

Printing Digital Photographs with L^AT_EX

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Abstract

Affordable digital cameras and photo inkjet printers make it possible to obtain digital prints with a quality which is generally as good as, and often better than, a compact film camera and standard processing. However, printing many photographs in various numbers of copies on standard-size paper may be cumbersome. There are programs to build albums and print them, but they generally force you to lay out photographs by hand on each page. The photoprint L^AT_EX document class is an attempt to automate the printing of digital photographs on standard-size paper. It uses a list of photographs tagged with the number of copies to print, divides the paper into “print slots”, and takes care of rotating, cropping or scaling the photographs to make them fit into the slots. It can also build an index of the photographs to help people choose the prints they want, add crop marks to the printed pages to help cut the prints, or overprint the date on the prints.

Résumé

Des appareils photographiques numériques et des imprimantes à jets d'encre de prix abordables permettent aujourd'hui d'obtenir des tirages papier d'une qualité équivalente, sinon meilleure, à celle obtenue avec un appareil argentique compact et un tirage standard. Toutefois, l'impression en quantité de photographies en nombre de copies variable sur du papier de taille standard devient rapidement malaisée. Il existe des programmes permettant de placer des photos dans un album pour l'imprimer ensuite, mais ils exigent généralement un placement manuel de chaque photographie. La classe de documents L^AT_EX photoprint est une tentative d'automatisation de l'impression de photographies sur du papier de taille standard. Elle s'appuie sur une liste de photographies associées au nombre de copies désirées et sur un découpage de chaque feuille en « emplacements d'impression ». Elle gère la rotation, la mise à l'échelle et le rognage des photographies pour les faire tenir au mieux dans les emplacements. Elle permet aussi d'obtenir un index des photographies qui facilite le choix des retirages, peut imprimer des marques repères pour le découpage, et afficher la date en surimpression.

Introduction

Printing photographs from a family wish list can keep you busy for a whole weekend: you must find the photographs to print, lay them out on pages, taking the total number of copies of each into account, rotate them if they do not match the page orientation, resize and crop them so they match the paper size, wait for the printer, and finally cut the pages into prints. Of course, you can use special photo-paper with pre-cut margins, but it is more expensive than standard-size paper, yields not so clean edges, works only for a given brand of printers because its margins are adapted to the print area of the printer, and limits you to one print size.

Using standard-size paper (for instance A4 paper) gives you more freedom since you can use it for prints from 10 × 14 cm up to 20 × 28 cm. You can even use smaller prints, for instance to make stamps printed on

self-adhesive paper. But this freedom comes at the cost of doing the layout of the photographs on the paper.

Regular digital photographs have a $\frac{4}{3}$ aspect ratio, while A4 paper has a $\sqrt{2}$ aspect ratio. So, to use as much as possible of the expensive sheets, the photos must be cropped. Some photos are in portrait orientation (their longer side is vertical), while others are in landscape orientation (their longer side is horizontal), so the photos which don't have the same orientation as the paper must be rotated.

The photoprint L^AT_EX document class divides pages into “print slots” and lays out photographs on these pages. It reads the names of the photographs and the number of copies of each from a file. This file can be written by hand, created by a shell script, or generated by a helper Java application which provides a contact-sheet-like view of the photographs from which you can select pictures

and choose the number of copies.

Since most digital cameras yield JPEG files, it is much easier to use photoprint with pdf \LaTeX . However, nothing in photoprint is hardcoded for pdf \LaTeX , so if you provide bounding box files for your JPEG pictures so that graphicx can determine their size, you can use photoprint with \LaTeX .

Basic setup

photoprint is a regular \LaTeX document class, so you just write:

```
\documentclass[a4paper,landscape]{photoprint}
```

to use it with A4 paper in landscape orientation. Then, you have to specify the size of the printable area of your printer. Since this does not depend on the orientation of the paper, photoprint uses the top, left, bottom and right margins from the edges of the paper in portrait orientation to describe the print area. The command used to set the print area is:

```
\photopaper{\top}{\left}{\bottom}{\right}
```

For instance:

```
\photopaper{0.5cm}{0.5cm}{1cm}{0.5cm}
```

says that your printer can print as close as 0.5 cm from the top edge, 0.5 cm from the left edge, 1 cm from the bottom edge, and 0.5 cm from the right edge of a sheet of paper. These are the default settings if you don't use the `\photopaper` command.

The bottom margin is generally larger than the other margins because the printer must still be able to hold the paper between its rolls while printing the bottom of the page.

