fpdf2 manual

A minimalist PDF creation library for Python

v2.6.1

Table of contents

1. fpdf2 4
1.1 Main features 4
1.2 Tutorials 5
1.3 Installation 6
1.4 Community 6
1.5 Misc 7
2. Tutorial 8
2.1 Hello World with fpdf2 8
2.2 Tutorial 9
2.3 Kurzanleitung 16
2.4 Tutorial 23
2.5 Tutorial 30
2.6 Πρόγραμμα Εκμάθησης 37
2.7 Tutorial 44
2.8 Tutorial 51
2.9 Руководство 58
2.10 65
2.11 מדריך 72
2.12 78
3. Page Layout 84
3.1 Page format and orientation 84
3.2 Margins 86
3.3 Introduction 87
3.4 How to use Templates 87
3.5 Details - Template definition 89
3.6 How to create a template 91
3.7 Example - Hardcoded 91
3.8 Example - Elements defined in CSV file 92
3.9 Tables 93
4. Text Content 95
4.1 Adding Text 95
4.2 Line breaks 98
4.3 Page breaks 99
4.4 Text styling 100
4.5 Unicode 105

4.6 Emojis, Symbols & Dingbats 108
4.7 HTML 110
5. Graphics Content 112
5.1 Images 112
5.2 Shapes 116
5.3 Transformations 126
5.4 Transparency 128
5.5 Barcodes 130
5.6 Drawing 134
5.7 Scalable Vector Graphics (SVG) 139
5.8 Charts & graphs 141
6. PDF Features 146
6.1 Links 146
6.2 Metadata 148
6.3 Annotations 149
6.4 Presentations 152
6.5 Document outline & table of contents 153
6.6 Encryption 155
6.7 Signing 157
6.8 File attachments 158
7. Mixing other libs 159
7.1 borb 159
7.2 Combine with pdfrw 160
7.3 Combine with PyPDF2 162
7.4 Templating with Jinja 163
7.5 Usage in web APIs 164
7.6 Database storage 167
8. Development 168
8.1 Development 168
8.2 Logging 173
9. FAQ 174
9.1 What is fpdf2? 174
9.2 What is this library **not**? 174
9.3 How does this library compare to ...? 174
9.4 What does the code look like? 175
9.5 Does this library have any framework integration? 175
9.6 What is the development status of this library? 176
9.7 What is the license of this library (fpdf2)? 176

1. fpdf2

Fork me on GitHub

`fpdf2` is a library for simple & fast PDF document generation in Python. It is a fork and the successor of `PyFPDF` (*cf.* history).

Latest Released Version: pypi v2.6.1

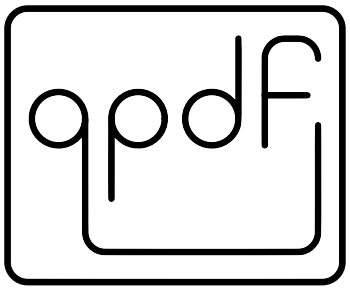
```python
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_font('helvetica', size=12)
pdf.cell(txt="hello world")
pdf.output("hello_world.pdf")
```

Go try it **now** online in a Jupyter notebook: Open in Colab or Open In nbviewer

1.1 Main features

- Easy to use, with a user-friendly API, and easy to extend
- Python 3.7+ support
- Unicode (UTF-8) TrueType font subset embedding (Central European, Cyrillic, Greek, Baltic, Thai, Chinese, Japanese, Korean, Hindi and almost any other language in the world)

- Internal / external links
- Embedding images, including transparency and alpha channel, using Pillow (Python Imaging Library)
- Arbitrary path drawing and basic SVG import
- Embedding barcodes, charts & graphs, emojis, symbols & dingbats
- Cell / multi-cell / plaintext writing, with automatic page breaks, line break and text justification
- Choice of measurement unit, page format & margins. Optional page header and footer
- Basic conversion from HTML to PDF
- A templating system to render PDFs in batchs
- Images & links alternative descriptions, for accessibility
- Table of contents & document outline
- Document encryption & document signing
- Annotations, including text highlights, and file attachments
- Presentation mode with control over page display duration & transitions
- Optional basic Markdown-like styling: `**bold**, __italics__`
- It has very few dependencies: Pillow, defusedxml, & fonttools
- Can render mathematical equations & charts
- Many example scripts available throughout this documentation, including usage examples with Django, Flask, streamlit, AWS lambdas... : Usage in web APIs
- Unit tests with `qpdf`-based PDF diffing, and PDF samples validation using 3 different checkers:



1.2 Tutorials

- English
- Deutsch

- Italian
- español
- français
-
- português
- Русский
- Ελληνικά
- עברית
-

1.3 Installation

From PyPI:

```
pip install fpdf2
```

To get the latest, unreleased, development version straight from the development branch of this repository:

```
pip install git+https://github.com/PyFPDF/fpdf2.git@master
```

Developement: check the dedicated documentation page.

1.3.1 Displaying deprecation warnings

`DeprecationWarning`s are not displayed by Python by default.

Hence, every time you use a newer version of `fpdf2`, we strongly encourage you to execute your scripts with the `-Wd` option (*cf.* documentation) in order to get warned about deprecated features used in your code.

This can also be enabled programmatically with `warnings.simplefilter('default', DeprecationWarning)`.

1.4 Community

1.4.1 Support

For community support, please feel free to file an issue or open a discussion.

1.4.2 They use fpdf2

- Undying Dusk : a **video game in PDF format**, with a gameplay based on exploration and logic puzzles, in the tradition of dungeon crawlers
- OpenDroneMap : a command line toolkit for processing aerial drone imagery
- OpenSfM : a Structure from Motion library, serving as a processing pipeline for reconstructing camera poses and 3D scenes from multiple images
- RPA Framework : libraries and tools for Robotic Process Automation (RPA), designed to be used with both Robot Framework
- Concordia : a platform developed by the US Library of Congress for crowdsourcing transcription and tagging of text in digitized images
- wudududu/extract-video-ppt : create a one-page-per-frame PDF from a video or PPT file. `fpdf2` also has a demo script to convert a GIF into a one-page-per-frame PDF: gif2pdf.py
- csv2pdf : convert CSV files to PDF files easily

1.4.3 Related

- Looking for alternative libraries? Check out this detailed list of PDF-related Python libs by Patrick Maupin (`pdfrw` author). There is also borb, PyPDF2, pikepdf, WeasyPrint & pydyf. We have some documentations about combining `fpdf2` with `borb`, `pdfrw`, & `PyPDF2`.
- Create PDFs with Python : a series of tutorial videos by bvalgard
- digidigital/Extensions-and-Scripts-for-pyFPDF-fpdf2 : scripts ported from PHP to add transpareny to elements of the page or part of an image, allow to write circular text, draw pie charts and bar diagrams, embed JavaScript, draw rectangles with rounded corners, draw a star shape, restrict the rendering of some elements to screen or printout, paint linear / radial / multi-color gradients gradients, add stamps & watermarks, write sheared text...

1.5 Misc

- Release notes: CHANGELOG.md
- This library could only exist thanks to the dedication of many volunteers around the world: list & map of contributors
- You can download an offline PDF version of this manual: fpdf2-manual.pdf

2. Tutorial

Open in Colab

Open In nbviewer

2.1 Hello World with fpdf2

This Jupyter notebook demontrates some basic usage of the Python fpdf2 library

```
# Installation avec PIP de fpdf2:
!pip install fpdf2
```

```

```

```
# Enable deprecation warnings:
import warnings
warnings.simplefilter('default', DeprecationWarning)
```

```
# Generate a PDF:
from fpdf import FPDF
pdf = FPDF()
pdf.add_page()
pdf.set_font('helvetica', size=48)
pdf.cell(txt="hello world")
pdf_bytes = pdf.output()
```

```
# Display the PDF in the notebook by embedding it as HTML content:
WIDTH, HEIGHT = 800, 400
from base64 import b64encode
from IPython.display import display, HTML
base64_pdf = b64encode(pdf_bytes).decode("utf-8")
display(HTML(f'<embed src="data:application/pdf; base64,{base64_pdf}" width="{WIDTH}" height="{HEIGHT}" type="application/pdf">'))
```

```
# Diplay a download button:
display(HTML(f'<a download="fpdf2-demo.pdf" href="data:application/pdf; base64,{base64_pdf}">Click to download PDF</a>'))
```

Click to download PDF

To continue learning about `fpdf2`, check our tutorial: - English - Deutsch - español - 中文 - português - Русский - Italian - français - Ελληνικά - עברית

2.2 Tutorial

Methods full documentation: `fpdf.FPDF` API doc

- Tutorial
- Tuto 1 - Minimal Example
- Tuto 2 - Header, footer, page break and image
- Tuto 3 - Line breaks and colors
- Tuto 4 - Multi Columns
- Tuto 5 - Creating Tables
- Tuto 6 - Creating links and mixing text styles

2.2.1 Tuto 1 - Minimal Example

Let's start with the classic example:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_font("helvetica", "B", 16)
pdf.cell(40, 10, "Hello World!")
pdf.output("tuto1.pdf")
```

Resulting PDF

After including the library file, we create an `FPDF` object. The FPDF constructor is used here with the default values: pages are in A4 portrait and the measure unit is millimeter. It could have been specified explicitly with:

```
pdf = FPDF(orientation="P", unit="mm", format="A4")
```

It is possible to set the PDF in landscape mode (`L`) or to use other page formats (such as `Letter` and `Legal`) and measure units (`pt` , `cm` , `in`).

There is no page for the moment, so we have to add one with add_page. The origin is at the upper-left corner and the current position is by default placed at 1 cm from the borders; the margins can be changed with set_margins.

Before we can print text, it is mandatory to select a font with set_font, otherwise the document would be invalid. We choose Helvetica bold 16:

```
pdf.set_font('helvetica', 'B', 16)
```

We could have specified italics with `I` , underlined with `U` or a regular font with an empty string (or any combination). Note that the font size is given in points, not millimeters (or another user unit); it is the only exception. The other built-in fonts are `Times` , `Courier` , `Symbol` and `ZapfDingbats` .

We can now print a cell with cell. A cell is a rectangular area, possibly framed, which contains some text. It is rendered at the current position. We specify its dimensions, its text (centered or aligned), if borders should be drawn, and where the current position moves after it (to the right, below or to the beginning of the next line). To add a frame, we would do this:

```
pdf.cell(40, 10, 'Hello World!', 1)
```

To add a new cell next to it with centered text and go to the next line, we would do:

```
pdf.cell(60, 10, 'Powered by FPDF.', new_x="LMARGIN", new_y="NEXT", align='C')
```

Remark: the line break can also be done with ln. This method allows to specify in addition the height of the break.

Finally, the document is closed and saved under the provided file path using output. Without any parameter provided, `output()` returns the PDF `bytearray` buffer.

2.2.2 Tuto 2 - Header, footer, page break and image

Here is a two page example with header, footer and logo:

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Rendering logo:
        self.image("../docs/fpdf2-logo.png", 10, 8, 33)
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Moving cursor to the right:
        self.cell(80)
        # Printing title:
        self.cell(30, 10, "Title", border=1, align="C")
        # Performing a line break:
        self.ln(20)

    def footer(self):
        # Position cursor at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Printing page number:
        self.cell(0, 10, f"Page {self.page_no()}/{{nb}}", align="C")


# Instantiation of inherited class
pdf = PDF()
pdf.add_page()
pdf.set_font("Times", size=12)
for i in range(1, 41):
    pdf.cell(0, 10, f"Printing line number {i}", new_x="LMARGIN", new_y="NEXT")
pdf.output("new-tuto2.pdf")
```

Resulting PDF

This example makes use of the header and footer methods to process page headers and footers. They are called automatically. They already exist in the FPDF class but do nothing, therefore we have to extend the class and override them.

The logo is printed with the image method by specifying its upper-left corner and its width. The height is calculated automatically to respect the image proportions.

To print the page number, a null value is passed as the cell width. It means that the cell should extend up to the right margin of the page; it is handy to center text. The current page number is returned by the page_no method; as for the total number of pages, it is obtained by means of the special value `{nb}` which will be substituted on document closure (this special value can be changed by alias_nb_pages()). Note the use of the set_y method which allows to set position at an absolute location in the page, starting from the top or the bottom.

Another interesting feature is used here: the automatic page breaking. As soon as a cell would cross a limit in the page (at 2 centimeters from the bottom by default), a break is performed and the font restored. Although the header and footer select their own font (`helvetica`), the body continues with `Times` . This mechanism of automatic restoration also applies to colors and line width. The limit which triggers page breaks can be set with set_auto_page_break.

2.2.3 Tuto 3 - Line breaks and colors

Let's continue with an example which prints justified paragraphs. It also illustrates the use of colors.

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Calculating width of title and setting cursor position:
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        # Setting colors for frame, background and text:
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
```

```
        self.set_text_color(220, 50, 50)
        # Setting thickness of the frame (1 mm)
        self.set_line_width(1)
        # Printing title:
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        # Performing a line break:
        self.ln(10)

    def footer(self):
        # Setting position at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Setting text color to gray:
        self.set_text_color(128)
        # Printing page number
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def chapter_title(self, num, label):
        # Setting font: helvetica 12
        self.set_font("helvetica", "", 12)
        # Setting background color
        self.set_fill_color(200, 220, 255)
        # Printing chapter name:
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            align="L",
            fill=True,
        )
        # Performing a line break:
        self.ln(4)

    def chapter_body(self, filepath):
        # Reading text file:
        with open(filepath, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing justified text:
        self.multi_cell(0, 5, txt)
        # Performing a line break:
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")

    def print_chapter(self, num, title, filepath):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(filepath)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto3.pdf")
```

Resulting PDF

Jules Verne text

The get_string_width method allows determining the length of a string in the current font, which is used here to calculate the position and the width of the frame surrounding the title. Then colors are set (via set_draw_color, set_fill_color and set_text_color) and the thickness of the line is set to 1 mm (against 0.2 by default) with set_line_width. Finally, we output the cell (the last parameter to true indicates that the background must be filled).

The method used to print the paragraphs is multi_cell. Text is justified by default. Each time a line reaches the right extremity of the cell or a carriage return character (`\n`) is met, a line break is issued and a new cell automatically created under the current one. An automatic break is performed at the location of the nearest space or soft-hyphen (`\u00ad`) character before the right limit. A soft-hyphen will be replaced by a normal hyphen when triggering a line break, and ignored otherwise.

Two document properties are defined: the title (set_title) and the author (set_author). Properties can be viewed by two means. First is to open the document directly with Acrobat Reader, go to the File menu and choose the Document Properties option. The second, also available from the plug-in, is to right-click and select Document Properties.

2.2.4 Tuto 4 - Multi Columns

This example is a variant of the previous one, showing how to lay the text across multiple columns.

```
from fpdf import FPDF


class PDF(FPDF):
    def __init__(self):
        super().__init__()
        self.col = 0  # Current column
        self.y0 = 0  # Ordinate of column start

    def header(self):
        self.set_font("helvetica", "B", 15)
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        self.set_line_width(1)
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        self.ln(10)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def footer(self):
        self.set_y(-15)
        self.set_font("helvetica", "I", 8)
        self.set_text_color(128)
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def set_col(self, col):
        # Set column position:
        self.col = col
        x = 10 + col * 65
        self.set_left_margin(x)
        self.set_x(x)

    @property
    def accept_page_break(self):
        if self.col < 2:
            # Go to next column:
            self.set_col(self.col + 1)
            # Set ordinate to top:
            self.set_y(self.y0)
            # Stay on the same page:
            return False
        # Go back to first column:
        self.set_col(0)
        # Trigger a page break:
        return True

    def chapter_title(self, num, label):
        self.set_font("helvetica", "", 12)
        self.set_fill_color(200, 220, 255)
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            border="L",
            fill=True,
        )
        self.ln(4)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def chapter_body(self, name):
        # Reading text file:
        with open(name, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing text in a 6cm width column:
```

```
        self.multi_cell(60, 5, txt)
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")
        # Start back at first column:
        self.set_col(0)

    def print_chapter(self, num, title, name):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(name)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto4.pdf")
```

Resulting PDF

Jules Verne text

The key difference from the previous tutorial is the use of the accept_page_break and the set_col methods.

Using the accept_page_break method, once the cell crosses the bottom limit of the page, it will check the current column number. If it is less than 2 (we chose to divide the page in three columns) it will call the set_col method, increasing the column number and altering the position of the next column so the text may continue there.

Once the bottom limit of the third column is reached, the accept_page_break method will reset and go back to the first column and trigger a page break.

2.2.5 Tuto 5 - Creating Tables

This tutorial will explain how to create tables easily.

The code will create three different tables to explain what can be achieved with some simple adjustments.

