PDF with animation using LaTeX. Some sites such as [19] provide source file (Tex) with the output file (pdf) for creating some animations in pdf/beamer.

A post in GeoGebratube shows how to include animated GIF in LaTeX and produce PDF file with animation [9]. The post explains the method to animated construction step with LaTeX syntax and packages such as Pstrics and PGF/TiKZ which are not popular to any LaTeX novice. Another site [14] shows how to include animation in pdf using LaTeX, especially using movie15 or Media9 packages in LaTeX.

In this article, we demonstrate how LaTeX together with a free photo editing program can be used in producing animation embedded in PDF file. We also introduce the desktop software of a smartpen and shows how to convert the note writing file to PDF file with video and audio recording together.

2 Making GIF Frames with IrfanView

To include animation into pdf file, the animation file (GIF) needs to convert to a series of gif frames. One of the best free programs to make such gif frames from

an animated gif file is IrfanView [10]. As an example, we can use the gif file from internet sites (such as [12]), or our own gif file using some programs such as GeoGebra. To retrieve the gif file from a internet site, right click on the first animation and select 'Save image as...' After save the file, we may use IrfanView to watch the animation of the original gif file.

To make the series of gif frames of the animated gif file (say 'Derivative') follow the steps below:

- i. Make a folder, say 'fig'.
- ii. Open the gif file with IrfanView. (See Fig. 1)
- iii. Select Options > Extract all frames...
- iv. Change the 'Destination directory:' to the 'fig' folder.
- v. Select PNG-Portable Network Graphics for 'Save As'.
- vi. Click 'Start'.

The procedure above produces several 'frame' files with the same name. For instance, there may be 36 gif frames in the 'fig' folder, starting from 'Derivative_frame_0001' to 'Derivative_frame_0036'. The number of frames depends on the condition of the original gif file, especially the minimum/maximum frame numbers and the increment. The name of those frame files will be the same as the original gif file name with the extra ending part, such as '_frame_xxxx'.

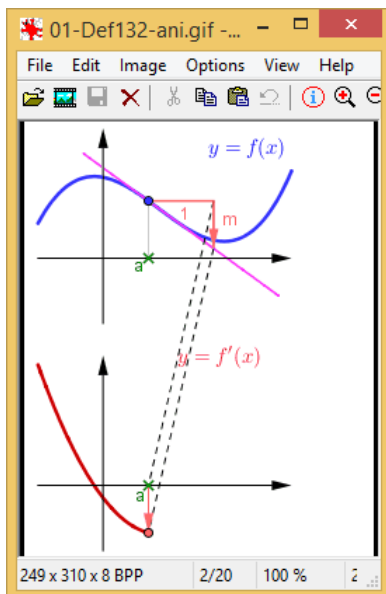


Figure 1: GIF (from [12]) in IrfanView

3 Making PDF with Animation using ShareLaTeX site

To make a pdf file with animation on it we need to create a source (LaTeX) file, and add the animate package into the preamble of the source file. Before installing a Tex program and an Tex editor program which requires a lot of time and effort, we recommend to use an online LaTeX editor service site such as ShareLaTeX [18]. It comes with a complete ready to work LaTeX environment running on their server with many LaTeX source templates. It requires no pre-installation on user's computer, but the user needs to make an account on the server to use the service.

3.1 Making a project in ShareLaTeX site

To make a LaTeX source file in ShareLaTeX site, follow the procedure below: i. Go to <https://www.sharelatex.com/project>, make an account, and then log in.

ii. Click 'New Project' at the top left side, and select Blank Project.

iii. Type a name, say mytex, for the New Project, and then click create.

There will be 3 views in the ShareLaTeX page: menu, source view and preview. (See Fig. 2)

3.2 Uploading gif frame files to the ShareLaTeX project site

The gif frame files should be uploaded to the mytex project in the ShareLaTeX page as the following:

iv. Click 'New Folder' (the second icon) above the menu side, type a name (say fig), then click Create.

v. Click the fig folder in the menu.

vi. Click 'Upload' (the third icon) above the menu side. The 'Upload File(s)' window will be appeared.

vii. Drag some (up to 40) gif frame files from the fig folder, and drop on the Upload File(s) window.

viii. Click the fig folder in the menu again, and do the same Drag-Drop procedure until to finish uploading the entire gif frame files.