If you print in landscape orientation, the bottom margin will be on the left of the printed page. You can consider that `\photopaper` takes a physical description of the print area in which top is the side which comes out of the printer first, bottom is the side which comes out last, and left and right are defined relative to top and bottom, without consideration of the printing orientation.

Next, you have to decide how you want to divide the sheet of paper. For this, you give the number of print slots per line (so it is the number of columns), and the number of print slots per column (the number of lines). You set the number of photographs on a line with the:

```
\photosperline{\number}
```

command, and the number of photographs in a column with the:

```
\photospercol{\number}
```

command. For instance:

```
\photosperline{2}
\photospercol{2}
```

sets four print slots. This is the default setting which yields about 10 × 14 cm prints on A4 paper.

To print a contact sheet, in landscape orientation, you could use:

```
\photosperline{5}
\photospercol{4}
```

which makes for 4 rows of 5 pictures on each page. However, since printing contact sheets is a common operation, photoprint has a command for this which does more than printing the pictures.

Last, in the body of your document, you will lay out the pictures, using as many pages as necessary, with the command:

```
\printphotos[{\filename}]
```

`{\filename}` is the name of the file which contains the list and number of copies of the pictures to print. It defaults to `photoprint.job`. To use the list `photosfordad.job`, write:

```
\printphotos[photosfordad.job]
```

The format of the `photoprint.job` file is very simple: each line contains the name of a picture file, optionally followed by a * and the number of copies to print. For instance, the following asks for one copy of `001-23-IMG_0375.jpg`, two copies of `004-20-IMG_0949.jpg`, one copy of `006-22-IMG_1126.jpg`, and no copy of the other pictures:

```
001-23-IMG_0375.jpg*1
002-28-IMG_0425.jpg*0
003-27-IMG_0707.jpg*0
004-20-IMG_0949.jpg*2
005-20-IMG_1091.jpg*0
006-22-IMG_1126.jpg*1
007-25-IMG_1313.JPG*0
008-05-IMG_1549.jpg*0
```

If you want contact sheets, use `\contactsheet` instead of `\printphotos`. `\contactsheet` will ignore any `\photosperline` and `\photospercol` settings and print four rows of 5 pictures per page, with a header, and the name and index of each photo printed below it. You may obtain strange results if you don't use landscape orientation when printing contact sheets. When printing contact sheets, photoprint ignores the number of copies requested for each photo, and puts each photo once on the contact sheet.

Convenience files

Some settings are so common that two files are defined to allow printing photos without writing any \LaTeX commands at all. The file `photos.tex` prints four pictures per page in landscape orientation:

```
\documentclass[%
a4paper,
landscape,
cropmarks
]{photoprint}
```

```

\photosperline{2}
\photospercol{2}
\begin{document}
  \printphotos%[name-of-photo-list]
\end{document}

```

With the contents of the `photoprint.job` file as shown above, running

```
pdflatex photos.tex
```

yields the result shown in figure 1.

The file `largephotos.tex` prints two pictures per page and yields 14 × 20 cm prints on A4 paper:

```

\documentclass[%
  a4paper,
  landscape,
  cropmarks
]{photoprint}
\photosperline{2}
\photospercol{1}
\begin{document}
  \printphotos%[name-of-photo-list]
\end{document}

```

With the contents of the `photoprint.job` file as shown above, running

```
pdflatex largephotos.tex
```

yields the result shown in figure 2.

The file `contactsheet.tex` prints contact sheets for the pictures listed in `photoprint.job`. It ignores the number of copies requested and makes each photo appear once on the contact sheet. With the contents of the `photoprint.job` file as shown above, running

```
pdflatex contactsheet.tex
```

yields the result shown in figure 3.

For Unix systems (Linux, Mac OS X, and others), `photoprint` is distributed with two shell scripts. The `mkphoto` script builds a `photoprint.job` file containing the list of all JPEG files in the current directory, with the number of copies set to 0. This script considers files to be JPEG if their extension is `.jpg`, in either lower or upper case. The `mkcs` script builds a contact sheet from the `photoprint.job` file in the current directory. It uses the name of the current directory as the title of the contact sheet.

When installing `photoprint`, since `docstrip` adds a dot at the end of the name of both scripts when they are extracted, you should rename these scripts and make them executable with the `chmod` Unix command. For instance `chmod a+x mkcs` will make `mkcs` executable by any user.

Options

In the examples of the previous section, you can see black lines in the margins of the pages. This is the effect of the `cropmarks` option. These marks help adjust the position

of the page on the paper cutter. The default is not to print crop marks.

