The **aeb_tilebg** Package

Creating Tiled Backgrounds

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Table of Contents

1 Introduction 3

2 Alternate package name: aeb-tilebg 3

3 The Preamble and Package Options 3

4 The Commands 4

5 Reducing the file size 6
   5.1 Tiling using the graphicxsp package ....................... 6
   5.2 Tiling using graphicxsp and layers ........................ 7
   5.3 Comparison of file sizes ............................... 7
1. Introduction

This package, \texttt{aeb\_tilebg}, is a simple application of established packages \texttt{graphicx}, \texttt{multido} and \texttt{web}.

Download your favorite tiled background swatch from the Internet or create one yourself, convert it to an \texttt{.eps} or a \texttt{.pdf} format (depending if you use \texttt{distiller} or \texttt{pdftex}), place that image in the same folder as your source document. Anywhere in your document, use the command \texttt{\setTileBgGraphic} to bring in your tiled background using the \texttt{graphicx} package; for example,

\begin{verbatim}
\setTileBgGraphic[\scale=.5]{(graphics\_file)}
\end{verbatim}

The \texttt{multido} package places these images in the background, starting from the upper-left corner (the lower left corner if the \texttt{uselltiling} option is taken) going across and down (respectively, going across and up), one row at a time. The \texttt{web} package is used to manage the graphical template created.

During the development of this package, I Googled “backgrounds”, “tiled backgrounds” and “math tiled backgrounds” and found, amongst many, the following links

\begin{itemize}
  \item http://www.patswebgraphics.com/tiled.html
  \item http://www.rhiossampler.com/Backgrounds/TBGIndex.htm
  \item http://www.backgroundcity.com/
  \item http://www.wou.edu/~burtonl/mathart/mathart.html
\end{itemize}

I downloaded a few of the swatches and used them during the testing phase. The mathematical tiles of last the URL listed above are particularly interesting.

2. Alternate package name: \texttt{aeb\_tilebg}

This package is listed on CTAN as \texttt{aeb\_tilebg}, there is now a ‘dummy’ package by that name that loads \texttt{aeb\_tilebg} with the specified options.

3. The Preamble and Package Options

In the preamble, place the \texttt{aeb\_tilebg} package like so

\begin{verbatim}
\usepackage[\langle\texttt{options}\rangle]{aeb\_tilebg}
\end{verbatim}

This must be placed after the introduction of the \texttt{web} package. A typical preamble might be

\begin{verbatim}
\documentclass{article}
\usepackage[\langle\texttt{driver}\rangle,tight,designiv,usetemplates]{web}
\usepackage[\langle\texttt{options}\rangle]{aeb\_tilebg}
\end{verbatim}

where \texttt{\langle\texttt{driver}\rangle} can be \texttt{dvipsone}, \texttt{dvips} or \texttt{pdftex} (which include the lualatex application) and \texttt{xetex}. Only the \texttt{usetemplates} option and the \texttt{driver} type are required options here, the others are optional.\footnote{The \texttt{web} package automatically detects \texttt{pdftex} and \texttt{xetex} so they need not be specified.}

The options of the \texttt{aeb\_tilebg} package are as follows:

\begin{itemize}
  \item \texttt{\setTileBgGraphic[\langle\texttt{options}\rangle]{(graphics\_file)}}
  \item \texttt{\setTileBgGraphic[\langle\texttt{options}\rangle]{(graphics\_file)}}
  \item \texttt{\setTileBgGraphic[\langle\texttt{options}\rangle]{(graphics\_file)}}
\end{itemize}
1. **uselltiling**: When the package tiles a background, it begins in the upper left corner, goes across the row from left to right, then moves downward to the next row. This is the default behavior. The algorithm uses the multido command and floating point arithmetic; there may be some round off that leaves the tiles not quite contiguous, though I haven’t observed this myself. If the upper-left starting point does not give satisfactory results, try using **uselltiling**, this option causes **aeb_tilebg** to begin tiling in the lower-left corner; tiling moves left-to-right and upward. This uses a faster, more accurate algorithm of multido and should be superior and give the contiguous tiling you want.