```
import csv
from fpdf import FPDF


class PDF(FPDF):
    def basic_table(self, headings, rows):
        for heading in headings:
            self.cell(40, 7, heading, 1)
        self.ln()
        for row in rows:
            for col in row:
                self.cell(40, 6, col, 1)
            self.ln()

    def improved_table(self, headings, rows, col_widths=(42, 39, 35, 40)):
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C")
        self.ln()
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR")
            self.cell(col_widths[1], 6, row[1], border="LR")
            self.cell(col_widths[2], 6, row[2], border="LR", align="R")
            self.cell(col_widths[3], 6, row[3], border="LR", align="R")
            self.ln()
        # Closure line:
        self.cell(sum(col_widths), 0, "", border="T")

    def colored_table(self, headings, rows, col_widths=(42, 39, 35, 42)):
        # Colors, line width and bold font:
        self.set_fill_color(255, 100, 0)
        self.set_text_color(255)
        self.set_draw_color(255, 0, 0)
        self.set_line_width(0.3)
        self.set_font(style="B")
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C", fill=True)
        self.ln()
        # Color and font restoration:
        self.set_fill_color(224, 235, 255)
        self.set_text_color(0)
        self.set_font()
        fill = False
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR", align="L", fill=fill)
```

```
            self.cell(col_widths[1], 6, row[1], border="LR", align="L", fill=fill)
            self.cell(col_widths[2], 6, row[2], border="LR", align="R", fill=fill)
            self.cell(col_widths[3], 6, row[3], border="LR", align="R", fill=fill)
            self.ln()
            fill = not fill
        self.cell(sum(col_widths), 0, "", "T")


def load_data_from_csv(csv_filepath):
    headings, rows = [], []
    with open(csv_filepath, encoding="utf8") as csv_file:
        for row in csv.reader(csv_file, delimiter=","):
            if not headings:  # extracting column names from first row:
                headings = row
            else:
                rows.append(row)
    return headings, rows


col_names, data = load_data_from_csv("countries.txt")
pdf = PDF()
pdf.set_font("helvetica", size=14)
pdf.add_page()
pdf.basic_table(col_names, data)
pdf.add_page()
pdf.improved_table(col_names, data)
pdf.add_page()
pdf.colored_table(col_names, data)
pdf.output("tuto5.pdf")
```

Resulting PDF - Countries text

Since a table is just a collection of cells, it is natural to build one from them.

The first example is achieved in the most basic way possible: simple framed cells, all of the same size and left aligned. The result is rudimentary but very quick to obtain.

The second table brings some improvements: each column has its own width, titles are centered and figures right aligned. Moreover, horizontal lines have been removed. This is done by means of the border parameter of the `Cell()` method, which specifies which sides of the cell must be drawn. Here we want the left (`L`) and right (`R`) ones. Now only the problem of the horizontal line to finish the table remains. There are two possibilities to solve it: check for the last line in the loop, in which case we use LRB for the border parameter; or, as done here, add the line once the loop is over.

The third table is similar to the second one but uses colors. Fill, text and line colors are simply specified. Alternate coloring for rows is obtained by using alternatively transparent and filled cells.

2.2.6 Tuto 6 - Creating links and mixing text styles

This tutorial will explain several ways to insert links inside a pdf document, as well as adding links to external sources.

It will also show several ways we can use different text styles, (bold, italic, underline) within the same text.

```
from fpdf import FPDF


pdf = FPDF()

# First page:
pdf.add_page()
pdf.set_font("helvetica", size=20)
pdf.write(5, "To find out what's new in self tutorial, click ")
pdf.set_font(style="U")
link = pdf.add_link(page=2)
pdf.write(5, "here", link)
pdf.set_font()

# Second page:
pdf.add_page()
pdf.image(
    "../docs/fpdf2-logo.png", 10, 10, 50, 0, "", "https://pyfpdf.github.io/fpdf2/"
)
pdf.set_left_margin(60)
pdf.set_font_size(18)
pdf.write_html(
    """You can print text mixing different styles using HTML tags: <b>bold</b>, <i>italic</i>,
<u>underlined</u>, or <b><i><u>all at once</u></i></b>!
<br><br>You can also insert links on text, such as <a href="https://pyfpdf.github.io/fpdf2/">https://pyfpdf.github.io/fpdf2/</a>,
or on an image: the logo is clickable!"""
)
pdf.output("tuto6.pdf")
```

Resulting PDF - fpdf2-logo

The new method shown here to print text is write() . It is very similar to multi_cell() , the key differences being:

- The end of line is at the right margin and the next line begins at the left margin.
- The current position moves to the end of the text.

The method therefore allows us to write a chunk of text, alter the font style, and continue from the exact place we left off. On the other hand, its main drawback is that we cannot justify the text like we do with the multi_cell() method.

In the first page of the example, we used write() for this purpose. The beginning of the sentence is written in regular style text, then using the set_font() method, we switched to underline and finished the sentence.

To add an internal link pointing to the second page, we used the add_link() method, which creates a clickable area which we named "link" that directs to another page within the document.

To create the external link using an image, we used image() . The method has the option to pass a link as one of its arguments. The link can be both internal or external.

As an alternative, another option to change the font style and add links is to use the `write_html()` method. It is an html parser, which allows adding text, changing font style and adding links using html.

2.3 Kurzanleitung

Vollständige Dokumentation der Methoden: `fpdf.FPDF` API doc

- Kurzanleitung
- Lektion 1 - Minimalbeispiel
- Lektion 2 - Kopfzeile, Fußzeile, Seitenumbruch und Bild
- Lektion 3 - Zeilenumbrüche und Farben
- Lektion 4 - Mehrspaltiger Text
- Lektion 5 - Tabellen erstellen
- Lektion 6 - Links erstellen und Textstile mischen

2.3.1 Lektion 1 - Minimalbeispiel

Beginnen wir mit dem Klassiker:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_font("helvetica", "B", 16)
pdf.cell(40, 10, "Hello World!")
pdf.output("tuto1.pdf")
```

Erzeugtes PDF

Nachdem wir die Bibliothek eingebunden haben, erstellen zuerst wir ein `FPDF` Objekt. Der `FPDF` Konstruktor wird hier mit den Standardwerten verwendet: Das Seitenformat wird auf A4-Hochformat gesetzt und als Maßeinheit Millimeter festgelegt.

Diese Werte hätten wir auch explizit angegeben können:

```
pdf = FPDF(orientation="P", unit="mm", format="A4")
```

Es ist auch möglich, eine PDF-Datei im Querformat zu erstellen (`L`), sowie andere Seitenformate (`Letter` und `Legal`) und Maßeinheiten (`pt` , `cm` , `in`) zu verwenden.

Bisher haben wir dem Dokument noch keine Seite hinzugefügt. Um eine Seite hinzuzufügen, verwenden wir `add_page` . Der Ursprung der Koordinaten liegt in der oberen linken Ecke und die aktuelle Schreibposition ist standardmäßig jeweils 1 cm von den Rändern entfernt. Diese Randabstände können mit `set_margins` angespasst werden.

Bevor wir Text hinzufügen können, müssen wir zuerst mit `set_font` eine Schriftart festlegen, um ein gültiges Dokument zu erzeugen. Wir wählen Helvetica, fett in Schriftgröße 16 pt:

```
pdf.set_font('helvetica', 'B', 16)
```

Anstelle von `B` hätten wir mit `I` kursiv , `U` unterstichen oder durch die Übergabe einer leeren Zeichenkette einen "normale" Textstil wählen können. Beliebige Kombinationen der drei Werte sind zulässig. Beachte, dass die Schriftgröße in Punkt und nicht in Millimetern (oder einer anderen durch den Benutzer bei der Erstellung mit `unit=` festgelegten Maßeinheit) angegeben wird. Dies ist die einzige Ausnahme vom Grundsatz, dass immer die durch den Benutzer gewählte Maßeinheit bei der Festlegung von Positions- oder Größenangaben genutzt wird. Neben `Helvetica` stehen `Times` , `Courier` , `Symbol` und `ZapfDingbats` als Standardschriftarten zur Verfügung.

Wir können jetzt eine erste Textzelle mit `cell` einfügen. Eine Zelle ist ein rechteckiger Bereich - optional umrahmt - der Text enthalten kann. Sie wird an der jeweils aktuellen Schreibposition gerendert. Wir können die Abmessungen der Zelle, den Text und dessen Formatierung (zentriert oder ausgerichtet), einen ggf. gewünschten Rahmen und die Festlegung der neuen Schreibposition nach dem Schreiben der Zelle (rechts, unten oder am Anfang der nächsten Zeile) bestimmen.

Um einen Rahmen hinzuzufügen, würden wir die Methode folgendermaßen einbinden:

```
pdf.cell(40, 10, 'Hello World!', 1)
```

Um eine neue Zelle mit zentriertem Text hinzuzufügen und anschließend in die nächste Zeile zu springen, können wir Folgendes schreiben:

```
pdf.cell(60, 10, 'Powered by FPDF.', new_x="LMARGIN", new_y="NEXT", align='C')
```

Anmerkung: Der Zeilenumbruch kann auch mit `ln` erfolgen. Diese Methode erlaubt es, zusätzlich die Höhe des Umbruchs anzugeben.

Schließlich wird das Dokument mit `output` geschlossen und unter dem angegebenen Dateipfad gespeichert. Ohne Angabe eines Parameters liefert `output()` den PDF `bytearray`-Puffer zurück.

2.3.2 Lektion 2 - Kopfzeile, Fußzeile, Seitenumbruch und Bild

Hier ein zweiseitiges Beispiel mit Kopfzeile, Fußzeile und Logo:

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Rendering logo:
        self.image("../docs/fpdf2-logo.png", 10, 8, 33)
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Moving cursor to the right:
        self.cell(80)
        # Printing title:
        self.cell(30, 10, "Title", border=1, align="C")
        # Performing a line break:
        self.ln(20)

    def footer(self):
        # Position cursor at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Printing page number:
        self.cell(0, 10, f"Page {self.page_no()}/{{nb}}", align="C")


# Instantiation of inherited class
pdf = PDF()
pdf.add_page()
pdf.set_font("Times", size=12)
for i in range(1, 41):
    pdf.cell(0, 10, f"Printing line number {i}", new_x="LMARGIN", new_y="NEXT")
pdf.output("new-tuto2.pdf")
```

Erzeugtes PDF

Dieses Beispiel verwendet die Methoden `header` und `footer`, um Kopf- und Fußzeilen zu verarbeiten. Sie werden jeweils automatisch aufgerufen. Die Methode 'header' direkt nach dem Hinzugügen einer neuen Seite, die Methode 'footer' wenn die Bearbeitung einer Seite durch das Hinzufügen einer weiteren Seite oder das Abspeichern des Dokuments abgeschlossen wird. Die Methoden existieren bereits in der Klasse FPDF, sind aber leer. Um sie zu nutzen, müssen wir die Klasse erweitern und sie überschreiben.

Das Logo wird mit der Methode `image` eingebunden, und auf der Seite durch die Angabe der Position der linken oberen Ecke und die gewünschte Bildbreite platziert. Die Höhe wird automatisch berechnet, um die Proportionen des Bildes zu erhalten.

Um die Seitenzahl einzufügenn, übergeben wir zuerst der Zelle einen Nullwert als Breite der Zelle. Das bedeutet, dass die Zelle bis zum rechten Rand der Seite reichen soll. Das ist besonders praktisch, um Text zu zentrieren. Die aktuelle Seitenzahl wird durch die Methode `page_no` ermittelt und in die Zelle geschrieben. Die Gesamtseitenzahl wird mit Hilfe des speziellen Platzhalterwertes `{nb}` ermittelt, der beim Schließen des Dokuments ersetzt wird aufgerufen. Beachte die Verwendung der Methode `set_y`, mit der du die vertikale Schreibposition an einer absoluten Stelle der Seite - von oben oder von unten aus - setzen kannst.

Eine weitere interessante Funktion wird hier ebenfalls verwendet: der automatische Seitenumbruch. Sobald eine Zelle eine festgelegte Grenze in der Seite überschreitet (standardmäßig 2 Zentimeter vom unteren Rand), wird ein Seitenumbruch durchgeführt und die Einstellungen der gewahlten Schrift auf der nächsten Seite automatisch beibehalten. Obwohl die Kopf- und

Fußzeilen ihre eigene Schriftart (`Helvetica`) wählen, wird im Textkörper `Times` verwendet. Dieser Mechanismus der automatischen Übernahme der Einstellungen nach Seitenumbruch gilt auch für Farben und Zeilenbreite. Der Grenzwert, der den Seitenumbruch auslöst, kann mit `set_auto_page_break` festgelegt werden .

2.3.3 Lektion 3 - Zeilenumbrüche und Farben

Fahren wir mit einem Beispiel fort, das Absätze im Blocksatz ausgibt. Es demonstriert auch die Verwendung von Farben.

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Calculating width of title and setting cursor position:
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        # Setting colors for frame, background and text:
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        # Setting thickness of the frame (1 mm)
        self.set_line_width(1)
        # Printing title:
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        # Performing a line break:
        self.ln(10)

    def footer(self):
        # Setting position at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Setting text color to gray:
        self.set_text_color(128)
        # Printing page number
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def chapter_title(self, num, label):
        # Setting font: helvetica 12
        self.set_font("helvetica", "", 12)
        # Setting background color
        self.set_fill_color(200, 220, 255)
        # Printing chapter name:
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            align="L",
            fill=True,
        )
        # Performing a line break:
        self.ln(4)

    def chapter_body(self, filepath):
        # Reading text file:
        with open(filepath, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing justified text:
        self.multi_cell(0, 5, txt)
        # Performing a line break:
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")

    def print_chapter(self, num, title, filepath):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(filepath)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
```

```
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto3.pdf")
```

Resulting PDF

Jules Verne text

Die Methode `get_string_width` ermöglicht die Bestimmung die Breite des übergebenen Textes in der aktuellen Schriftart. Das Beispiel nutzt sie zur Berechnung der Position und der Breite des Rahmens, der den Titel umgibt. Anschließend werden die Farben mit `set_draw_color`, `set_fill_color` und und `set_text_color` gesetzt und die Linienstärke mit `set_line_width` auf 1 mm (Abweichend vom Standardwert von 0,2) festgelegt. Schließlich geben wir die Zelle aus (Der letzte Parameter True zeigt an, dass der Hintergrund gefüllt werden muss).

Zur Erstellung von Absätzen wir die Methode `multi_cell` genutzt. Jedes Mal, wenn eine Zeile den rechten Rand der Zelle erreicht oder ein Zeilenumbruchzeichen `\\n` im Text erkannt wird, wird ein Zeilenumbruch durchgeführt und automatisch eine neue Zelle unterhalb der aktuellen Zelle erstellt. Der Text wird standardmäßig im Blocksatz ausgerichtet.

Es werden zwei Dokumenteigenschaften definiert: Titel (`set_title`) und Autor (`set_author`). Dokumenteneigenschaften können auf zwei Arten eingesehen werden. Man kann das Dokument mit dem Acrobat Reader öffnen und im Menü **Datei** die Option **Dokumenteigenschaften** auswählen. Alternativ kann man auch mit der rechten Maustaste auf das Dokument klicken und die Option Dokumenteigenschaften wählen.

2.3.4 Lektion 4 - Mehrspaltiger Text

Dieses Beispiel ist eine Abwandlung des vorherigen Beispiels und zeigt, wie sich Text über mehrere Spalten verteilen lässt.

```
from fpdf import FPDF


class PDF(FPDF):
    def __init__(self):
        super().__init__()
        self.col = 0  # Current column
        self.y0 = 0  # Ordinate of column start

    def header(self):
        self.set_font("helvetica", "B", 15)
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        self.set_line_width(1)
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        self.ln(10)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def footer(self):
        self.set_y(-15)
        self.set_font("helvetica", "I", 8)
        self.set_text_color(128)
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def set_col(self, col):
        # Set column position:
        self.col = col
        x = 10 + col * 65
        self.set_left_margin(x)
        self.set_x(x)

    @property
    def accept_page_break(self):
        if self.col < 2:
            # Go to next column:
            self.set_col(self.col + 1)
            # Set ordinate to top:
            self.set_y(self.y0)
            # Stay on the same page:
            return False
        # Go back to first column:
```

```
        self.set_col(0)
        # Trigger a page break:
        return True

    def chapter_title(self, num, label):
        self.set_font("helvetica", "", 12)
        self.set_fill_color(200, 220, 255)
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            border="L",
            fill=True,
        )
        self.ln(4)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def chapter_body(self, name):
        # Reading text file:
        with open(name, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing text in a 6cm width column:
        self.multi_cell(60, 5, txt)
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")
        # Start back at first column:
        self.set_col(0)

    def print_chapter(self, num, title, name):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(name)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto4.pdf")
```

Erzeugtes PDF

Jules Verne Text

Der Hauptunterschied zur vorherigen Lektion ist die Verwendung der Methoden `accept_page_break` und `set_col`.

Wird `accept_page_break` verwendet, wird die aktuelle Spaltennummer überprüft, sobald die Zelle den zur Auslösung eines Seitenumbruchs festgelegten Abstand zum unteren Seitenrand (Standard 2cm) überschreitet. Ist die Spaltennummer kleiner als 2 (wir haben uns entschieden, die Seite in drei Spalten zu unterteilen), wird die Methode `set_col` aufgerufen. Sie erhöht die Spaltennummer auf die nächsthöhere und setzt die Schreibposition auf den Anfang der nächsten Spalte, damit der Text dort fortgesetzt werden kann.

Sobald det Text der dritten den oben beschriebenen Abstand zum Seitenende erreicht, wird durch die Methode `accept_page_break` ein Seitenumbruch ausgelöst und die aktive Spalte sowie Schreibposition zurückgesetzt.