The ShareLaTeX site accepts up to 40 files at the same time for uploading. Hence the procedure vii should be done several times depending on the total number of frames.

3.3 Making the PDF with animation

Replace the entire content in the source view by the following code:

```
\documentclass[10pt]{article}
\usepackage{animate}
\begin{document}
```

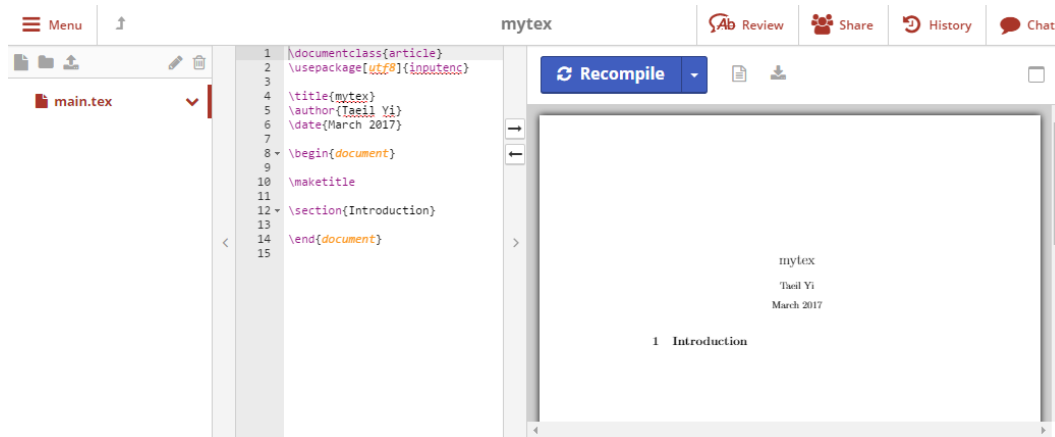


Figure 2: ShareLaTeX page

```
\animategraphics[autoplay,controls]
{12}{fig/Derivative_frame_00}{01}{36}
\end{document}
```

The last number, 36, in the code above should match with the gif frame numbers in the 'fig' folder. The folder name, fig, should match with the folder name in the menu. To produce the pdf file, do the following procedure:

- ix. Click 'main.tex' on the menu, and then click 'Recompile' above the preview.
- x. Click 'download PDF' icon above the preview window, and then open the downloaded pdf file.

The preview window in ShareLaTeX does not show the animation. To see the animation the pdf file should be downloaded from ShareLaTeX site and open it with a PDF viewer program such as Adobe Acrobat. (See Fig. 3)

For the case of the number of frames is less than 10, say 8 frames only, the code may be written by either

```
\animategraphics[autoplay,controls]
{12}{fig/Derivative_frame_00}{01}{08}
```

or

```
\animategraphics[autoplay,controls]
{12}{fig/Derivative_frame_000}{1}{8}
```

On the other hand, if the number of frames is more than 99, say 153 frames, then the code should be changed as:

```
\animategraphics[autoplay,controls]
{12}{fig/Derivative_frame_0}{001}{008}
```

The ShareLaTeX provides lots of templates such as CV, cover letter, presentation, thesis, etc., and they can be chosen after click the New Project at the main

page of ShareLaTeX. (See Fig. 4) By using the code `\usepackage{animate}` at the preamble (before `\begin{document}`), the animation can be embedded to any of templates.

Figure 3: Animation in PDF

To see the animation, download this PDF file and open it with a PDF viewer program such as Adobe Acrobat Reader.

3.4 Options

We can assign several options (inside the blankets) regarding the animation using the blankets in the code. For instance, `controls` in the option in the code is for insertion of control buttons below the animation (see Fig. 3). To change the size of the control buttons, put `buttonsize=<size>` in the option such as

```
[autoplay, controls, buttonsize=10pt].
```