2. **draft**: Tiling slows down **\LaTeX** compilation and obscures the text content as viewed in the previewer; therefore, use the **draft** to suppress tiling during the content development phase of the document. Remove the option to build the final document.

3. **ignoreforpaper**: The default behavior of **aeb_tilebg** is to automatically remove the tiling when the **forpaper** option of the **web** package is selected. To ignore this default “forpaper” behavior, select the **ignoreforpaper** option; then, even if the **forpaper** option is used, tiling of the document will occur.

4. **The Commands**

There are only a few commands of this package, which we list and discuss in this section.

To specify the graphics file that is to be tiled, use the **\setTileBgGraphic**, the central command of this package:

\begin{verbatim}
\setTileBgGraphic[⟨key_values⟩]{⟨filename⟩}
\end{verbatim}

**Parameter Description:** The two parameters are passed to the **\includegraphics** command of the **graphicx** package, consequently, their descriptions are the same: the ⟨⟨filename⟩⟩ is the base name of the graphics file and ⟨⟨key_values⟩⟩ are any options of the **\includegraphics** command desired. The package automatically inserts the **hiresbb** option of **\includegraphics** to get a better fit of the tiles; specifying this option, therefore, is not needed.

**Command Location:** This command can be placed in the preamble to tile beginning at the first page, or anywhere in the body of the document to tile the current page, and all pages thereafter. The tile graphic can be changed freely, just by specifying a new graphics file in the **\setTileBgGraphic** command.

Below is an example of usage:

\begin{verbatim}
\setTileBgGraphic[⟨key_values⟩]{⟨filename⟩}
\end{verbatim}

The **scale** option re-scales the graphics by a factor given as its value. This option is often used to set the size of the tile, appropriate to the screen size. Other useful options are **width** and **height**.

You can disable and enable tiling using the following two commands:
The Commands

\disableTiling \enableTiling

When you execute \enableTiling, the graphic tile currently defined will be used. You can change the tiling as well.

You can disable tiling by using the \disableTiling command then...

\disableTiling

...\enableTiling\setTileBgGraphic[scale=.2]{tmfpurple_50}

For \multido, the number of iterations must be specified in advance. The aeb_tilebg package uses \multidostop to break out of a \multido loop early. By default it is set at 10, but can be changed through the \maxiterations command.\footnote{It may become necessary to increase this number if you decide to have a lot of tiles per page (increasing the size of your file, I might add) or if you use the \ignoreforpaper command, where you are now trying to tile a larger area than typically is done for the screen.}

\maxiterations{⟨number⟩}

here, the parameter ⟨number⟩ is the maximum number of iterations to be performed by the (nested) \multido's that tile the background. The default is \maxiterations{10}.

The file tilebg_tst.tex is the demo file for the above series of commands.

The tiling algorithm automatically determines how many rows and columns you need to completely cover the background. This, of course, leads to partial tiles appearing in the background. In most cases this is not a problem; however, if you are particularly picky, you want only complete tiles to appear, no partials please. To accomplish this wonder feat of magic, use the \autosetScreensizeWithMargins command.

\autosetScreensizeWithMargins{⟨n_rows⟩}{⟨n_cols⟩}{⟨lm⟩}{⟨rm⟩}{⟨tm⟩}{⟨bm⟩}

Parameter Description: The command has six parameters, as listed below and described briefly.

1. ⟨n_rows⟩: number of rows
2. ⟨n_cols⟩: number of columns
3. ⟨lm⟩: length of left margin
4. ⟨rm⟩: length of right margin
5. ⟨tm⟩: length of top margin
6. ⟨bm⟩: length of bottom margin
Important: This command, which sets the screen dimensions of the document, can be used only in the preamble. When using this command, do not specify a design argument for the web package, and don't use either the \margins or \screensize commands of web as these two commands are used by \autosetScreensizeWithMargins.

An example of usage is

\setTileBgGraphic[scale=.25]{bike_10}
\autosetScreensizeWithMargins{7}{5}{.25in}{.25in}{24pt}{.25in}

The last four parameters are typical margin settings for the web package.