2.3.5 Lektion 5 - Tabellen erstellen

In dieser Lektion zeigen wir, wie man auf einfache Weise Tabellen erstellen kann.

Der Code wird drei verschiedene Tabellen erstellen, um zu zeigen, welche Effekte wir mit einigen einfachen Anpassungen erzielen können.

```
import csv
from fpdf import FPDF


class PDF(FPDF):
    def basic_table(self, headings, rows):
        for heading in headings:
            self.cell(40, 7, heading, 1)
        self.ln()
        for row in rows:
            for col in row:
                self.cell(40, 6, col, 1)
```

```
            self.ln()

    def improved_table(self, headings, rows, col_widths=(42, 39, 35, 40)):
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C")
        self.ln()
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR")
            self.cell(col_widths[1], 6, row[1], border="LR")
            self.cell(col_widths[2], 6, row[2], border="LR", align="R")
            self.cell(col_widths[3], 6, row[3], border="LR", align="R")
            self.ln()
        # Closure line:
        self.cell(sum(col_widths), 0, "", border="T")

    def colored_table(self, headings, rows, col_widths=(42, 39, 35, 42)):
        # Colors, line width and bold font:
        self.set_fill_color(255, 100, 0)
        self.set_text_color(255)
        self.set_draw_color(255, 0, 0)
        self.set_line_width(0.3)
        self.set_font(style="B")
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C", fill=True)
        self.ln()
        # Color and font restoration:
        self.set_fill_color(224, 235, 255)
        self.set_text_color(0)
        self.set_font()
        fill = False
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR", align="L", fill=fill)
            self.cell(col_widths[1], 6, row[1], border="LR", align="L", fill=fill)
            self.cell(col_widths[2], 6, row[2], border="LR", align="R", fill=fill)
            self.cell(col_widths[3], 6, row[3], border="LR", align="R", fill=fill)
            self.ln()
            fill = not fill
        self.cell(sum(col_widths), 0, "", "T")


def load_data_from_csv(csv_filepath):
    headings, rows = [], []
    with open(csv_filepath, encoding="utf8") as csv_file:
        for row in csv.reader(csv_file, delimiter=","):
            if not headings:  # extracting column names from first row:
                headings = row
            else:
                rows.append(row)
    return headings, rows


col_names, data = load_data_from_csv("countries.txt")
pdf = PDF()
pdf.set_font("helvetica", size=14)
pdf.add_page()
pdf.basic_table(col_names, data)
pdf.add_page()
pdf.improved_table(col_names, data)
pdf.add_page()
pdf.colored_table(col_names, data)
pdf.output("tuto5.pdf")
```

Erzeugtes PDF - Länder

Da eine Tabelle lediglich eine Sammlung von Zellen darstellt, ist es naheliegend, eine Tabelle aus den bereits bekannten Zellen aufzubauen.

Das erste Beispiel wird auf die einfachste Art und Weise realisiert. Einfach gerahmte Zellen, die alle die gleiche Größe haben und linksbündig ausgerichtet sind. Das Ergebnis ist rudimentär, aber sehr schnell zu erzielen.

Die zweite Tabelle bringt einige Verbesserungen: Jede Spalte hat ihre eigene Breite, die Überschriften sind zentriert und die Zahlen rechtsbündig ausgerichtet. Außerdem wurden die horizontalen Linien entfernt. Dies geschieht mit Hilfe des Randparameters der Methode `cell()`, der angibt, welche Seiten der Zelle gezeichnet werden müssen. Im Beispiel wählen wir die linke (L) und die rechte (R) Seite. Jetzt muss nur noch das Problem der horizontalen Linie zum Abschluss der Tabelle gelöst werden. Es gibt zwei Möglichkeiten, es zu lösen: In der Schleife prüfen, ob wir uns in der letzten Zeile befinden und dann "LRB" als Rahmenparameter übergeben oder, wie hier geschehen, eine abschließende Zelle separat nach dem Durchlaufen der Schleife einfügen.

Die dritte Tabelle der zweiten sehr ähnlich, verwendet aber zusätzlich Farben. Füllung, Text und Linienfarben werden einfach mit den entsprechenden Methoden gesetzt. Eine wechselnde Färbung der Zeilen wird durch die abwechselnde Verwendung transparenter und gefüllter Zellen erreicht.

2.3.6 Lektion 6 - Links erstellen und Textstile mischen

In dieser Lektion werden verschiedene Möglichkeiten der Erstellung interner und externer Links beschrieben.

Es wird auch gezeigt, wie man verschiedene Textstile (fett, kursiv, unterstrichen) innerhalb eines Textes verwenden kann.

```
from fpdf import FPDF


pdf = FPDF()

# First page:
pdf.add_page()
pdf.set_font("helvetica", size=20)
pdf.write(5, "To find out what's new in self tutorial, click ")
pdf.set_font(style="U")
link = pdf.add_link(page=2)
pdf.write(5, "here", link)
pdf.set_font()

# Second page:
pdf.add_page()
pdf.image(
    "../docs/fpdf2-logo.png", 10, 10, 50, 0, "", "https://pyfpdf.github.io/fpdf2/"
)
pdf.set_left_margin(60)
pdf.set_font_size(18)
pdf.write_html(
    """You can print text mixing different styles using HTML tags: <b>bold</b>, <i>italic</i>,
<u>underlined</u>, or <b><i><u>all at once</u></i></b>!
<br><br>You can also insert links on text, such as <a href="https://pyfpdf.github.io/fpdf2/">https://pyfpdf.github.io/fpdf2/</a>,
or on an image: the logo is clickable!"""
)
pdf.output("tuto6.pdf")
```

Erzeugtes PDF - fpdf2-logo

Die hier gezeigte neue Methode zur Einbindung von Text lautet `write()`. Sie ähnelt der bereits bekannten `multi_cell()`. Die wichtigsten Unterschiede sind:

- Das Ende der Zeile befindet sich am rechten Rand und die nächste Zeile beginnt am linken Rand.
- Die aktuelle Position wird an das Textende gesetzt.

Die Methode ermöglicht es uns somit, zuerst einen Textabschnitt zu schreiben, dann den Schriftstil zu ändern und genau an der Stelle fortzufahren, an der wir aufgehört haben. Der größte Nachteil ist jedoch, dass die von `multi_cell()` bekannte Möglichkeit zur Festlegung der Textausrichtung fehlt.

Auf der ersten Seite des Beispiels nutzen wir `write()`. Der Anfang des Satzes wird in "normalem" Stil geschrieben, dann mit der Methode `set_font()` auf Unterstreichung umgestellt und der Satz beendet.

Um einen internen Link hinzuzufügen, der auf die zweite Seite verweist, nutzen wir die Methode `add_link()`, die einen anklickbaren Bereich erzeugt, den wir "link" nennen und der auf eine andere Stelle innerhalb des Dokuments verweist.

Um einen externen Link mit Hilfe eines Bildes zu erstellen, verwenden wir `image()`. Es besteht die Möglichkeit, der Methode ein Linkziel als eines ihrer Argumente zu übergeben. Der Link kann sowohl einer interner als auch ein externer sein.

Eine weitere Möglichkeit, den Schriftstil zu ändern und Links hinzuzufügen, stellt die Verwendung der Methode `write_html()` dar. Sie ist ein HTML-Parser, der das Hinzufügen von Text, Änderung des Schriftstils und Erstellen von Links mittels HTML ermöglicht.

2.4 Tutorial

Documentación completa de los métodos: Documentación de la API de `fpdf.FPDF`

- Tutorial
- Tutorial 1 - Ejemplo básico
- Tutorial 2 - Encabezado, pie de página, salto de página e imagen
- Tutorial 3 - Saltos de línea y colores
- Tutorial 4 - Múltiples columnas
- Tutorial 5 - Creando tablas
- Tutorial 6 - Creando enlaces y combinando estilos de texto

2.4.1 Tutorial 1 - Ejemplo básico

Empecemos con el ejemplo clásico:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_font("helvetica", "B", 16)
pdf.cell(40, 10, "Hello World!")
pdf.output("tuto1.pdf")
```

PDF resultante

Luego de incluir la biblioteca, creamos un objeto `FPDF`. El constructor FPDF es usado aquí con los valores predeterminados: Las páginas están en A4 vertical y la unidad de medida es milímetros. Podría haberse especificado explícitamente con:

```
pdf = FPDF(orientation="P", unit="mm", format="A4")
```

Es posible configurar el PDF en modo horizontal (`L`) o usar otros formatos de página como carta (`Letter`) y oficio (`Legal`) y unidades de medida (`pt` , `cm` , `in`).

Por el momento no hay una página, entonces tenemos que agregar una con add_page. El origen es la esquina superior izquierda y la posición actual está ubicada por defecto a 1 cm de los bordes; los márgenes pueden ser cambiados con set_margins.

Antes de que podamos imprimir texto, es obligatorio seleccionar una fuente con set_font, de lo contrario, el documento sería inválido. Elegimos helvetica en negrita 16:

```
pdf.set_font('helvetica', 'B', 16)
```

Podríamos haber especificado cursiva con `I` , subrayado con `U` o fuente regular con una cadena de texto vacía (o cualquier combinación). Nota que el tamaño de la fuente es dado en puntos, no en milímetros (u otra unidad de medida del usuario); ésta es la única excepción. Las otras fuentes estándar son `Times` , `Courier` , `Symbol` y `ZapfDingbats` .

Podemos ahora imprimir una celda con cell. Una celda es un área rectangular, posiblemente enmarcada, que contiene algún texto. Se imprime en la posición actual. Especificamos sus dimensiones, su texto (centrado o alineado), si los bordes deberían ser dibujados, y a donde la posición actual se mueve después (a la derecha, abajo o al principio de la próxima linea). Para agregar un marco, haremos esto:

```
pdf.cell(40, 10, '¡Hola mundo!', 1)
```

Para agregar una nueva celda próxima a él, con texto centrado y luego ir a la siguiente línea, haríamos:

```
pdf.cell(60, 10, 'Hecho con FPDF.', new_x="LMARGIN", new_y="NEXT", align='C')
```

Nota: el salto de línea puede hacerse también con ln. Este método permite especificar adicionalmente la altura del salto.

Finalmente, el documento es cerrado y guardado en la ruta provista usando output. Sin ningún parámetro provisto, `output()` devuelve el búfer `bytearray` del PDF.

2.4.2 Tutorial 2 - Encabezado, pie de página, salto de página e imagen

Aquí hay un ejemplo de dos páginas con encabezado, pie de página y logo:

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Rendering logo:
        self.image("../docs/fpdf2-logo.png", 10, 8, 33)
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Moving cursor to the right:
        self.cell(80)
        # Printing title:
        self.cell(30, 10, "Title", border=1, align="C")
        # Performing a line break:
        self.ln(20)

    def footer(self):
        # Position cursor at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Printing page number:
        self.cell(0, 10, f"Page {self.page_no()}/{{nb}}", align="C")


# Instantiation of inherited class
pdf = PDF()
pdf.add_page()
pdf.set_font("Times", size=12)
for i in range(1, 41):
    pdf.cell(0, 10, f"Printing line number {i}", new_x="LMARGIN", new_y="NEXT")
pdf.output("new-tuto2.pdf")
```

PDF resultante

Este ejemplo hace uso de los métodos header y footer para procesar encabezados y pies de página. Estos son invocados automáticamente. Ellos ya existen en la clase FPDF pero no hacen nada, por lo tanto tenemos que extender la clase y sobreescribirlos.

El logo es impreso con el método image especificando su esquina superior izquierda y su ancho. La altura es calculada automáticamente para respetar las proporciones de la imagen.

Para imprimir el número de página, un valor nulo es pasado como ancho de celda. Esto significa que la celda deberá ser extendida hasta el margen derecho de la página; es útil para centrar texto. El número de página actual es devuelto por el método page_no; respecto al número total de páginas, éste es obtenido mediante el valor especial `{nb}` que será sustituido al cerrar el documento (este valor especial puede ser cambiado con alias_nb_pages()). Nota el uso del método set_y que permite establecer la posición en una ubicación absoluta en la página, empezando desde arriba o desde abajo.

Otra característica interesante es usada aquí: el salto de página automático. Tan pronto como una celda cruzaría el límite de la página (por defecto a 2 centímetros del borde inferior), un salto es realizado y la fuente es restaurada. Aunque el encabezado y pie de página tienen su propia fuente (`helvetica`), el cuerpo continúa en `Times`. Este mecanismo de restauración automática también se aplica a los colores y al ancho de la línea. El límite que dispara los saltos de página puede establecerse con set_auto_page_break.

2.4.3 Tutorial 3 - Saltos de línea y colores

Continuemos con un ejemplo que imprime párrafos justificados. También ilustra el uso de colores.

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Calculating width of title and setting cursor position:
        width = self.get_string_width(self.title) + 6
```

```
        self.set_x((210 - width) / 2)
        # Setting colors for frame, background and text:
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        # Setting thickness of the frame (1 mm)
        self.set_line_width(1)
        # Printing title:
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        # Performing a line break:
        self.ln(10)

    def footer(self):
        # Setting position at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Setting text color to gray:
        self.set_text_color(128)
        # Printing page number
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def chapter_title(self, num, label):
        # Setting font: helvetica 12
        self.set_font("helvetica", "", 12)
        # Setting background color
        self.set_fill_color(200, 220, 255)
        # Printing chapter name:
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            align="L",
            fill=True,
        )
        # Performing a line break:
        self.ln(4)

    def chapter_body(self, filepath):
        # Reading text file:
        with open(filepath, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing justified text:
        self.multi_cell(0, 5, txt)
        # Performing a line break:
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")

    def print_chapter(self, num, title, filepath):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(filepath)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto3.pdf")
```

PDF resultante

Texto de Julio Verne

El método get_string_width permite determinar la longitud de una cadena de texto en la fuente actual, usada aquí para calcular la posición y el ancho del marco que rodea al título. Los colores son establecidos (vía set_draw_color, set_fill_color y set_text_color) y el grosor de la línea es establecido a 1 mm (contra 0.2 por defecto) con set_line_width. Finalmente, emitimos la celda (el último parámetro en `True` para indicar que el fondo debe ser rellenado).

El método usado para imprimir párrafos es multi_cell. El texto es justificado por defecto. Cada vez que una línea alcanza el extremo derecho de la celda o un caracter de retorno de línea (`\n`) es encontrado, un salto de línea es emitido y una nueva celda

es automáticamente creada bajo la actual. Un salto automático es realizado en la ubicación del espacio o guión suave (`\u00ad`) más cercano antes del límite derecho. Un guión suave será reemplazado por un guión normal cuando un salto de línea se dispara, e ignorado en cualquier otro caso.

Dos propiedades del documento son definidas: el título (set_title) y el autor (set_author). Las propiedades pueden ser vistas de dos formas. La primera es abrir el documento directamente con Acrobat Reader, ir al menú Archivo y elegir la opción Propiedades del Documento. La segunda, también disponible desde el complemento, es hacer clic derecho y seleccionar Propiedades del documento.

2.4.4 Tutorial 4 - Múltiples columnas

Este ejemplo es una variante del anterior, mostrando cómo poner el texto en múltiples columnas.

```
from fpdf import FPDF


class PDF(FPDF):
    def __init__(self):
        super().__init__()
        self.col = 0  # Current column
        self.y0 = 0  # Ordinate of column start

    def header(self):
        self.set_font("helvetica", "B", 15)
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        self.set_line_width(1)
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        self.ln(10)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def footer(self):
        self.set_y(-15)
        self.set_font("helvetica", "I", 8)
        self.set_text_color(128)
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def set_col(self, col):
        # Set column position:
        self.col = col
        x = 10 + col * 65
        self.set_left_margin(x)
        self.set_x(x)

    @property
    def accept_page_break(self):
        if self.col < 2:
            # Go to next column:
            self.set_col(self.col + 1)
            # Set ordinate to top:
            self.set_y(self.y0)
            # Stay on the same page:
            return False
        # Go back to first column:
        self.set_col(0)
        # Trigger a page break:
        return True

    def chapter_title(self, num, label):
        self.set_font("helvetica", "", 12)
        self.set_fill_color(200, 220, 255)
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            border="L",
            fill=True,
        )
        self.ln(4)
        # Saving ordinate position:
        self.y0 = self.get_y()
```

```
    def chapter_body(self, name):
        # Reading text file:
        with open(name, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing text in a 6cm width column:
        self.multi_cell(60, 5, txt)
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")
        # Start back at first column:
        self.set_col(0)

    def print_chapter(self, num, title, name):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(name)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto4.pdf")
```

PDF resultante

Texto de Julio Verne

La diferencia clave con el tutorial anterior es el uso de los métodos accept_page_break y set_col.

Utilizando el método accept_page_break, una vez la celda cruce el límite inferior de la página, éste comprobará el número de la columna actual. Si es menor que 2 (decidimos dividir la página en tres columnas) éste invocará al método set_col, incrementando el número de columna y alterando la posición de la siguiente columna tal que el texto pueda continuar aquí.

Una vez el límite inferior de la tercera columna es alcanzado, el método accept_page_break se reiniciará y volverá a la primera columna, desencadenando un salto de página.

2.4.5 Tutorial 5 - Creando tablas

Este tutorial explicará cómo crear tablas fácilmente.

El código creará tres tablas diferentes para explicar lo que puede lograrse con algunos cambios sencillos.