If you want white margins around your prints, use the `whitemargins` option. The length of the smallest margin of the printable area is used as the white margin, making for an even white border around the prints when they are cut. Figure 4 illustrates the effect of the `whitemargins` option.

Some photographs may contain important details even at their edges, and cropping them to adapt their aspect ratio may lead to bad results, with important details removed. The `fullpictures` option prevents `photoprint` from cropping pictures. This makes less optimal use of the paper since the aspect ratio of the pictures can no longer be adapted to the print slots, as shown in figure 5.

The `landscape` option makes `photoprint` use the paper in landscape orientation (largest edge is horizontal). It should always be used for contact sheets. When printing photographs, the `landscape` option does not change the aspect of the prints. It only changes the way they are laid out on the pages.

The `showdate` option prints the date in the lower right corner of the pictures, which may be useful later to remember on which occasion a picture was taken. The date is read from a file which should be named `!Name_Map.can` or `!Name_Map.mav` and contains information about the photographs. The name and format of this file are set for historical reasons from the tools I use to manage my digital photographs. Each line of the file describes a photograph with four items delimited by braces:

1. The number of seconds since January 1, 1904 (the epoch on the Macintosh). This item is not used by `photoprint` and may be left empty (but must be present).
2. The file name of the photograph.
3. The file name of the original picture as taken by the camera. This item is not used by `photoprint` and may also be left empty.
4. The date and time when the photograph was taken, in ISO format:

```
YYYY-MM-DDThh:mm:ssZ
```

where `YYYY` is the year, `MM` the month (01 for January, 12 for December), `DD` the day of month, `T` the separator between date and time in the ISO format, `hh` the hour (00–23), `mm` the minutes (00–59), `ss` the seconds (00–59), and `Z` the time zone. The letter `Z` indicates UTC time. It may be replaced by the signed offset of the time with regard to Universal Time (for instance `+01:00` is the offset of French local time in winter). Everything after the `T` is ignored by `photoprint`.

For instance, the file used to store information about the example pictures has the following contents (because of