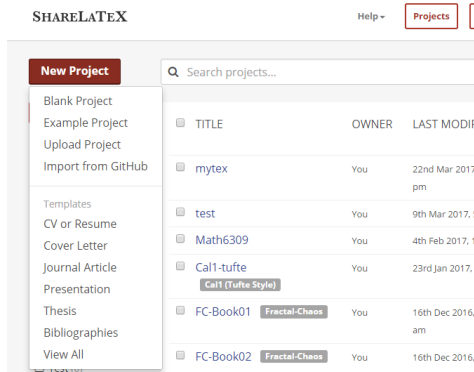


Figure 4: Templates in ShareLaTeX

By default, the control button comes with black. By using `buttonbg=<color>` and `buttonfg=<color>` the control button colors can be changed. By default, control button widgets are drawn with black strokes on transparent background. The background can be turned into a solid color by the `rst` option such as `buttonbg=rst`, while the second option species the stroke color. The parameter is an array of colon-(`:`)-separated numbers in the range from 0.0 to 1.0. The number of array elements determines the color model in which the color is defined: (1) gray value, (3) RGB, (4) CMYK. For example, 1, 1:0.5:0.2 and 0.5:0.3:0.7:0.1 are valid color specifications such as

`Buttonfg=1:0.5:0.2`

To make the animation loops, put `loop` in the option such as

`[loop, autoplay, controls]`

To scale the size of the animation, use `scale=<factor>` in the option where `<factor>` is between 0 and 1, such as

`[autoplay, scale=0.5, controls]`

Most of this section is from [5], and check out the file for more detail information.

4 Making PDF including Lecture Video with Voice using a Smartpen

The Livescribe Echo smartpen digital voice recorder is a ballpoint pen and comes with a camera (at the tip of the pen) and a voice recorder together. Writing on a digital paper which can be made using a laser printer (600dpi), it records what it writes with synchronized audio which has recorded at the same time. Users can

download and install the free smartpen desktop software. The digital copy of notes with video and audio recordings produced by this pen can be replayed and shared through the desktop software. (See Fig. 5)

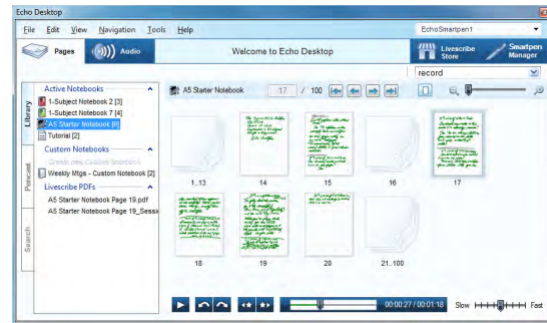


Figure 5: Smartpen desktop program

One of sharing methods is to export the digital copy of notes to PDF format. The PDF control toolbar is located at the bottom of each page in the PDF file. This toolbar controls playback of recorded handwriting and audio. (See Fig. 6) There are two ways of search and pick playback of the recording: the slider in the toolbar and clicking. Users can search and play any position in each page by moving the slider in the toolbar or click on the page at which they want to watch. One downside of the produced PDF file is that this PDF file cannot be merged with a regular PDF file unless losing the video and the voice.

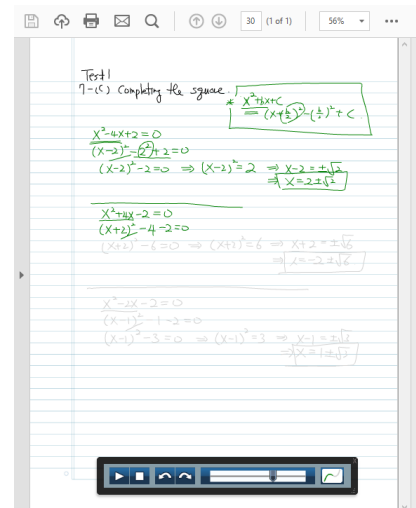


Figure 6: Playing mode of Smartpen note

5 Conclusion

It is widely recognized that visualization and animation of lecture contents give better chance students

to understand the course content. Teaching materials with video and audio recordings have become the most valuable teaching modules especially for online and distance learning. Many technologies have been developed to help producing such teaching materials. Thus, while instructors are urged to use these visual aids in their teaching, they are also encouraged to produce such material by themselves.

However, producing such teaching materials is not an easy task for instructors. There are needs to find easy way to practice making their own teaching modules. This article provides a couple of examples of producing PDFs with visual contents so that instructors may use them as supporting materials for teaching. It is hoped that easier methods and technology would be developed which come with shorter learning curve, and they would benefit instructors who are novice to such methods. It is also hoped that the suggested methods in this article are not to be taken as ultimate solutions. Rather, it provides a starting point that instructors can use them as a springboard for developing their technology skills for producing better teaching modules.

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