```
import csv
from fpdf import FPDF


class PDF(FPDF):
    def basic_table(self, headings, rows):
        for heading in headings:
            self.cell(40, 7, heading, 1)
        self.ln()
        for row in rows:
            for col in row:
                self.cell(40, 6, col, 1)
            self.ln()

    def improved_table(self, headings, rows, col_widths=(42, 39, 35, 40)):
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C")
        self.ln()
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR")
            self.cell(col_widths[1], 6, row[1], border="LR")
            self.cell(col_widths[2], 6, row[2], border="LR", align="R")
            self.cell(col_widths[3], 6, row[3], border="LR", align="R")
            self.ln()
        # Closure line:
        self.cell(sum(col_widths), 0, "", border="T")

    def colored_table(self, headings, rows, col_widths=(42, 39, 35, 42)):
        # Colors, line width and bold font:
        self.set_fill_color(255, 100, 0)
        self.set_text_color(255)
        self.set_draw_color(255, 0, 0)
        self.set_line_width(0.3)
        self.set_font(style="B")
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C", fill=True)
```

```
        self.ln()
        # Color and font restoration:
        self.set_fill_color(224, 235, 255)
        self.set_text_color(0)
        self.set_font()
        fill = False
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR", align="L", fill=fill)
            self.cell(col_widths[1], 6, row[1], border="LR", align="L", fill=fill)
            self.cell(col_widths[2], 6, row[2], border="LR", align="R", fill=fill)
            self.cell(col_widths[3], 6, row[3], border="LR", align="R", fill=fill)
            self.ln()
            fill = not fill
        self.cell(sum(col_widths), 0, "", "T")


def load_data_from_csv(csv_filepath):
    headings, rows = [], []
    with open(csv_filepath, encoding="utf8") as csv_file:
        for row in csv.reader(csv_file, delimiter=","):
            if not headings:  # extracting column names from first row:
                headings = row
            else:
                rows.append(row)
    return headings, rows


col_names, data = load_data_from_csv("countries.txt")
pdf = PDF()
pdf.set_font("helvetica", size=14)
pdf.add_page()
pdf.basic_table(col_names, data)
pdf.add_page()
pdf.improved_table(col_names, data)
pdf.add_page()
pdf.colored_table(col_names, data)
pdf.output("tuto5.pdf")
```

PDF resultante - Archivo de texto con países

Dado que una tabla es solo una colección de celdas, es natural construir una a partir de ellas.

El primer ejemplo se logra de la forma más básica posible: simples celdas enmarcadas, todas del mismo tamaño y alineadas a la izquierda. El resultado es rudimentario pero muy rápido de obtener.

La segunda tabla incluye algunas mejoras: cada columna tiene su propio ancho, los títulos están centrados y las figuras alineadas a la derecha. Es más, las líneas horizontales han sido removidas. Esto es hecho por medio del parámetro `border` del método `Cell()`, el cual especifica qué lados de la celda deben dibujarse. Aquí queremos el izquierdo (`L`) y el derecho (`R`). Ahora solo queda el problema de la línea horizontal para terminar la tabla. Hay dos posibilidades para resolverlo: encontrar la última línea en el ciclo, en cuyo caso usamos LRB para el parámetro `border`; o, como se hizo aquí, agregar la línea una vez el ciclo ha terminado.

La tercera tabla es similar a la segunda, pero usa colores. Los colores de relleno, texto y línea son especificados de manera simple. Un coloreado alternante para las filas es obtenido usando de forma alternada celdas transparentes y rellenas.

2.4.6 Tutorial 6 - Creando enlaces y combinando estilos de texto

Este tutorial explicará varias formas de insertar enlaces dentro de un documento pdf, al igual que cómo agregar enlaces a recursos externos.

También mostrará muchas formas en que podemos usar los diferentes estilos de texto (negrita, cursiva, subrayado) dentro del mismo texto.

```
from fpdf import FPDF


pdf = FPDF()

# First page:
pdf.add_page()
pdf.set_font("helvetica", size=20)
pdf.write(5, "To find out what's new in self tutorial, click ")
pdf.set_font(style="U")
link = pdf.add_link(page=2)
pdf.write(5, "here", link)
pdf.set_font()

# Second page:
pdf.add_page()
pdf.image(
```

```
    "../docs/fpdf2-logo.png", 10, 10, 50, 0, "", "https://pyfpdf.github.io/fpdf2/"
)
pdf.set_left_margin(60)
pdf.set_font_size(18)
pdf.write_html(
    """You can print text mixing different styles using HTML tags: <b>bold</b>, <i>italic</i>,
<u>underlined</u>, or <b><i><u>all at once</u></i></b>!
<br><br>You can also insert links on text, such as <a href="https://pyfpdf.github.io/fpdf2/">https://pyfpdf.github.io/fpdf2/</a>,
or on an image: the logo is clickable!"""
)
pdf.output("tuto6.pdf")
```

PDF resultante - Logo de fpdf2

El nuevo método mostrado aquí para imprimir texto es write() . Es muy similar a multi_cell() , siendo las diferencias clave:

- El final de línea está en el margen derecho y la siguiente línea comienza en el margen izquierdo.
- La posición actual se desplaza al final del texto.

El método por tanto nos permite escribir un trozo de texto, alterar el estilo de la fuente, y continuar desde el lugar exacto donde quedamos. Por otro lado, su principal desventaja es que no podemos justificar el texto como hacemos con el método multi_cell().

En la primera página del ejemplo usamos write() para este propósito. El comienzo de la oración está escrito usando texto en estilo regular, luego usando el método set_font() cambiamos a subrayado y terminamos la oración.

Para agregar un enlace interno apuntando a la segunda página, usamos el método add_link() , el cual crea un área clicable a la que nombramos "link" que redirige a otro lugar dentro del documento.

Para crear un enlace externo usando una imagen, usamos image() . El método tiene la opción de recibir un enlace como uno de sus argumentos. El enlace puede ser tanto interno como externo.

Como alternativa, otra opción para cambiar el estilo de fuente y agregar enlaces es usar el método `write_html()`. Este es un analizador de html que permite agregar texto, cambiar el estilo de fuente y agregar enlaces usando html.

2.5 Tutorial

Documentation complète des méthodes : `fpdf.FPDF` API doc

- Tutorial
- Tuto 1 - Exemple minimal
- Tuto 2 - En-tête, bas de page, saut de page et image
- Tuto 3 - Saut de ligne et couleur
- Tuto 4 - Colonnes multiples
- Tuto 5 - Créer des tables
- Tuto 6 - Créer des liens et mélanger différents styles de textes

2.5.1 Tuto 1 - Exemple minimal

Commençons par un exemple classique :

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_font("helvetica", "B", 16)
pdf.cell(40, 10, "Hello World!")
pdf.output("tuto1.pdf")
```

PDF généré

Après avoir inclus la librairie, on crée un objet `FPDF`. Le constructeur FPDF est utilisé avec ses valeurs par défaut : les pages sont en format portrait A4 et l'unité de mesure est le millimètre. Cela peut également être spéficié de cette manière :

```
pdf = FPDF(orientation="P", unit="mm", format="A4")
```

Il est possible de créer un PDF en format paysage (`L`) ou encore d'utiliser d'autres formats (par exemple `Letter` et `Legal`) et unités de mesure (`pt`, `cm`, `in`).

Il n'y a pas encore de page, il faut donc en créer une avec add_page. Le coin en haut à gauche correspond à l'origine, et le curseur (c'est-à-dire la position actuelle où l'on va afficher un élément) est placé par défaut à 1 cm des bords. Les marges peuvent être modifiées avec set_margins.

Avant de pouvoir afficher du texte, il faut obligatoirement choisir une police de caractères avec set_font. Choisissons Helvetica bold 16 :

```
pdf.set_font('helvetica', 'B', 16)
```

On aurait pu spécifier une police en italique avec `I`, soulignée avec `U` ou une police normale avec une chaine de caractères vide. Il est aussi possible de combiner les effets en combinant les caractères. Notez que la taille des caractères est à spécifier en points (pts), pas en millimètres (ou tout autre unité). C'est la seule exception. Les autres polices fournies par défaut sont `Times`, `Courier`, `Symbol` et `ZapfDingbats`.

On peut maintenant afficher une cellule avec cell. Une cellule est une zone rectangulaire, avec ou sans cadre, qui contient du texte. Elle est affichée à la position actuelle du curseur. On spécifie ses dimensions, le texte (centré ou aligné), s'il y a une bordure ou non, ainsi que la position du curseur après avoir affiché la cellule (s'il se déplace à droite, vers le bas ou au début de la ligne suivante). Pour ajouter un cadre, on utilise ceci :

```
pdf.cell(40, 10, 'Hello World!', 1)
```

Pour ajouter une nouvelle cellule avec un texte centré et déplacer le curseur à la ligne suivante, on utilise cela :

```
pdf.cell(60, 10, 'Powered by FPDF.', new_x="LMARGIN", new_y="NEXT", align='C')
```

Remarque : le saut de ligne peut aussi être fait avec ln. Cette méthode permet de spécifier la hauteur du saut.

Enfin, le document est sauvegardé à l'endroit spécifié en utilisant output. Sans aucun paramètre, `output()` retourne le buffer `bytearray` du PDF.

2.5.2 Tuto 2 - En-tête, bas de page, saut de page et image

Voici un exemple contenant deux pages avec un en-tête, un bas de page et un logo :

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Rendering logo:
        self.image("../docs/fpdf2-logo.png", 10, 8, 33)
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Moving cursor to the right:
        self.cell(80)
        # Printing title:
        self.cell(30, 10, "Title", border=1, align="C")
        # Performing a line break:
        self.ln(20)

    def footer(self):
        # Position cursor at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Printing page number:
        self.cell(0, 10, f"Page {self.page_no()}/{{nb}}", align="C")


# Instantiation of inherited class
pdf = PDF()
pdf.add_page()
pdf.set_font("Times", size=12)
for i in range(1, 41):
    pdf.cell(0, 10, f"Printing line number {i}", new_x="LMARGIN", new_y="NEXT")
pdf.output("new-tuto2.pdf")
```

PDF généré

Cet exemple utilise les méthodes header et footer pour générer des en-têtes et des bas de page. Elles sont appelées automatiquement. Elles existent déjà dans la classe FPDF mais elles ne font rien, il faut donc les redéfinir dans une classe fille.

Le logo est affiché avec la méthode image en spécifiant la position du coin supérieur gauche et la largeur de l'image. La hauteur est calculée automatiquement pour garder les proportions de l'image.

Pour centrer le numéro de page dans le bas de page, il faut passer la valeur nulle à la place de la largeur de la cellule. Cela fait prendre toute la largeur de la page à la cellule, ce qui permet de centrer le texte. Le numéro de page actuel est obtenu avec la méthode page_no. Le nombre total de pages est obtenu avec la variable `{nb}` qui prend sa valeur quand le document est fermé (la méthode alias_nb_pages permet de définir un autre nom de variable pour cette valeur). La méthode set_y permet de spécifier une position dans la page relative au haut ou bas de page.

Une autre fonctionnalité intéressante est utilisée ici : les sauts de page automatiques. Si une cellule dépasse la limite du contenu de la page (par défaut à 2 centimètres du bas), un saut de page est inséré à la place et la police de caractères est restaurée. C'est-à-dire, bien que l'en-tête et le bas de page utilisent la police `helvetica`, le corps du texte garde la police `Times`. Ce mécanisme de restauration automatique s'applique également à la couleur et l'épaisseur des lignes. La limite du contenu qui déclenche le saut de page peut être spécifiée avec set_auto_page_break.

2.5.3 Tuto 3 - Saut de ligne et couleur

Continuons avec un exemple qui affiche des paragraphes avec du texte justifié. Cet exemple montre également l'utilisation de couleurs.

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
```

```
        # Calculating width of title and setting cursor position:
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        # Setting colors for frame, background and text:
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        # Setting thickness of the frame (1 mm)
        self.set_line_width(1)
        # Printing title:
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        # Performing a line break:
        self.ln(10)

    def footer(self):
        # Setting position at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Setting text color to gray:
        self.set_text_color(128)
        # Printing page number
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def chapter_title(self, num, label):
        # Setting font: helvetica 12
        self.set_font("helvetica", "", 12)
        # Setting background color
        self.set_fill_color(200, 220, 255)
        # Printing chapter name:
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            align="L",
            fill=True,
        )
        # Performing a line break:
        self.ln(4)

    def chapter_body(self, filepath):
        # Reading text file:
        with open(filepath, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing justified text:
        self.multi_cell(0, 5, txt)
        # Performing a line break:
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")

    def print_chapter(self, num, title, filepath):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(filepath)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto3.pdf")
```

PDF généré

Texte de Jules Verne

La méthode get_string_width permet de déterminer la largeur d'un texte utilisant la police actuelle, ce qui permet de calculer la position et la largeur du cadre autour du titre. Ensuite les couleurs sont spécifiées (avec set_draw_color, set_fill_color et set_text_color) et on spécifie l'épaisseur de la bordure du cadre à 1 mm (contre 0.2 par défaut) avec set_line_width. Enfin, on affiche la cellule (le dernier paramètre "true" indique que le fond doit être rempli).

La méthode multi_cell est utilisée pour afficher les paragraphes. Chaque fois qu'une ligne atteint le bord d'une cellule ou qu'un caractère de retour à la ligne est présent, un saut de ligne est inséré et une nouvelle cellule est créée automatiquement sous la cellule actuelle. Le texte est justifié par défaut.

Deux propriétés sont définies pour le document : le titre (set_title) et l'auteur (set_author). Les propriétés peuvent être trouvées en ouvrant le document PDF avec Acrobat Reader. Elles sont alors visibles dans le menu Fichier -> Propriétés du document.

2.5.4 Tuto 4 - Colonnes multiples

Cet exemple est une variante du précédent qui montre comment répartir le texte sur plusieurs colonnes.

```
from fpdf import FPDF


class PDF(FPDF):
    def __init__(self):
        super().__init__()
        self.col = 0  # Current column
        self.y0 = 0  # Ordinate of column start

    def header(self):
        self.set_font("helvetica", "B", 15)
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        self.set_line_width(1)
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        self.ln(10)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def footer(self):
        self.set_y(-15)
        self.set_font("helvetica", "I", 8)
        self.set_text_color(128)
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def set_col(self, col):
        # Set column position:
        self.col = col
        x = 10 + col * 65
        self.set_left_margin(x)
        self.set_x(x)

    @property
    def accept_page_break(self):
        if self.col < 2:
            # Go to next column:
            self.set_col(self.col + 1)
            # Set ordinate to top:
            self.set_y(self.y0)
            # Stay on the same page:
            return False
        # Go back to first column:
        self.set_col(0)
        # Trigger a page break:
        return True

    def chapter_title(self, num, label):
        self.set_font("helvetica", "", 12)
        self.set_fill_color(200, 220, 255)
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            border="L",
            fill=True,
        )
        self.ln(4)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def chapter_body(self, name):
        # Reading text file:
```

```
        with open(name, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing text in a 6cm width column:
        self.multi_cell(60, 5, txt)
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")
        # Start back at first column:
        self.set_col(0)

    def print_chapter(self, num, title, name):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(name)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto4.pdf")
```

PDF généré

Extrait de Jules Verne

La principale différence avec le tutoriel précédent est l'utilisation des méthodes accept_page_break et `set_col()`.

En utilisant la méthode accept_page_break, une fois que la cellule franchit la limite inférieure de la page, elle vérifie le numéro de la colonne actuelle. Si celui-ci est inférieur à 2 (nous avons choisi de diviser la page en trois colonnes), il appelle la méthode `set_col()`, en augmentant le numéro de la colonne et en modifiant la position de la colonne suivante pour que le texte puisse s'y poursuivre.

Une fois que la limite inférieure de la troisième colonne est atteinte, la méthode accept_page_break sera réinitialisée et retournera à la première colonne. Cela déclenchera un saut de page.

2.5.5 Tuto 5 - Créer des tables

Ce tutoriel explique comment créer facilement des tableaux.