FIG. 1: Result of `pdflatex photos.tex`



FIG. 2: Result (first page only) of `pdflatex largephotos.tex`

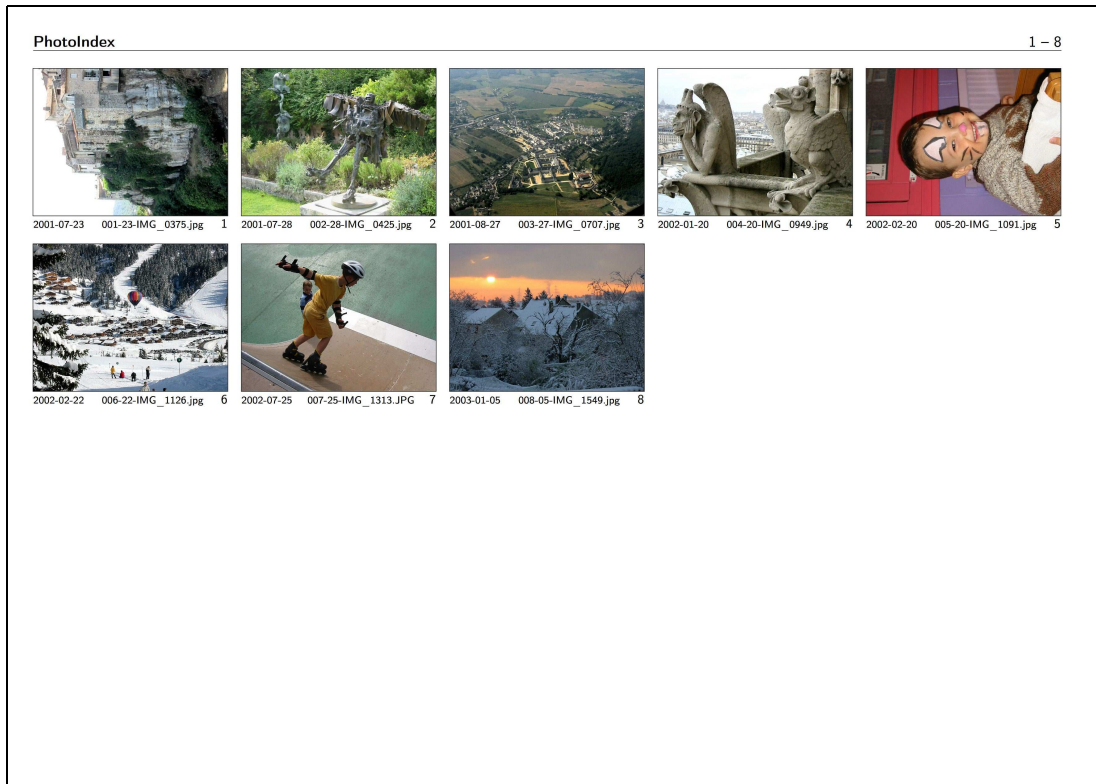


FIG. 3: Result of `pdflatex contactsheet.tex`



FIG. 4: Effect of `whitemargins` option

narrow width of this column, we have broken lines with a `\`:

```
{3078749666} {001-23-IMG_0375.jpg} {} \
  {2001-07-23T16:14:26+01:00}
{3079183448} {002-28-IMG_0425.jpg} {} \
  {2001-07-28T16:44:08+01:00}
{3081773514} {003-27-IMG_0707.jpg} {} \
  {2001-08-27T16:11:54+01:00}
{3094393350} {004-20-IMG_0949.jpg} {} \
  {2002-01-20T17:42:30+01:00}
{3097077318} {005-20-IMG_1091.jpg} {} \
  {2002-02-20T19:15:18+01:00}
{3097226436} {006-22-IMG_1126.jpg} {} \
  {2002-02-22T12:40:36+01:00}
{3110471962} {007-25-IMG_1313.JPG} {} \
  {2002-07-25T19:59:22+01:00}
{3124602926} {008-05-IMG_1549.jpg} {} \
  {2003-01-05T09:15:26+01:00}
```

The effect of the `showdate` option is shown in figure 6 where unusual settings have been chosen to make the date very visible (`\datecolor{red}` and `\datestyle{Huge\sffamily\bfseries}`).

Other options (for instance `a4paper`) are passed to the article document class.

Finer tuning

Several commands allow for changing the default behavior of `photoprint`:

`\datecolor{<color>}` sets the color used to print the date on pictures when the `showdate` option is active. The default is black.

`\datestyle{<style>}` sets the text style used to print the date on pictures when the `showdate` option is active. `<style>` should be a series of text style declarations. The default is `\sffamily\small`.

`\infostyle{<style>}` sets the text style used to print the information about the pictures on contact sheets (date and name). `<style>` should be a series of text style declarations. The default is:

```
\sffamily\footnotesize
```

`\cstitle` If this command is defined, its value will be used as the title of the contact sheet by the `\contactsheet` command. For instance:

```
\newcommand{\cstitle}{Summer 2002}
\contactsheet
```

will produce a contact sheet with the title “Summer 2002”.

`\photohmargin{<length>}` sets the amount of horizontal white space left around pictures. Consecutive pictures will be separated horizontally by twice this length. The default value is 0 pt (or the smallest margin of the print area when the `whitemargins` option is active).

`\photovmargin{<length>}` sets the amount of vertical white space left around pictures. Consecutive pictures will be separated vertically by twice this length. The default value is 0 pt (or the smallest margin of the print area when the `whitemargins` option is active).

`\photomargins{<length>}` sets the amount of white space left around pictures, both vertically and horizontally. Consecutive pictures will be separated by twice this length. The default value is 0 pt (or the smallest margin of the print area when the `whitemargins` option is active).

Requirements

The photoprint document class relies on the standard \LaTeX document class `article`, on the standard \LaTeX packages `calc`, `ifthen`, `graphicx`, `color` and `fontenc`. It also needs the `geometry` package.

Although `photoprint` does not make any assumption on the \TeX engine used, and uses the `graphicx` package to include pictures, it is much easier to use with `pdflatex` since digital photographs are generally in JPEG format.

The tasks of photoprint

`photoprint` performs several tasks to prepare pages of prints from the list of photographs and selected layout:

1. From the dimensions of the print area, the orientation of the paper, and the number of photographs to print per page, `photoprint` computes the size and position of the “print slots” (the areas where pictures will be placed).
2. From the list of photographs and number of copies to print, `photoprint` builds a list of pictures to lay out.
3. For each picture in this list, `photoprint` compares the orientation of the picture and the orientation of the current print slot. If they differ, the picture is rotated by 90° .
4. The picture is then scaled to fit into the print slot.
5. When the last print slot on a page has been used, a new page is started.