\texttt{tilebg\_tst\_auto.tex} is the demo file for the \texttt{\autosetScreensizeWithMargins} command.

5. Reducing the file size

Tiling the background increases the file size of the document. I believe pdftex and xetex can reuse a graphics file to reduce the file size, and does a decent job.

5.1. Tiling using the graphicxsp package

One approach to reducing file size is to embed your tile graphic once and use and reuse it without significantly increasing file size. How is this done? Using the graphicxsp package.

We outline the method through example. In the preamble, we have,

\begin{verbatim}
\usepackage[tight,designiv,usetemplates]{web}
\usepackage{graphicxsp}
\usepackage{aeb_tilebg}

\embedEPS[transparencyGroup]{bike}{tile/bike_10}
\setTileBgGraphic[name=bike, transparency={/ca .3},scale=.25]{tile/bike_10}
%\autosetScreensizeWithMargins{7}{5}{.25in}{.25in}{24pt}{.25in}
\end{verbatim}

You can optionally set the dimensions of the page to exactly 7 rows and 5 columns. With graphicxsp, you embed the graphic using \texttt{\embedEPS} and give it a name, bike in this example. In the optional argument of \texttt{\setTileBgGraphic} we pass that name using the \texttt{(name)} key and pass some transparency settings as well. See the documentation of graphicxsp for more information.

\texttt{tilebg\_test\_sp.tex} is the test file for demonstrating this method. Acrobat Distiller is required as the PDF creator.

\footnote{This is referring to the web options of designi-designvii.}
Reducing the file size

5.2. Tiling using graphicxsp and layers

One criticism of a background or tiled background is that it is really not desired when the document is printed. However, if you put the background in layers and set the layers never to print, the problem is solved. To use layers, the uselayers option of the aeb_pro package must be used (with Distiller as the PDF creator). To get the tiles to appear in their a layer (all in the same layer), use the aeb_tilebg \placeTilesinLayers command.

\placeTilesinLayers[⟨name⟩]{⟨KV-pairs⟩}

The ⟨name⟩ argument is the name of the layer, the default is tileBG. The ⟨KV-pairs⟩ argument consists of key-value pairs that are recognized by the \Bld of AeB Pro, refer to the documentation of \Bld in the AeB Pro manual.

We outline the method through example. In the preamble, we have,

\usepackage[graphicxsp,uselayers,
web={tight,designiv,usetemplates}]
{aeb_pro}
\usepackage{aeb_tilebg}
\embedEPS{transparencyGroup}{bike}{tile/bike_10}
\placeTilesinLayers{initState=on,print=never}
\setTileBgGraphic[⟨name⟩=bike,
transparency={/ca .3},scale=.25]{tile/bike_10}

This is pretty much the same as the previous example, except aeb_pro is used with the uselayers option.

tilebg_tst_layers.tex is the test file for demonstrating this method. Acrobat Distiller is required as the PDF creator, the Standard_transparency.joboptions, which ships with aeb_pro, is required to distill this file so it has a transparent background.

5.3. Comparison of file sizes

We build and noted the file size of one of the test files under various conditions.

<table>
<thead>
<tr>
<th>Driver</th>
<th>graphicx</th>
<th>graphicxsp</th>
<th>Reduced Size PDF</th>
</tr>
</thead>
<tbody>
<tr>
<td>dvips</td>
<td>797KB</td>
<td>42KB</td>
<td>23KB</td>
</tr>
<tr>
<td>pdftex</td>
<td>62KB</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>xetex</td>
<td>27KB</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Using the standard graphics package graphicx, dvips does the worst with xetex doing best. For dvips, with the test file uses graphicxsp, the file size is reduced to 43KB, and reduced further when the Reduced Size PDF operation is performed by Acrobat, accessed through the menu File > Save As Other > Reduced Size PDF.\footnote{The user-interface is often redesigned, this is the location for Acrobat 11.}

Now, I simply must get back to my retirement.