Le code créera trois tableaux différents pour expliquer ce qui peut être réalisé avec quelques modifications.

```
import csv
from fpdf import FPDF


class PDF(FPDF):
    def basic_table(self, headings, rows):
        for heading in headings:
            self.cell(40, 7, heading, 1)
        self.ln()
        for row in rows:
            for col in row:
                self.cell(40, 6, col, 1)
            self.ln()

    def improved_table(self, headings, rows, col_widths=(42, 39, 35, 40)):
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C")
        self.ln()
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR")
            self.cell(col_widths[1], 6, row[1], border="LR")
            self.cell(col_widths[2], 6, row[2], border="LR", align="R")
            self.cell(col_widths[3], 6, row[3], border="LR", align="R")
            self.ln()
        # Closure line:
        self.cell(sum(col_widths), 0, "", border="T")

    def colored_table(self, headings, rows, col_widths=(42, 39, 35, 42)):
        # Colors, line width and bold font:
        self.set_fill_color(255, 100, 0)
        self.set_text_color(255)
        self.set_draw_color(255, 0, 0)
        self.set_line_width(0.3)
        self.set_font(style="B")
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C", fill=True)
        self.ln()
```

```
        # Color and font restoration:
        self.set_fill_color(224, 235, 255)
        self.set_text_color(0)
        self.set_font()
        fill = False
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR", align="L", fill=fill)
            self.cell(col_widths[1], 6, row[1], border="LR", align="L", fill=fill)
            self.cell(col_widths[2], 6, row[2], border="LR", align="R", fill=fill)
            self.cell(col_widths[3], 6, row[3], border="LR", align="R", fill=fill)
            self.ln()
            fill = not fill
        self.cell(sum(col_widths), 0, "", "T")


def load_data_from_csv(csv_filepath):
    headings, rows = [], []
    with open(csv_filepath, encoding="utf8") as csv_file:
        for row in csv.reader(csv_file, delimiter=","):
            if not headings:  # extracting column names from first row:
                headings = row
            else:
                rows.append(row)
    return headings, rows


col_names, data = load_data_from_csv("countries.txt")
pdf = PDF()
pdf.set_font("helvetica", size=14)
pdf.add_page()
pdf.basic_table(col_names, data)
pdf.add_page()
pdf.improved_table(col_names, data)
pdf.add_page()
pdf.colored_table(col_names, data)
pdf.output("tuto5.pdf")
```

PDF généré - Liste de pays

Comme un tableau n'est qu'une collection de cellules, il est naturel d'en construire un à partir de celles-ci.

Le premier exemple est réalisé de la manière la plus basique qui soit : de simples cellules encadrées, toutes de même taille et alignées à gauche. Le résultat est rudimentaire mais très rapide à obtenir.

Le deuxième tableau apporte quelques améliorations : chaque colonne possède sa propre largeur, les titres sont centrés et les chiffres alignés à droite. De plus, les lignes horizontales ont été supprimées. C'est fait grâce au paramètre `border` de la méthode `.cell()` qui spécifie quels côtés de la cellule doivent être dessinés. Ici, nous voulons les côtés gauche (`L`) et droit (`R`). Il ne reste plus que le problème de la ligne horizontale pour terminer le tableau. Il y a deux possibilités pour le résoudre : vérifier la dernière ligne dans la boucle (dans ce cas nous utilisons `LRB` pour le paramètre de bordure) ou, comme fait ici, ajouter la ligne une fois la boucle terminée.

Le troisième tableau est similaire au deuxième mais utilise des couleurs. Les couleurs de remplissage, de texte et de ligne sont simplement spécifiées. Une coloration alternative pour les lignes est obtenue en utilisant des cellules alternativement transparentes et remplies.

2.5.6 Tuto 6 - Créer des liens et mélanger différents styles de textes

Ce tutoriel explique plusieurs façons d'insérer des liens à l'intérieur d'un document pdf, ainsi que l'ajout de liens vers des sources externes.

Il montrera également plusieurs façons d'utiliser différents styles de texte (gras, italique, souligné) dans un même texte.

```
from fpdf import FPDF


pdf = FPDF()

# First page:
pdf.add_page()
pdf.set_font("helvetica", size=20)
pdf.write(5, "To find out what's new in self tutorial, click ")
pdf.set_font(style="U")
link = pdf.add_link(page=2)
pdf.write(5, "here", link)
pdf.set_font()

# Second page:
pdf.add_page()
pdf.image(
    "../docs/fpdf2-logo.png", 10, 10, 50, 0, "", "https://pyfpdf.github.io/fpdf2/"
```

```
)
pdf.set_left_margin(60)
pdf.set_font_size(18)
pdf.write_html(
    """You can print text mixing different styles using HTML tags: <b>bold</b>, <i>italic</i>,
<u>underlined</u>, or <b><i><u>all at once</u></i></b>!
<br><br>You can also insert links on text, such as <a href="https://pyfpdf.github.io/fpdf2/">https://pyfpdf.github.io/fpdf2/</a>,
or on an image: the logo is clickable!"""
)
pdf.output("tuto6.pdf")
```

PDF créé dans ce tutoriel - fpdf2-logo

La nouvelle méthode présentée ici pour imprimer du texte est write(). Elle est très similaire à multi_cell(). Les principales différences sont les suivantes :

- La fin de la ligne se trouve dans la marge de droite et la ligne suivante commence dans la marge de gauche.
- La position actuelle se déplace à la fin du texte.

Cette méthode nous permet donc d'écrire un morceau de texte, de modifier le style de police et de reprendre exactement là où nous nous sommes arrêtés. En revanche, son principal inconvénient est que nous ne pouvons pas justifier le texte comme nous le faisons avec la méthode multi_cell().

Dans la première page de l'exemple, nous avons utilisé write() à cette fin. Le début de la phrase est écrit en style normal, puis en utilisant la méthode set_font(), nous sommes passés au soulignement et avons terminé la phrase.

Pour ajouter un lien interne pointant vers la deuxième page, nous avons utilisé la méthode add_link(), qui crée une zone cliquable que nous avons nommée `link` et qui dirige vers une autre page du document.

Pour créer le lien externe à l'aide d'une image, nous avons utilisé image(). Cette méthode a la possibilité de transmettre un lien comme l'un de ses arguments. Le lien peut être interne ou externe.

Comme alternative, une autre option pour changer le style de police et ajouter des liens est d'utiliser la méthode `write_html()`. Celle-ci permet de lire du HTML pour produire du texte, changer le style de police ou encore ajouter des liens.

2.6 Πρόγραμμα Εκμάθησης

Πλήρης τεκμηρίωση των μεθόδων: `fpdf.FPDF` API doc

- Πρόγραμμα Εκμάθησης
- Μάθημα 1 - Απλό Παράδειγμα
- Μάθημα 2 - Επικεφαλίδα, υποσέλιδο, αλλαγή σελίδας και εικόνα
- Μάθημα 3 - Αλλαγές γραμμής και χρώματα
- Μάθημα 4 - Πολλαπλές Στήλες
- Μάθημα 5 - Δημιουργία Πινάκων
- Μάθημα 6 - Δημιουργία συνδέσμων και μίξη στυλ κειμένου

2.6.1 Μάθημα 1 - Απλό Παράδειγμα

Ας ξεκινήσουμε με ένα κλασσικό παράδειγμα:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_font("helvetica", "B", 16)
pdf.cell(40, 10, "Hello World!")
pdf.output("tuto1.pdf")
```

Παραγόμενο PDF

Αφού συμπεριλάβουμε το αρχείο βιβλιοθήκης, δημιουργούμε ένα αντικείμενο `FPDF`. Ο κατασκευαστής FPDF χρησιμοποιείται στην προκειμένη περίπτωση με τις προκαθορισμένες τιμές: οι σελίδες έχουν διαστάσεις A4 και η μονάδας μέτρησης είναι το χιλιοστόμετρο. Οι συγκεκριμένες τιμές μπορούν να προσδιοριστούν αναλυτικά ως εξής:

```
pdf = FPDF(orientation="P", unit="mm", format="A4")
```

Δίνεται η δυνατότητα να ορίσουμε το PDF σε λειτουργία τοπίου (`L`) ή να χρησιμοποιήσουμε άλλες μορφοποιήσεις σελίδας (όπως `Letter` και `Legal`) και μονάδες μέτρησης (`pt` , `cm` , `in`).

Προς το παρόν δεν υπάρχει σελίδα, οπότε θα προσθέσουμε μία με την μέθοδο add_page. Η αρχή βρίσκεται στην αριστερή άνω γωνία και η τρέχουσα θέση τοποθετείται, από προεπιλογή, σε απόσταση 1 cm από το περίγραμμα. Τα περιθώρια μπορούν να οριστούν με set_margins.

Πρωτού μπορέσουμε να εκτυπώσουμε κείμενο, είναι υποχρεωτικό να επιλέξουμε γραμματοσειρά με set_font, αλλιώς το αρχείο δεν θα είναι έγκυρο. Επιλέγουμε τη γραμματοσειρά Helvetica bold 16:

```
pdf.set_font('helvetica', 'B', 16)
```

Μπορούμε να επιλέξουμε πλάγια γραφή με `I` , υπογράμμιση με `U` η μία απλή γραμματοσειρά με μία κενή συμβολοσειρά (ή οποιονδήποτε συνδιασμό). Αξίζει να σημειωθεί ότι το μέγεθος της γραμματοσειράς δίνεται σε σημεία, όχι χιλιοστόμετρα (ή κάποια άλλη μονάδα μέτρησης). Το παραπάνω αποτελεί τη μοναδική εξαίρεση. Οι υπόλοιπες ενσωματωμένες γραμματοσείρες είναι `Times` , `Courier` , `Symbol` and `ZapfDingbats` .

Πλέον, μπορούμε να εκτυπώσουμε ένα κελί cell. Ένα κελί αποτελεί μία ορθογώνια επιφάνεια, πιθανώς πλαισιωμένη, η οποία περιέχει κείμενο. Απεικονίζεται στην τρέχουσα θέση. Ορίζουμε τις διαστάσεις της, το κείμενό της (κεντραρισμένο ή ευθυγραμμισμένο), εάν επιθυμούμε εμφάνιση του περιγράμματος, και που θα μετακινηθεί η τρέχουσα θέση μετά από αυτή (στα δεξιά της ορθογώνιας επιφάνειας, από κάτω της ή στην αφετηρία της επόμενης γραμμής). Μπορούμε να προσθέσουμε ένα πλαίσιο ως εξής:

```
pdf.cell(40, 10, 'Hello World!', 1)
```

Για να προσθέσουμε ένα νέο κελί δίπλα στο αρχικό με κεντραρισμένο κείμενο και στη συνέχεια να μεταβούμε στην επόμενη γραμμή, χρησιμοποιούμε:

```
pdf.cell(60, 10, 'Powered by FPDF.', new_x="LMARGIN", new_y="NEXT", align='C')
```

Παρατήρηση: η αλλαγή γραμμής μπορεί να πραγματοποιηθεί και με ln. Αυτή η μέθοδος επιτρέπει επίσης τον προσδιορισμό του ύψους της αλλαγής γραμμής.

Εν τέλει, το αρχείο μας είναι κλειστό και έχει αποθηκευτεί στην παρεχόμενη διαδρομή αρχείου χρησιμοποιώντας output. Αν δεν παρέχουμε παραμέτρους, η μέθοδος `output()` επιστρέφει το αρχείο PDF σε μορφή `bytearray`.

2.6.2 Μάθημα 2 - Επικεφαλίδα, υποσέλιδο, αλλαγή σελίδας και εικόνα

Παρακάτω, παρουσιάζεται ένα παράδειγμα με τη χρήση επικεφαλίδας, υποσέλιδου και λογότυπου:

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Rendering logo:
        self.image("../docs/fpdf2-logo.png", 10, 8, 33)
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Moving cursor to the right:
        self.cell(80)
        # Printing title:
        self.cell(30, 10, "Title", border=1, align="C")
        # Performing a line break:
        self.ln(20)

    def footer(self):
        # Position cursor at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Printing page number:
        self.cell(0, 10, f"Page {self.page_no()}/{{nb}}", align="C")


# Instantiation of inherited class
pdf = PDF()
pdf.add_page()
pdf.set_font("Times", size=12)
for i in range(1, 41):
    pdf.cell(0, 10, f"Printing line number {i}", new_x="LMARGIN", new_y="NEXT")
pdf.output("new-tuto2.pdf")
```

Παραγόμενο PDF

Στο συγκεκριμένο παράδειγμα γίνεται χρήση των μεθόδων header και footer έτσι ώστε να επεξεργαστούμε τις επικεφαλίδες και τα υποσέλιδα των σελίδων ενός αρχείου. Η κλήση τους γίνεται αυτόματα. Υπάρχουν ήδη στην κλάση FPDF αλλά δεν προσφέρουν καμία λειτουργία, επομένως χρειάζεται να επεκτείνουμε την κλάση και να τις υπερκαλύψουμε.

Το λογότυπο εκτυπώνεται με την μέθοδο image διευκρινίζοντας την αριστερή άνω γωνία και το πλάτος του. Το ύψος της υπολογίζεται αυτόματα λαμβάνοντας υπόψη τις αναλογίες της εικόνας.

Για να εκτυπώσουμε τον αριθμό της σελίδας, χρειάζεται να περάσουμε την μηδενική τιμή στην παράμετρο του πλάτους κελιού. Αυτό σημαίνει ότι το κελί θα επεκταθεί μέχρι και το δεξί περιθώριο της σελίδας, το οποίο βολεύει στο κεντράρισμα του κειμένου. Ο αριθμός της τωρινής σελίδας παρέχεται από την μέθοδο page_no. Ο συνολικός αριθμός σελίδων του κειμένου είναι διαθέσιμος μέσω της ειδικής μεταβλητής `{nb}`, η οποία ορίζεται με το κλείσιμο του αρχείου. Αυτή η ειδική τιμή μπορεί να τροποποιηθεί μέσω της μεθόδου alias_nb_pages(). Αξίζει να σημειωθεί ότι η μέθοδος set_y επιτρέπει τον ορισμό της τρέχουσας θέσης σε οποιαδήποτε τοποθεσία στη σελίδα, ξεκινώντας από την κορυφή ή το τέλος της σελίδας.

Ένα ακόμη ενδιαφέρον χαρακτηριστικό παρουσιάζεται στην συγκεκριμένη περίπτωση: η αυτόματη αλλαγή σελίδας. Μόλις ένα κελί ξεπεράσει ένα προκαθορισμένο όριο στη σελίδα (2 εκατοστά από το κάτω μέρος της σελίδας εξ ορισμού), πραγματοποιείται αλλαγή γραμμής και η γραμματοσειρά επαναφέρεται. Παρόλο που η επικεφαλίδα και το υποσέλιδο επιλέγουν την δικιά τους γραμματοσειρά (`helvetica`), το κύριο τμήμα του κειμένου συνεχίζει με τη γραμματοσειρά `Times`. Αυτός ο μηχανισμός της αυτόματης επαναφοράς εφαρμόζεται επιπλέον στο χρώμα και στο πλάτος γραμμής. Το όριο που προκαλεί την αλλαγή σελίδας μπορεί να οριστεί μέσω της μεθόδου set_auto_page_break.

2.6.3 Μάθημα 3 - Αλλαγές γραμμής και χρώματα

Ας συνεχίσουμε με ένα παράδειγμα το οποίο εκτυπώνει ευθυγραμμισμένες παραγράφους. Επίσης επεξηγεί τη χρήση χρωμάτων.

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Calculating width of title and setting cursor position:
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        # Setting colors for frame, background and text:
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        # Setting thickness of the frame (1 mm)
        self.set_line_width(1)
        # Printing title:
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        # Performing a line break:
        self.ln(10)

    def footer(self):
        # Setting position at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Setting text color to gray:
        self.set_text_color(128)
        # Printing page number
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def chapter_title(self, num, label):
        # Setting font: helvetica 12
        self.set_font("helvetica", "", 12)
        # Setting background color
        self.set_fill_color(200, 220, 255)
        # Printing chapter name:
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            align="L",
            fill=True,
        )
        # Performing a line break:
        self.ln(4)

    def chapter_body(self, filepath):
        # Reading text file:
        with open(filepath, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing justified text:
        self.multi_cell(0, 5, txt)
        # Performing a line break:
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")

    def print_chapter(self, num, title, filepath):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(filepath)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto3.pdf")
```

Παραγόμενο PDF

Κείμενο του Jules Verne

Η μέθοδος get_string_width επιτρέπει τον καθορισμό του μήκους μίας συμβολοσειράς στην τωρινή γραμματοσειρά, το οποίο χρησιμοποιείται στη συγκεκριμένη περίπτωση για τον υπολογισμό της θέσης και του πλάτους του πλαισίου που περιβάλλει τον τίτλο. Έπειτα ορίζονται τα χρώματα (μέσω set_draw_color, set_fill_color και set_text_color) και το πάχος της γραμμής ορίζεται ως 1 χιλιοστόμετρο (αντιθέτως της προκαθορισμένης τιμής 0.2) μέσω της μεθόδου set_line_width. Τελικά, εκτυπώνουμε το κελί (η τελευταία παράμετρος ίση με true υποδηλώνει την κάλυψη του υπόβαθρου).

Για την εκτύπωση των παραγράφων χρησιμοποιήσαμε την μέθοδο multi_cell. Το κείμενο ευθυγραμμίζεται αυτόματα. Κάθε φορά που μία γραμμή φτάνει στην ακραία δεξιά θέση του κελιού ή συναντάται χαρακτήρας επιστροφής φορέα (`\n`), καλείται αλλαγή γραμμής και ένα νέο κελί δημιουργείται αυτόματα κάτω από το τωρινό. Μία αυτόματη αλλαγή γραμμής πραγματοποιείται στο σημείο με το πλησιέστερο χαρακτήρα κενού ή ενωτικού συλλαβής (`\u00ad`) πριν την ακραία δεξιά θέση. Ένα ενωτικό συλλαβής θα αντικατασταθεί από ένα απλό ενωτικό όταν πραγματοποιείται αλλαγή γραμμής, αλλιώς θα αγνοηθεί.

Ορίζονται δύο ιδιότητες αρχείου: ο τίτλος (set_title) και ο συγγραφέας (set_author). Οι ιδιότητες μπορούν να προβληθούν με δύο τρόπους. Πρώτον, μπορούμε να ανοίξουμε το αρχείο απευθείας μέσω Acrobat Reader, να κατευθυνθούμε στο Μενού Αρχείων και να επιλέξουμε την επιλογή Ιδιότητες Αρχείου. Δεύτερον, μπορούμε απευθείας να κάνουμε δεξί κλικ στο εικονίδιο αρχείου και να επιλέξουμε τις Ιδιότητες Αρχείου.

2.6.4 Μάθημα 4 - Πολλαπλές Στήλες

Αυτό το παράδειγμα αποτελεί μία παραλλαγή του προηγούμενου και μας παρουσιάζει πως να κατανέμουμε το κείμενό μας σε πολλαπλές στήλες.