Determining print slots `photoprint` considers only the print area of a page, and divides it according to the required numbers of photos per line and per column. The horizontal and vertical margins around prints are also taken into account to determine the size of the print slots. Figure 7 shows how print slots are determined in landscape orientation, with two photos per line and per column.

Reading the list of photos The default name for the file which contains the list of photographs is `photoprint.job`. In this file, each line should be formatted as:

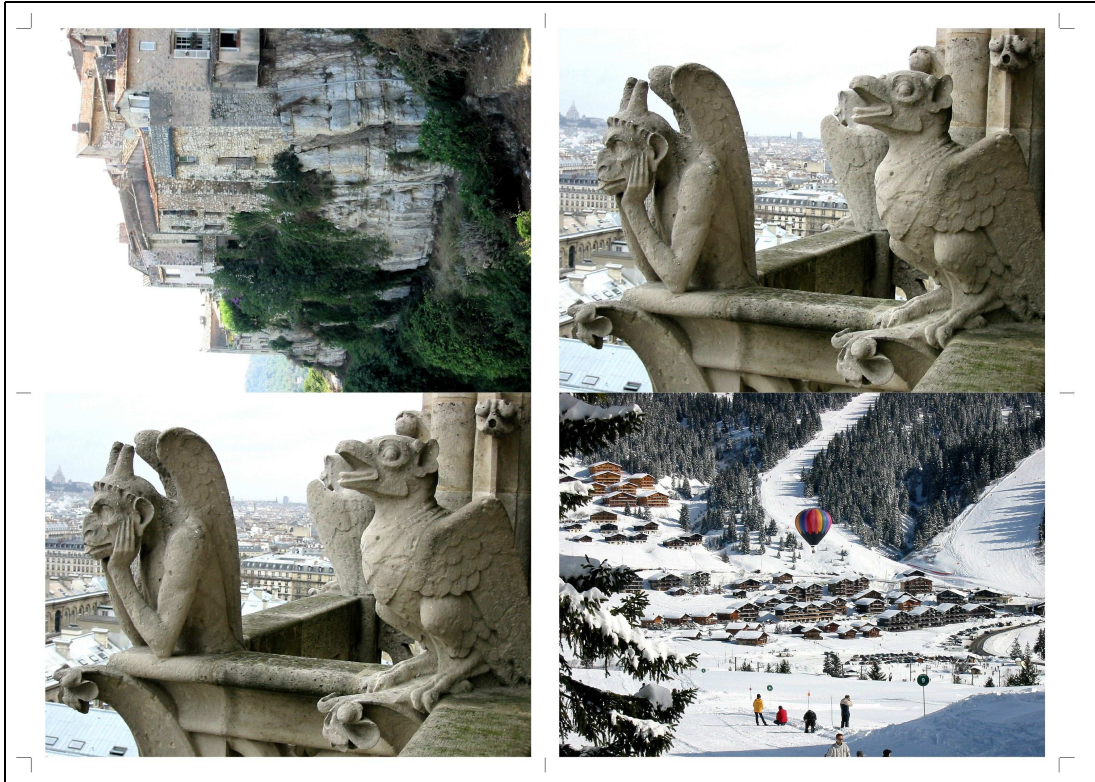


FIG. 5: Effect of the fullpictures option



FIG. 6: Effect (exaggerated) of the showdate option

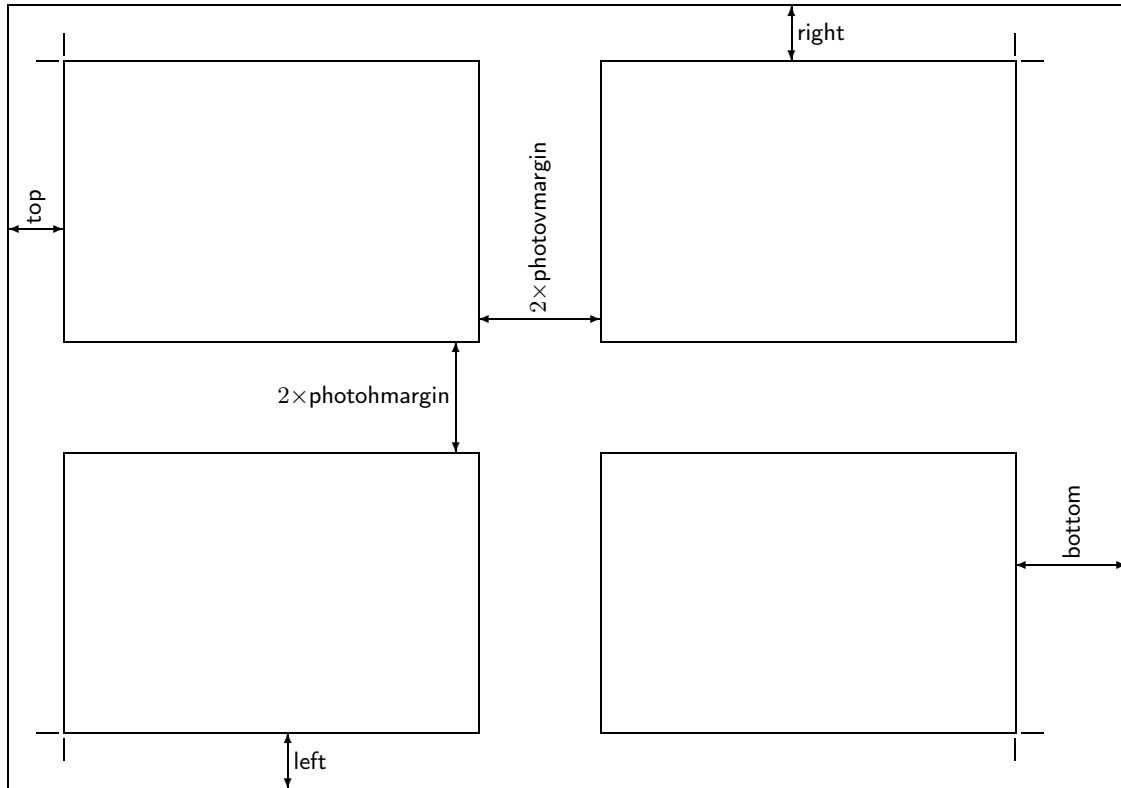


FIG. 7: Dividing the print area



Print slot is too narrow



Print slot is too shallow

FIG. 8: Fitting a picture into a print slot

$$\langle filename \rangle * \langle num \rangle$$

or as:

$$\langle filename \rangle$$

where $\langle filename \rangle$ is the name of a picture file, and $\langle num \rangle$ is the requested number of copies for this photograph. If the “ $*\langle num \rangle$ ” part is omitted, a value of one is assumed.

photoprint stops reading the file as soon as it reads an empty string, so the file should not contain empty lines

except at its end. There is no special character to mark a line as a comment.

Putting the photos in the print slots The print slots are used starting from the upper left, and ending with the lower right, from top to bottom and from left to right. Each picture is put in the first unused slot on the page.

For each picture, photoprint compares the orientation (landscape or portrait) of the print slot and the ori-

entation of the picture. If they differ, the picture is rotated by 90° counter-clockwise.

Then, `photoprint` computes the width the picture would have if it was scaled by a factor s_h so that its height were exactly the height of the print slot. This width is called the *scaled width* of the picture. `photoprint` also computes the height the picture would have if it was scaled by a factor s_w so that its width becomes exactly the width of the print slot. This height is called the *scaled height* of the picture.