```
from fpdf import FPDF


class PDF(FPDF):
    def __init__(self):
        super().__init__()
        self.col = 0  # Current column
        self.y0 = 0  # Ordinate of column start

    def header(self):
        self.set_font("helvetica", "B", 15)
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        self.set_line_width(1)
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        self.ln(10)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def footer(self):
        self.set_y(-15)
        self.set_font("helvetica", "I", 8)
        self.set_text_color(128)
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def set_col(self, col):
        # Set column position:
        self.col = col
        x = 10 + col * 65
        self.set_left_margin(x)
        self.set_x(x)

    @property
    def accept_page_break(self):
        if self.col < 2:
            # Go to next column:
            self.set_col(self.col + 1)
            # Set ordinate to top:
            self.set_y(self.y0)
            # Stay on the same page:
            return False
        # Go back to first column:
        self.set_col(0)
        # Trigger a page break:
```

```
        return True

    def chapter_title(self, num, label):
        self.set_font("helvetica", "", 12)
        self.set_fill_color(200, 220, 255)
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            border="L",
            fill=True,
        )
        self.ln(4)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def chapter_body(self, name):
        # Reading text file:
        with open(name, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing text in a 6cm width column:
        self.multi_cell(60, 5, txt)
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")
        # Start back at first column:
        self.set_col(0)

    def print_chapter(self, num, title, name):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(name)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto4.pdf")
```

Παραγόμενο PDF

Κείμενο του Jules Verne

Η κύρια διαφορά από το προηγούμενο παράδειγμα είναι η χρήση των μεθόδων accept_page_break και set_col.

Χρησιμοποιώντας την μέθοδο accept_page_break, μόλις το κελί ξεπεράσει το κάτω όριο της σελίδας, γίνεται έλεγχος του αριθμού της τωρινής στήλης. Εάν ο αριθμός αυτός είναι μικρότερος του 2 (επιλέξαμε την κατανομή της σελίδας σε τρεις στήλες) θα κληθεί η μέθοδος set_col, αυξάνοντας τον αριθμό στήλης και αλλάζοντας την θέση της αμέσως επόμενης στήλης έτσι ώστε το κείμενο να συνεχιστεί εκεί.

Μόλις φτάσουμε στο το κάτω όριο σελίδας της τρίτης στήλης, η μέθοδος accept_page_break επαναφέρεται και μεταφερόμαστε ξανά πίσω στην πρώτη στήλη όπου πραγματοποιείται αλλαγή σελίδας.

2.6.5 Μάθημα 5 - Δημιουργία Πινάκων

Σε αυτό το μάθημα θα εξηγήσουμε πως να δημιουργούμε εύκολα πίνακες.

Ο κώδικας θα δημιουργήσει τρεις διαφορετικούς πίνακες έτσι ώστε να παρουσιάσουμε τι μπορεί να επιτευχθεί με μερικές απλές προσαρμογές.

```
import csv
from fpdf import FPDF


class PDF(FPDF):
    def basic_table(self, headings, rows):
        for heading in headings:
            self.cell(40, 7, heading, 1)
        self.ln()
        for row in rows:
            for col in row:
                self.cell(40, 6, col, 1)
            self.ln()

    def improved_table(self, headings, rows, col_widths=(42, 39, 35, 40)):
        for col_width, heading in zip(col_widths, headings):
```

```
            self.cell(col_width, 7, heading, border=1, align="C")
        self.ln()
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR")
            self.cell(col_widths[1], 6, row[1], border="LR")
            self.cell(col_widths[2], 6, row[2], border="LR", align="R")
            self.cell(col_widths[3], 6, row[3], border="LR", align="R")
            self.ln()
        # Closure line:
        self.cell(sum(col_widths), 0, "", border="T")

    def colored_table(self, headings, rows, col_widths=(42, 39, 35, 42)):
        # Colors, line width and bold font:
        self.set_fill_color(255, 100, 0)
        self.set_text_color(255)
        self.set_draw_color(255, 0, 0)
        self.set_line_width(0.3)
        self.set_font(style="B")
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C", fill=True)
        self.ln()
        # Color and font restoration:
        self.set_fill_color(224, 235, 255)
        self.set_text_color(0)
        self.set_font()
        fill = False
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR", align="L", fill=fill)
            self.cell(col_widths[1], 6, row[1], border="LR", align="L", fill=fill)
            self.cell(col_widths[2], 6, row[2], border="LR", align="R", fill=fill)
            self.cell(col_widths[3], 6, row[3], border="LR", align="R", fill=fill)
            self.ln()
            fill = not fill
        self.cell(sum(col_widths), 0, "", "T")


def load_data_from_csv(csv_filepath):
    headings, rows = [], []
    with open(csv_filepath, encoding="utf8") as csv_file:
        for row in csv.reader(csv_file, delimiter=","):
            if not headings:  # extracting column names from first row:
                headings = row
            else:
                rows.append(row)
    return headings, rows


col_names, data = load_data_from_csv("countries.txt")
pdf = PDF()
pdf.set_font("helvetica", size=14)
pdf.add_page()
pdf.basic_table(col_names, data)
pdf.add_page()
pdf.improved_table(col_names, data)
pdf.add_page()
pdf.colored_table(col_names, data)
pdf.output("tuto5.pdf")
```

Παραγόμενο PDF - Κείμενο Χωρών

Εφόσον ένας πίνακας αποτελεί μία συλλογή από κελιά, είναι φυσικό να τον κατασκευάσουμε από αυτά.

Το πρώτο παράδειγμα επιτυγχάνεται με τον πιο απλό τρόπο: πλαισιωμένα κελιά, ίδιου μεγέθους και αριστερά στοιχισμένα. Το αποτέλεσμα είναι υποτυπώδες αλλά αποκτάται αρκετά εύκολα.

Ο δεύτερος πίνακας παρουσιάζει ορισμένες βελτιώσεις: κάθε στήλη έχει το δικό της πλάτος, οι τίτλοι είναι κεντραρισμένοι και οι αριθμοί δεξιά στοιχισμένοι. Επιπλέον, οριζόντιες γραμμές έχουν αφαιρεθεί. Αυτό επιτυγχάνεται με την παράμετρο border της μεθόδου Cell(), η οποία ορίζει ποιες πλευρές του κελιού χρειάζεται να σχεδιαστούν. Στη συγκεκριμένη περίπτωση θέλουμε τις αριστερές (L) και τις δεξιές (R). Τώρα απομένει μόνο το πρόβλημα των οριζόντιων γραμμών. Μπορούμε να το λύσουμε με δύο τρόπους: να ελέγξουμε την τελευταία γραμμή στο βρόχο επαναλήψεων, οπότε θα χρησιμοποιήσουμε LRB για την παράμετρο border ή, όπως πράξαμε εδώ, να προσθέσουμε την γραμμή όταν τελειώσει ο βρόχος επαναλήψεων.

Ο τρίτος πίνακας είναι παρόμοιος με τον δεύτερο αλλά χρησιμοποιεί χρώματα. Τα χρώματα του γεμίσματος, του κειμένου και των γραμμών ορίζονται ξεχωριστά. Ο εναλλασσόμενος χρωματισμός των γραμμών του πίνακα επιτυγχάνεται με τη χρήση διαφανών και γεμισμένων κελιών.

2.6.6 Μάθημα 6 - Δημιουργία συνδέσμων και μίξη στυλ κειμένου

Σε αυτό το μάθημα θα εξηγήσουμε πολλαπλούς τρόπους εισαγωγής εσωτερικών αλλα και εξωτερικών συνδέσμων σε ένα αρχείο pdf.

Θα αναλύσουμε επίσης πως μπορούμε να χρησιμοποιήσουμε διάφορα στυλ κειμένου (έντονη γραφή, πλάγια γραφή, υπογράμμιση) εντός του ίδιου κειμένου.

```
from fpdf import FPDF


pdf = FPDF()

# First page:
pdf.add_page()
pdf.set_font("helvetica", size=20)
pdf.write(5, "To find out what's new in self tutorial, click ")
pdf.set_font(style="U")
link = pdf.add_link(page=2)
pdf.write(5, "here", link)
pdf.set_font()

# Second page:
pdf.add_page()
pdf.image(
    "../docs/fpdf2-logo.png", 10, 10, 50, 0, "", "https://pyfpdf.github.io/fpdf2/"
)
pdf.set_left_margin(60)
pdf.set_font_size(18)
pdf.write_html(
    """You can print text mixing different styles using HTML tags: <b>bold</b>, <i>italic</i>,
<u>underlined</u>, or <b><i><u>all at once</u></i></b>!
<br><br>You can also insert links on text, such as <a href="https://pyfpdf.github.io/fpdf2/">https://pyfpdf.github.io/fpdf2/</a>,
or on an image: the logo is clickable!"""
)
pdf.output("tuto6.pdf")
```

Παραγόμενο PDF - fpdf2-logo

Παρατηρούμε μία νέα μέθοδο για την εκτύπωση κειμένου, την write() . Η μέθοδος αυτή, θυμίζει αρκετά την multi_cell() , παρόλα αυτά εμφανίζει τις εξής διαφορές:

- Το τέλος της γραμμής βρίσκεται στο δεξί περιθώριο και η επόμενη γραμμή ξεκινάει στο αριστερό περιθώριο.
- Η τρέχουσα θέση μετακινείται στο τέλος του κειμένου.

Αυτή η μέθοδος, επομένως μας επιτρέπει να γράψουμε ένα κομμάτι κειμένου, να αλλάξουμε τη γραμματοσειρά, και να συνεχίσουμε ακριβώς στο σημείο που είχαμε απομείνει. Από την άλλη πλευρά, το βασικό της μειονέκτημα είναι ότι δεν μπορούμε να ευθυγραμμίσουμε το κείμενο όπως με την μέθοδο multi_cell().

Στην πρώτη σελίδα του παραδείγματος χρησιμοποιήσαμε την μέθοδο write() για αυτό το σκοπό. Το πρώτο κομμάτι της πρότασης είναι γραμμένο ως απλό κείμενο, ενώ στη συνέχεια, αφού χρησιμοποιήσαμε την μέθοδο set_font(), αλλάξαμε το στυλ κειμένου σε υπογράμμιση και κλείσαμε την πρόταση.

Για να προσθέσουμε έναν εσωτερικό σύνδεσμο ο οποίος θα κατευθύνει στην επόμενη σελίδα, χρησιμοποιήσαμε την μέθοδο add_link(), η οποία δημιουργεί μία επιφανεία με όνομα "link". Αν κλικάρουμε την επιφάνεια αυτή μεταφερόμαστε σε μία άλλη τοποθεσία του αρχείου.

Για να δημιουργήσουμε έναν εξωτερικό σύνδεσμο μέσω μιας εικόνας, θα χρησιμοποιήσουμε την μέθοδο image(). Αυτή η μέθοδος μας δίνει την επιλογή να περάσουμε έναν σύνδεσμο ως τιμή σε μία από τις παραμέτρους της. Ο σύνδεσμος μπορεί να είναι εσωτερικός ή εξωτερικός.

Εναλλακτικά, μία ακόμη επιλογή για να αλλάξουμε το στυλ κειμένου και να προσθέσουμε συνδέσμους είναι η χρήση της μεθόδου `write_html()` . Η μέθοδος αυτή, αποτελεί έναν αναλυτή html ο οποίος επιτρέπει την προσθήκη κειμένου, την αλλαγή γραμματοσειράς και την προσθήκη συνδέσμων με την χρήση της html.

2.7 Tutorial

Documentazione completa dei metodi: `fpdf.FPDF` API doc

- Tutorial
- Tuto 1 - Esempio base
- Tuto 2 - Intestazione, piè di pagina, interruzione di pagina ed immagini
- Tuto 3 - Interruzioni di riga e colori
- Tuto 4 - Colonne multiple
- Tuto 5 - Creare tabelle
- Tuto 6 - Creare link e mescolare stili di testo

2.7.1 Tuto 1 - Esempio base

Iniziamo con un esempio comune:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_font("helvetica", "B", 16)
pdf.cell(40, 10, "Hello World!")
pdf.output("tuto1.pdf")
```

Risultato PDF

Dopo aver incluso la libreria, creiamo un oggetto `FPDF`. Così facendo il costruttore FPDF viene utilizzato con i suoi valori di default: le pagine sono in A4 verticale e l'unità di misura è millimetri. Avremmo potuto specificarle esplicitamente facendo:

```
pdf = FPDF(orientation="P", unit="mm", format="A4")
```

È possibile impostare il PDF in modalità orizzontale (`L`) o utilizzare altri formati (come `Letter` e `Legal`) e unità di misura (`pt` , `cm` , `in`).

Non esiste una pagina al momento, quindi dobbiamo aggiungerne una con add_page. L'origine è in alto a sinistra e la posizione corrente è a 1cm dai bordi; i margini possono essere cambiati con set_margins.

Prima di poter stampare del testo, è obbligatorio selezionare un font con set_font, altrimenti il documento risulterebbe non valido. Scegliamo Helvetica bold 16:

```
pdf.set_font('helvetica', 'B', 16)
```

Avremmo potuto scegliere il corsivo con `I` , sottolineato con `U` o un font regolare lasciando la stringa vuota (o ogni combinazione). Notare che la dimensione dei caratteri è specificata in punti, non millimetri (o altre unità di misura); questa è l'unica eccezione. Gli altri font disponibili sono `Times` , `Courier` , `Symbol` and `ZapfDingbats` .

Adesso possiamo disegnare una cella con cell. Una cella è un'area rettangolare, in caso con bordo, che contiene del testo. È disegnata nella attuale posizione. Specifichiamo le sue dimensioni, il suo testo (centrato o allineato), se i bordi devono essere mostrati, e dove verrà spostata la posizione quando avremo finito (a destra, sotto, o all'inizio della riga successiva). Faremmo così:

```
pdf.cell(40, 10, 'Hello World!', 1)
```

Per aggiungere una nuova cella di fianco alla precedente con testo centrato e poi spostarci alla riga successiva, faremmo:

```
pdf.cell(60, 10, 'Powered by FPDF.', new_x="LMARGIN", new_y="NEXT", align='C')
```

NB: si può andare a capo anche con ln. Questo metodo permette di specificare l'altezza dello spazio.

In fine, il documento è chiuso e salvato nella destinazione fornita attraverso output. Senza alcun parametro, `output()` ritorna il PDF in un buffer `bytearray`.

2.7.2 Tuto 2 - Intestazione, piè di pagina, interruzione di pagina ed immagini

Ecco un esempio composto da due pagine con intestazione, piè di pagina e logo:

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Rendering logo:
        self.image("../docs/fpdf2-logo.png", 10, 8, 33)
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Moving cursor to the right:
        self.cell(80)
        # Printing title:
        self.cell(30, 10, "Title", border=1, align="C")
        # Performing a line break:
        self.ln(20)

    def footer(self):
        # Position cursor at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Printing page number:
        self.cell(0, 10, f"Page {self.page_no()}/{{nb}}", align="C")


# Instantiation of inherited class
pdf = PDF()
pdf.add_page()
pdf.set_font("Times", size=12)
for i in range(1, 41):
    pdf.cell(0, 10, f"Printing line number {i}", new_x="LMARGIN", new_y="NEXT")
pdf.output("new-tuto2.pdf")
```

Risultato PDF

Questo esempio sfrutta i metodi header e footer per processare intestazioni e piè di pagina. Vengono chiamati automaticamente. Esistono nella classe FPDF ma non eseguono operazioni, quindi è necessario estendere la classe e sovrascriverli.

Il logo è stampato con il metodo image specificando la posizione del suo angolo in alto a sinistra e la sua larghezza. L'altezza è calcolata automaticamente per rispettare le proporzioni dell'immagine.

Per stampare il numero della pagina, un valore nullo può essere passato come larghezza della cella. Significa che la cella "crescerà" fino al margine destro della pagina; è utile per centrare il testo. Il numero di pagina è ritornato da page_no; mentre per il numero totale di pagine, si ottiene attraverso il valore speciale `{nb}` che verrà sostituito quando le pagine saranno generate. Importante menzionare il metodo set_y che permette di selezionare una posizione assoluta all'interno della pagina, incominciando dall'alto o dal basso.

Un'altra feature interessante: l'interruzione di pagina automatica. Non appena una cella dovesse superare il limite nella pagina (a 2 centimetri dal fondo di default), ci sarebbe un'interruzione e un reset del font. Nonostante l'intestazione e il piè di pagina scelgano il proprio font (`helvetica`), il contenuto continua in `Times`. Questo meccanismo di reset automatico si applica anche ai colori e allo spessore della linea. Il limite può essere scelto con set_auto_page_break.

2.7.3 Tuto 3 - Interruzioni di riga e colori

Continuiamo con un esempio che stampa paragrafi giustificati. Mostreremo anche l'utilizzo dei colori.

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Calculating width of title and setting cursor position:
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        # Setting colors for frame, background and text:
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
```

```
        self.set_text_color(220, 50, 50)
        # Setting thickness of the frame (1 mm)
        self.set_line_width(1)
        # Printing title:
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        # Performing a line break:
        self.ln(10)

    def footer(self):
        # Setting position at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Setting text color to gray:
        self.set_text_color(128)
        # Printing page number
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def chapter_title(self, num, label):
        # Setting font: helvetica 12
        self.set_font("helvetica", "", 12)
        # Setting background color
        self.set_fill_color(200, 220, 255)
        # Printing chapter name:
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            align="L",
            fill=True,
        )
        # Performing a line break:
        self.ln(4)

    def chapter_body(self, filepath):
        # Reading text file:
        with open(filepath, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing justified text:
        self.multi_cell(0, 5, txt)
        # Performing a line break:
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")

    def print_chapter(self, num, title, filepath):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(filepath)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto3.pdf")
```

Risultato PDF

Testo Jules Verne

Il metodo get_string_width permette di determinare la lunghezza di una stringa nel font selezionato, e viene utilizzato per calcolare la posizione e la larghezza della cornice intorno al titolo. Successivamente selezioniamo i colori (utilizzando set_draw_color, set_fill_color e set_text_color) e aumentiamo la larghezza della linea a 1mm (invece dei 0.2 di default) con set_line_width. In fine, stampiamo la cella (l'ultimo parametro a true indica che lo sfondo dovrà essere riempito).

Il metodo utilizzato per stampare i paragrafi è multi_cell. Ogni volta che una linea raggiunge l'estremità destra della cella o c'è un carattere carriage return, avremo un'interruzione di linea e una nuova cella verrà automaticamente creata. Il testo è giustificato di default.

Due proprietà del documento vengono definite: il titolo (set_title) e l'autore (set_author). Le proprietà possono essere controllate in due modi. Il primo è aprire direttamente il documento con Acrobat Reader, cliccare sul menù File e scegliere l'opzione Proprietà del documento. la seconda, è di cliccare con il tasto destro e scegliere Proprietà del documento.

2.7.4 Tuto 4 - Colonne multiple

Questo esempio è una variante del precedente, mostra come disporre il test attraverso colonne multiple.

```
from fpdf import FPDF


class PDF(FPDF):
    def __init__(self):
        super().__init__()
        self.col = 0  # Current column
        self.y0 = 0  # Ordinate of column start

    def header(self):
        self.set_font("helvetica", "B", 15)
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        self.set_line_width(1)
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        self.ln(10)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def footer(self):
        self.set_y(-15)
        self.set_font("helvetica", "I", 8)
        self.set_text_color(128)
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def set_col(self, col):
        # Set column position:
        self.col = col
        x = 10 + col * 65
        self.set_left_margin(x)
        self.set_x(x)

    @property
    def accept_page_break(self):
        if self.col < 2:
            # Go to next column:
            self.set_col(self.col + 1)
            # Set ordinate to top:
            self.set_y(self.y0)
            # Stay on the same page:
            return False
        # Go back to first column:
        self.set_col(0)
        # Trigger a page break:
        return True

    def chapter_title(self, num, label):
        self.set_font("helvetica", "", 12)
        self.set_fill_color(200, 220, 255)
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            border="L",
            fill=True,
        )
        self.ln(4)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def chapter_body(self, name):
        # Reading text file:
        with open(name, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
```

```
        self.set_font("Times", size=12)
        # Printing text in a 6cm width column:
        self.multi_cell(60, 5, txt)
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")
        # Start back at first column:
        self.set_col(0)

    def print_chapter(self, num, title, name):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(name)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto4.pdf")
```

Risultato PDF

Testo Jules Verne

La differenza dal precedente tutoria è l'utilizzo dei metodi accept_page_break e set_col.

Usando accept_page_break, una volta che la cella oltrepasserà il limite basso della pagina, il numero della colonna corrente verrà controllato. Se sarà meno di 2 (abbiamo deciso di dividere la pagina in 3 colonne) chiamerà il metodo set_cal, incrementando il numero della colonna e modificando la posizione della prossima colonna in modo e il testo continui lì.

Una volta che il limite inferiore della terza colonna sarà raggiunto, accept_page_break resetterà e andrà alla prima colonna provocando una interruzione di pagina.

2.7.5 Tuto 5 - Creare tabelle

Questo tutoria spiegherà come creare facilmente tabelle.

Creeremo tre diverse tabelle per spiegare cosa si può ottenere con piccolo cambiamenti.

```
import csv
from fpdf import FPDF


class PDF(FPDF):
    def basic_table(self, headings, rows):
        for heading in headings:
            self.cell(40, 7, heading, 1)
        self.ln()
        for row in rows:
            for col in row:
                self.cell(40, 6, col, 1)
            self.ln()

    def improved_table(self, headings, rows, col_widths=(42, 39, 35, 40)):
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C")
        self.ln()
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR")
            self.cell(col_widths[1], 6, row[1], border="LR")
            self.cell(col_widths[2], 6, row[2], border="LR", align="R")
            self.cell(col_widths[3], 6, row[3], border="LR", align="R")
            self.ln()
        # Closure line:
        self.cell(sum(col_widths), 0, "", border="T")

    def colored_table(self, headings, rows, col_widths=(42, 39, 35, 42)):
        # Colors, line width and bold font:
        self.set_fill_color(255, 100, 0)
        self.set_text_color(255)
        self.set_draw_color(255, 0, 0)
        self.set_line_width(0.3)
        self.set_font(style="B")
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C", fill=True)
        self.ln()
        # Color and font restoration:
        self.set_fill_color(224, 235, 255)
        self.set_text_color(0)
        self.set_font()
        fill = False
```

```
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR", align="L", fill=fill)
            self.cell(col_widths[1], 6, row[1], border="LR", align="L", fill=fill)
            self.cell(col_widths[2], 6, row[2], border="LR", align="R", fill=fill)
            self.cell(col_widths[3], 6, row[3], border="LR", align="R", fill=fill)
            self.ln()
            fill = not fill
        self.cell(sum(col_widths), 0, "", "T")


def load_data_from_csv(csv_filepath):
    headings, rows = [], []
    with open(csv_filepath, encoding="utf8") as csv_file:
        for row in csv.reader(csv_file, delimiter=","):
            if not headings:  # extracting column names from first row:
                headings = row
            else:
                rows.append(row)
    return headings, rows


col_names, data = load_data_from_csv("countries.txt")
pdf = PDF()
pdf.set_font("helvetica", size=14)
pdf.add_page()
pdf.basic_table(col_names, data)
pdf.add_page()
pdf.improved_table(col_names, data)
pdf.add_page()
pdf.colored_table(col_names, data)
pdf.output("tuto5.pdf")
```

Risultato PDF - Testo delle nazioni

Dato che una tabella è un insieme di celle, viene natura crearne una partendo da loro.

Il primo esempio è la via più elementare: semplici celle con cornice, tutte della stessa dimensione e allineate a sinistra. Il risultato è rudimentale ma molto veloce da ottenere.

La seconda tabella contiene dei miglioramenti: ogni colonna ha la propria larghezza, i titoli sono centrati e i numeri allineati a destra. Inoltre, le linee orizzontale sono state rimosse. Questo è stato possibile grazie al parametro border del metodo Cell(), che specifica quali lati della cella saranno disegnati. In questo caso vogliamo il sinistro (L) e il destro (R). Rimane il problema delle linee orizzontali. Ci sono due possibilità per risolverlo: controllare di essere nell'ultimo giro del ciclo, nel qual caso utilizziamo LRB per il parametro border; oppure, come fatto in questo esempio, aggiungiamo una linea dopo il completamento del ciclo.

La terza tabella è molto simile alla seconda, ma utilizza i colori. Il colore di sfondo, testo e linee sono semplicemente specificati. L'alternanza dei colori delle righe è ottenuta utilizzando celle con sfondo colorato e trasparente alternativamente.

2.7.6 Tuto 6 - Creare link e mescolare stili di testo

Questo tutorial spiegherà molti modi di inserire link interni al pdf, e come inserirne a sorgenti esterne.

Saranno mostrati anche molti modi di utilizzare diversi stili di testo (grassetto, corsivo e sottolineato) nello stesso testo.

```
from fpdf import FPDF


pdf = FPDF()

# First page:
pdf.add_page()
pdf.set_font("helvetica", size=20)
pdf.write(5, "To find out what's new in self tutorial, click ")
pdf.set_font(style="U")
link = pdf.add_link(page=2)
pdf.write(5, "here", link)
pdf.set_font()

# Second page:
pdf.add_page()
pdf.image(
    "../docs/fpdf2-logo.png", 10, 10, 50, 0, "", "https://pyfpdf.github.io/fpdf2/"
)
pdf.set_left_margin(60)
pdf.set_font_size(18)
pdf.write_html(
    """You can print text mixing different styles using HTML tags: <b>bold</b>, <i>italic</i>,
<u>underlined</u>, or <b><i><u>all at once</u></i></b>!
<br><br>You can also insert links on text, such as <a href="https://pyfpdf.github.io/fpdf2/">https://pyfpdf.github.io/fpdf2/</a>,
or on an image: the logo is clickable!"""
```

```
)
pdf.output("tuto6.pdf")
```

Risultato PDF - fpdf2-logo

Il nuovo metodo qui utilizzato per stampare testo è write() . È molto simile a multi_cell() , ma con delle differenze:

- La fine della linea è al margine destro e la linea successiva inizia al margine sinistro.
- La posizione attuale si sposta alla fine del testo stampato.

Il metodo quindi ci permette di scrivere un blocco di testo, cambiare lo stile del testo, e continuare a scrivere esattamente da dove eravamo rimasti. D'altro canto, il suo peggior svantaggio è che non possiamo giustificare il testo come con multi_cell() method.

Nella prima pagina dell'esempio, abbiamo usato write() per questo scopo. L'inizio della frase è scritta in font normale, poi utilizzando set_font() siamo passati al sottolineato e abbiamo finito la frase.

Per aggiungere un link interno che puntasse alla seconda pagina, abbiamo utilizzato add_link() che crea un area cliccabile che abbiamo chiamato "link" che redirige ad un altro punto del documento.

Per creare un link esterno utilizzando un'immagine, abbiamo usato image() . Il metodo ha l'opzione di passare un link come argomento. Il link può essere sia interno che esterno.

In alternativa, un'altra opzione per cambiare lo stile e aggiungere link è di utilizzare `write_html()` . È un parser hrml che permette di aggiungere testo, cambiare stile e aggiungere link utilizzando html.

2.8 Tutorial

Methods full documentation: `fpdf.FPDF` API doc

- Tutorial
- Tuto 1 - Exemplo Mínimo
- Tuto 2 - Cabeçalho, rodapé, quebra de página e imagem
- Tuto 3 - Quebras de linha e cores
- Tuto 4 - Multi Colunas
- Tuto 5 - Criar Tabelas
- Tuto 6 - Criar links e misturar estilos de texto

2.8.1 Tuto 1 - Exemplo Mínimo

Vamos começar com um exemplo clássico:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_font("helvetica", "B", 16)
pdf.cell(40, 10, "Hello World!")
pdf.output("tuto1.pdf")
```

PDF resultante

Após incluirmos o ficheiro da biblioteca, criamos um objeto `FPDF`. O FPDF construtor é construído com os seguintes parâmetros por omissão: Páginas são em formato A4 vertical e a unidade de medida é o milímetro. Pode ser especificado explicitamente através de:

```
pdf = FPDF(orientation="P", unit="mm", format="A4")
```

É possível colocar o PDF em modo horizontal (`L`) ou em outros formatos de página (como `Letter` e `Legal`) e em outras unidades de medida (`pt` , `cm` , `in`).

Neste momento, não há nenhuma página, então temos que adicionar uma com add_page. A origem está no canto superior esquerdo e a posição atual é, por padrão, colocada a 1 cm das bordas; as margens podem ser alteradas com set_margins.

Antes de imprimirmos o texto, é obrigatório selecionar uma fonte com set_font, caso contrário, o documento será inválido. Nós escolhemos Helvetica bold 16:

```
pdf.set_font('helvetica', 'B', 16)
```

Podemos formatar em itálico com `I` , sublinhar com `U` ou uma fonte normal com uma string vazia (ou qualquer combinação). Observe que o tamanho da fonte é fornecido em pontos, não milímetros (ou outra unidade do utilizador); esta é a única exceção. As outras fontes integradas são `Times` , `Courier` , `Symbol` e `ZapfDingbats` .

Agora podemos imprimir uma célula com cell. Uma célula é uma área retangular, possivelmente emoldurada, que contém algum texto. É renderizado na posição atual. Nós especificamos as suas dimensões, o seu texto (centrado ou alinhado), se as bordas devem ser desenhadas, e para onde a posição atual se deve mover depois desta alteração (para a direita, abaixo ou no início da próxima linha). Para adicionar uma moldura, temos de fazer o seguinte:

```
pdf.cell(40, 10, 'Hello World!', 1)
```

Para adicionar uma nova célula ao lado desta, com texto centralizado e ir para a próxima linha, teríamos de fazer:

```
pdf.cell(60, 10, 'Powered by FPDF.', new_x="LMARGIN", new_y="NEXT", align='C')
```

Nota: a quebra de linha também pode ser feita com ln. Esse método permite especificar, adicionalmente, a altura da quebra.

Finalmente, o documento é fechado e guardado no caminho do arquivo fornecido utilizando output. Sem termos qualquer parâmetro fornecido, `output()` retorna o buffer PDF `bytearray`.

2.8.2 Tuto 2 - Cabeçalho, rodapé, quebra de página e imagem

Aqui temos um exemplo de duas páginas com cabeçalho, rodapé e logótipo:

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Rendering logo:
        self.image("../docs/fpdf2-logo.png", 10, 8, 33)
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Moving cursor to the right:
        self.cell(80)
        # Printing title:
        self.cell(30, 10, "Title", border=1, align="C")
        # Performing a line break:
        self.ln(20)

    def footer(self):
        # Position cursor at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Printing page number:
        self.cell(0, 10, f"Page {self.page_no()}/{{nb}}", align="C")


# Instantiation of inherited class
pdf = PDF()
pdf.add_page()
pdf.set_font("Times", size=12)
for i in range(1, 41):
    pdf.cell(0, 10, f"Printing line number {i}", new_x="LMARGIN", new_y="NEXT")
pdf.output("new-tuto2.pdf")
```

PDF resultante

Este exemplo usa os header e o footer para processar cabeçalhos e rodapés de página. Estes são chamados automaticamente. Eles já existem na classe FPDF, mas não fazem nada, portanto, temos que os estender a classe e substituí-los.

O logótipo é impresso utilizando o método image, especificando o seu canto superior esquerdo e sua largura. A altura é calculada automaticamente para respeitar as proporções da imagem.

Para imprimir o número da página, um valor nulo é passado como a largura da célula. Isso significa que a célula deve se estender até a margem direita da página; é útil para centralizar texto. O número da página atual é retornado pelo método page_no; quanto ao número total de páginas, é obtido por meio do valor especial `{nb}` que será substituído quando se fecha o documento. Observe que o uso do método set_y permite definir a posição em um local absoluto da página, começando do início ou do fim.

Outro recurso interessante que se usa aqui é a quebra de página automática. Desde do momento em que uma célula cruza o limite da página (a 2 centímetros da parte inferior por padrão), uma pausa é executada e a fonte restaurada. Embora o cabeçalho e rodapés selecionam a sua própria fonte (`helvetica`), o corpo continua com `Times`. Este mecanismo de restauração automática também se aplica a cores e largura de linha. O limite que dispara quebras de página pode ser definido com set_auto_page_break.

2.8.3 Tuto 3 - Quebras de linha e cores

Vamos continuar com um exemplo que imprime parágrafos justificados e o uso de cores.

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Calculating width of title and setting cursor position:
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        # Setting colors for frame, background and text:
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
```

```
        # Setting thickness of the frame (1 mm)
        self.set_line_width(1)
        # Printing title:
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        # Performing a line break:
        self.ln(10)

    def footer(self):
        # Setting position at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Setting text color to gray:
        self.set_text_color(128)
        # Printing page number
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def chapter_title(self, num, label):
        # Setting font: helvetica 12
        self.set_font("helvetica", "", 12)
        # Setting background color
        self.set_fill_color(200, 220, 255)
        # Printing chapter name:
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            align="L",
            fill=True,
        )
        # Performing a line break:
        self.ln(4)

    def chapter_body(self, filepath):
        # Reading text file:
        with open(filepath, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing justified text:
        self.multi_cell(0, 5, txt)
        # Performing a line break:
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")

    def print_chapter(self, num, title, filepath):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(filepath)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto3.pdf")
```

PDF resultante

Texto de Júlio Verne

O método get_string_width permite determinar o comprimento de uma string na fonte atual, e que é usada aqui para calcular a posição e a largura do quadro ao redor do título. Em seguida, as cores são definidas (via set_draw_color, set_fill_color e set_text_color) e a espessura da linha é definida como 1 mm (contra 0,2 por padrão) com set_line_width. Finalmente, produzimos a célula (se o último parâmetro for verdadeiro, indica que o plano de fundo deve ser preenchido).

O método usado para imprimir os parágrafos é multi_cell. Cada vez que uma linha atinge a extremidade direita da célula ou um código de fim de linha é encontrado, uma quebra de linha é emitida e uma nova célula é criada automaticamente sob a atual. O texto é justificado por padrão.

Duas propriedades do documento são definidas: o título (set_title) e o autor (set_author). As propriedades podem ser visualizadas de duas maneiras: A primeira é abrir o documento diretamente com o Acrobat Reader, vá para o menu Arquivo e escolha a opção

Propriedades do documento. O segundo, também disponível no plug-in, é clicar com o botão direito e selecionar Propriedades do documento.

2.8.4 Tuto 4 - Multi Colunas

Este exemplo é uma variante do anterior, mostrando como colocar o texto em várias colunas.