If the scaled width of the picture is larger than the width of the print slot, `photoprint` scales the picture by s_h and trims its left and right edges by half the difference between the scaled width and the width of the slot.

If the scaled height of the picture is larger than the height of the print slot, `photoprint` scales the picture by s_w and trims its top and bottom edges by half the difference between the scaled height and the height of the slot.

In both cases, the picture fills the print slot, but it is cropped, as shown in figure 8.

However, when the `fullpictures` option is on, `photoprint` uses the smaller of s_h and s_w so that the picture fits entirely inside the print slot, between equal white bands to fill the slot.

Contact sheets Contact sheets are a special case in which `photoprint` reserves space at the top of the page to display the title of the contact sheet and the picture range (there are 20 pictures on each page of a contact sheet). It also reserves space between the rows of pictures to display their names, indices and date if available.

Related software

`Photoprint` started as a Java application, but I never managed to make it print my pictures the right way. This is why I started writing the `photoprint` document class (everybody knows that it is much easier to develop in L^AT_EX than in Java ...)

However, the Java `Photoprint` application is still here and allows choosing pictures to print and to set the number of copies of each. So I added a menu item to save the current selection of pictures to a file whose default name is ... `photoprint.job`.

This Java application has never been released, but I plan to make it available as a helper to `photoprint`. It may even launch `pdflatex` and open the result in Acrobat so that people who don't like command-line tools feel more at ease. Keep an eye on

<http://wwsi.supelec.fr/fb/Development.html>
for a release.