```
from fpdf import FPDF


class PDF(FPDF):
    def __init__(self):
        super().__init__()
        self.col = 0  # Current column
        self.y0 = 0  # Ordinate of column start

    def header(self):
        self.set_font("helvetica", "B", 15)
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        self.set_line_width(1)
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        self.ln(10)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def footer(self):
        self.set_y(-15)
        self.set_font("helvetica", "I", 8)
        self.set_text_color(128)
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def set_col(self, col):
        # Set column position:
        self.col = col
        x = 10 + col * 65
        self.set_left_margin(x)
        self.set_x(x)

    @property
    def accept_page_break(self):
        if self.col < 2:
            # Go to next column:
            self.set_col(self.col + 1)
            # Set ordinate to top:
            self.set_y(self.y0)
            # Stay on the same page:
            return False
        # Go back to first column:
        self.set_col(0)
        # Trigger a page break:
        return True

    def chapter_title(self, num, label):
        self.set_font("helvetica", "", 12)
        self.set_fill_color(200, 220, 255)
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            border="L",
            fill=True,
        )
        self.ln(4)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def chapter_body(self, name):
        # Reading text file:
        with open(name, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing text in a 6cm width column:
        self.multi_cell(60, 5, txt)
        self.ln()
```

```
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")
        # Start back at first column:
        self.set_col(0)

    def print_chapter(self, num, title, name):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(name)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto4.pdf")
```

PDF resultante

Texto de Júlio Verne

A principal diferença em relação ao tutorial anterior é o uso do accept_page_break e os métodos set_col.

Usando o método accept_page_break, quando a célula ultrapassar o limite inferior da página, ela verificará o número da coluna atual. Se isso for menor que 2 (optamos por dividir a página em três colunas), chamando o método set_col, aumentando o número da coluna e alterando a posição da próxima coluna para que o texto continue aí.

Quando o limite inferior da terceira coluna é alcançado, o método accept_page_break será redefinido e vai voltar para a primeira coluna e adicionar uma quebra de página.

2.8.5 Tuto 5 - Criar Tabelas

Este tutorial irá explicar como criar tabelas facilmente.

O código seguinte cria três tabelas diferentes para explicar o que pode ser alcançado com alguns ajustes simples.

```
import csv
from fpdf import FPDF


class PDF(FPDF):
    def basic_table(self, headings, rows):
        for heading in headings:
            self.cell(40, 7, heading, 1)
        self.ln()
        for row in rows:
            for col in row:
                self.cell(40, 6, col, 1)
            self.ln()

    def improved_table(self, headings, rows, col_widths=(42, 39, 35, 40)):
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C")
        self.ln()
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR")
            self.cell(col_widths[1], 6, row[1], border="LR")
            self.cell(col_widths[2], 6, row[2], border="LR", align="R")
            self.cell(col_widths[3], 6, row[3], border="LR", align="R")
            self.ln()
        # Closure line:
        self.cell(sum(col_widths), 0, "", border="T")

    def colored_table(self, headings, rows, col_widths=(42, 39, 35, 42)):
        # Colors, line width and bold font:
        self.set_fill_color(255, 100, 0)
        self.set_text_color(255)
        self.set_draw_color(255, 0, 0)
        self.set_line_width(0.3)
        self.set_font(style="B")
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C", fill=True)
        self.ln()
        # Color and font restoration:
        self.set_fill_color(224, 235, 255)
        self.set_text_color(0)
        self.set_font()
        fill = False
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR", align="L", fill=fill)
            self.cell(col_widths[1], 6, row[1], border="LR", align="L", fill=fill)
            self.cell(col_widths[2], 6, row[2], border="LR", align="R", fill=fill)
```

```
            self.cell(col_widths[3], 6, row[3], border="LR", align="R", fill=fill)
            self.ln()
            fill = not fill
        self.cell(sum(col_widths), 0, "", "T")


def load_data_from_csv(csv_filepath):
    headings, rows = [], []
    with open(csv_filepath, encoding="utf8") as csv_file:
        for row in csv.reader(csv_file, delimiter=","):
            if not headings:  # extracting column names from first row:
                headings = row
            else:
                rows.append(row)
    return headings, rows


col_names, data = load_data_from_csv("countries.txt")
pdf = PDF()
pdf.set_font("helvetica", size=14)
pdf.add_page()
pdf.basic_table(col_names, data)
pdf.add_page()
pdf.improved_table(col_names, data)
pdf.add_page()
pdf.colored_table(col_names, data)
pdf.output("tuto5.pdf")
```

PDF resultante - Texto dos países

Uma vez que uma tabela é apenas uma coleção de células, é natural construir uma a partir delas.

O primeiro exemplo é obtido da maneira mais básica possível: moldura simples células, todas do mesmo tamanho e alinhadas à esquerda. O resultado é rudimentar, mas muito rápido de obter.

A segunda tabela traz algumas melhorias: cada coluna tem sua largura própria, os títulos estão centrados e as figuras alinhadas à direita. Além disso, as linhas horizontais foram removidas. Isto é feito por meio do parâmetro border do método Cell(), que especifica quais lados da célula devem ser desenhados. Aqui nós queremos os esquerdo (L) e direito (R). Agora apenas o problema da linha horizontal para terminar a mesa permanece. Existem duas possibilidades para resolvê-lo: verificar para a última linha do loop, caso este em que usamos LRB para o parâmetro da borda; ou, como foi feito aqui, adicione a linha assim que o loop terminar.

A terceira tabela é semelhante à segunda, mas usa cores. Preenchimento, texto e as cores das linhas são simplesmente especificadas. Coloração alternativa para linhas é obtida usando células alternativamente transparentes e preenchidas.

2.8.6 Tuto 6 - Criar links e misturar estilos de texto

Este tutorial irá explicar várias maneiras de inserir links dentro de um documento PDF, bem como adicionar links para fontes externas.

Também mostrará várias maneiras de usar diferentes estilos de texto, (negrito, itálico, sublinhado) no mesmo texto.

```
from fpdf import FPDF


pdf = FPDF()

# First page:
pdf.add_page()
pdf.set_font("helvetica", size=20)
pdf.write(5, "To find out what's new in self tutorial, click ")
pdf.set_font(style="U")
link = pdf.add_link(page=2)
pdf.write(5, "here", link)
pdf.set_font()

# Second page:
pdf.add_page()
pdf.image(
    "../docs/fpdf2-logo.png", 10, 10, 50, 0, "", "https://pyfpdf.github.io/fpdf2/"
)
pdf.set_left_margin(60)
pdf.set_font_size(18)
pdf.write_html(
    """You can print text mixing different styles using HTML tags: <b>bold</b>, <i>italic</i>,
<u>underlined</u>, or <b><i><u>all at once</u></i></b>!
<br><br>You can also insert links on text, such as <a href="https://pyfpdf.github.io/fpdf2/">https://pyfpdf.github.io/fpdf2/</a>,
or on an image: the logo is clickable!"""
)
pdf.output("tuto6.pdf")
```

PDF resultante - fpdf2-logo

O novo método mostrado aqui para imprimir texto é write(). É muito parecido com multi_cell (), sendo as principais diferenças:

- O fim da linha está na margem direita e a próxima linha começa na margem esquerda.
- A posição atual move-se para o final do texto.

O método, portanto, nos permite escrever um pedaço de texto, alterar o estilo da fonte, e continuar do ponto exato em que paramos. Por outro lado, a sua principal desvantagem é que não podemos justificar o texto como nós fazemos com o método [multi_cell()(https://pyfpdf.github.io/fpdf2/fpdf/fpdf.html#fpdf.fpdf.FPDF.multi_cell) .

Na primeira página do exemplo, usámos write() para este propósito. O início da frase está escrita no estilo de texto normal, depois usando o método set_font(), trocamos para sublinhado e acabámos a frase.

Para adicionar o link externo a apontar para a segunda página, nós usámos o método add_link(), que cria uma área clicável à qual demos o nome de “link” que direciona para outra parte do documento.

Para criar o link externo usando uma imagem, usámos image(). O método tem a opção de passar um link como um dos seus argumentos. O link pode ser interno ou externo.

Como alternativa, outra opção para mudar o estilo da fonte e adicionar links é usar o método `write_html()`. É um “parser” que permite adicionar texto, mudar o estilo da fonte e adicionar links usando html.

2.9 Руководство

Полная документация по методам класса **FPDF**: `fpdf.FPDF` API doc

- Руководство
- Руководство 1 - Минимальный пример
- Руководство 2 - Верхний колонтитул, нижний колонтитул, разрыв страницы и картинка
- Руководство 3 - Переносы строк и цвета
- Руководство 4 - Несколько колонок
- Руковдство 5 - Создание таблиц
- Руководство 6 - Создание ссылок и смешивание стилей текста

2.9.1 Руководство 1 - Минимальный пример

Начнём с классического примера:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_font("helvetica", "B", 16)
pdf.cell(40, 10, "Hello World!")
pdf.output("tuto1.pdf")
```

Итоговый PDF

После подключения библиотеки мы создаем объект `FPDF`. Здесь используется конструктор FPDF со значениями по умолчанию: страницы формата A4 портретные, единица измерения - миллиметр.

```
pdf = FPDF(orientation="P", unit="mm", format="A4")
```

Можно установить PDF в альбомном режиме (`L`) или использовать другой формат страниц (например, `Letter` или `Legal`) и единицы измерения (`pt` , `cm` , `in`).

На данный момент страницы нет, поэтому мы должны добавить ее с помощью команды add_page. Начало страницы находится в левом верхнем углу, а текущая позиция по умолчанию располагается на расстоянии 1 см от границ; поля можно изменить с помощью команды set_margins.

Прежде чем мы сможем напечатать текст, обязательно нужно выбрать шрифт с помощью set_font, иначе документ будет недействительным. Мы выбираем Helvetica bold 16:

```
pdf.set_font('helvetica', 'B', 16)
```

Мы можем указать курсив с помощью `I` , подчеркнутый шрифт с помощью `U` или обычный шрифт с помощью пустой строки (или использовать любую комбинацию). Обратите внимание, что размер шрифта задается в пунктах, а не в миллиметрах (или другой единице измерений); это единственное исключение. Другие встроенные шрифты: `Times` , `Courier` , `Symbol` и `ZapfDingbats` .

Теперь мы можем распечатать ячейку с помощью cell. Ячейка - это прямоугольная область, возможно, обрамленная рамкой, которая содержит некоторый текст. Она отображается в текущей позиции. Мы указываем ее размеры, текст (центрированный или выровненный), должны ли быть нарисованы рамки, и куда текущая позиция перемещается после нее (вправо, вниз или в начало следующей строки). Чтобы добавить рамку, мы сделаем следующее:

```
pdf.cell(40, 10, 'Hello World!', 1)
```

Чтобы добавить новую ячейку с центрированным текстом и перейти к следующей строке, мы сделаем следующее:

```
pdf.cell(60, 10, 'Powered by FPDF.', new_x="LMARGIN", new_y="NEXT", align='C')
```

Примечание: разрыв строки также можно сделать с помощью ln. Этот метод позволяет дополнительно указать высоту разрыва.

Наконец, документ закрывается и сохраняется по указанному пути к файлу с помощью функции output. Без указания параметров `output()` возвращает буфер PDF `bytearray`.

2.9.2 Руководство 2 - Верхний колонтитул, нижний колонтитул, разрыв страницы и картинка

Пример двух страниц с верхним и нижним колонтитулами и логотипом:

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Rendering logo:
        self.image("../docs/fpdf2-logo.png", 10, 8, 33)
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Moving cursor to the right:
        self.cell(80)
        # Printing title:
        self.cell(30, 10, "Title", border=1, align="C")
        # Performing a line break:
        self.ln(20)

    def footer(self):
        # Position cursor at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Printing page number:
        self.cell(0, 10, f"Page {self.page_no()}/{{nb}}", align="C")


# Instantiation of inherited class
pdf = PDF()
pdf.add_page()
pdf.set_font("Times", size=12)
for i in range(1, 41):
    pdf.cell(0, 10, f"Printing line number {i}", new_x="LMARGIN", new_y="NEXT")
pdf.output("new-tuto2.pdf")
```

Итоговый PDF

В этом примере используются методы header и footer для обработки заголовков и колонтитулов страницы. Они вызываются автоматически. Они уже существуют в классе FPDF, но ничего не делают, поэтому мы должны расширить класс и переопределить их.

Логотип печатается методом image с указанием его левого верхнего угла и ширины. Высота вычисляется автоматически, чтобы соблюсти пропорции изображения.

Для печати номера страницы в качестве ширины ячейки передается нулевое значение. Это означает, что ячейка должна простираться до правого поля страницы; это удобно для центрирования текста. Номер текущей страницы возвращается методом page_no; что касается общего количества страниц, то оно получается с помощью специального значения `{nb}`, которое будет подставлено при закрытии документа. Обратите внимание на использование метода set_y, который позволяет установить позицию в абсолютном месте страницы, начиная сверху или снизу.

Здесь используется еще одна интересная функция: автоматический разрыв страницы. Как только ячейка пересекает границу страницы (по умолчанию 2 сантиметра от низа), происходит разрыв и шрифт восстанавливается. Хотя верхний и нижний колонтитулы выбирают свой собственный шрифт (`helvetica`), основная часть продолжает использовать `Times`. Этот механизм автоматического восстановления также применяется к цветам и ширине линий. Предел, который вызывает разрыв страницы, можно установить с помощью set_auto_page_break.

2.9.3 Руководство 3 - Переносы строк и цвета

Продолжим с примера, который печатает выровненные абзацы. Он также иллюстрирует использование цветов.

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
```

```
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Calculating width of title and setting cursor position:
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        # Setting colors for frame, background and text:
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        # Setting thickness of the frame (1 mm)
        self.set_line_width(1)
        # Printing title:
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        # Performing a line break:
        self.ln(10)

    def footer(self):
        # Setting position at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Setting text color to gray:
        self.set_text_color(128)
        # Printing page number
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def chapter_title(self, num, label):
        # Setting font: helvetica 12
        self.set_font("helvetica", "", 12)
        # Setting background color
        self.set_fill_color(200, 220, 255)
        # Printing chapter name:
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            align="L",
            fill=True,
        )
        # Performing a line break:
        self.ln(4)

    def chapter_body(self, filepath):
        # Reading text file:
        with open(filepath, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing justified text:
        self.multi_cell(0, 5, txt)
        # Performing a line break:
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")

    def print_chapter(self, num, title, filepath):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(filepath)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto3.pdf")
```

Итоговый PDF

Текст Жюля Верна

Метод get_string_width позволяет определить длину строки в текущем шрифте, которая используется здесь для расчета положения и ширины рамки, окружающей заголовок. Затем устанавливаются цвета (через set_draw_color, set_fill_color и set_text_color), а толщина линии устанавливается в 1 мм (против 0,2 по умолчанию) с помощью set_line_width. Наконец, мы выводим ячейку (последний параметр True указывает на то, что фон должен быть заполнен).

Для печати абзацев используется метод multi_cell. Каждый раз, когда строка достигает правого края ячейки или встречается символ возврата каретки, выдается разрыв строки и автоматически создается новая ячейка под текущей. По умолчанию текст выравнивается по ширине.

Определены два свойства документа: заголовок (set_title) и автор (set_author). Свойства можно просматривать двумя способами. Первый - открыть документ непосредственно с помощью Acrobat Reader, перейти в меню Файл и выбрать пункт Свойства документа. Второй, также доступный из плагина, - щелкнуть правой кнопкой мыши и выбрать пункт Свойства документа.

2.9.4 Руководство 4 - Несколько колонок

Этот пример является вариантом предыдущего и показывает, как расположить текст в нескольких колонках.

```
from fpdf import FPDF


class PDF(FPDF):
    def __init__(self):
        super().__init__()
        self.col = 0  # Current column
        self.y0 = 0  # Ordinate of column start

    def header(self):
        self.set_font("helvetica", "B", 15)
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        self.set_line_width(1)
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        self.ln(10)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def footer(self):
        self.set_y(-15)
        self.set_font("helvetica", "I", 8)
        self.set_text_color(128)
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def set_col(self, col):
        # Set column position:
        self.col = col
        x = 10 + col * 65
        self.set_left_margin(x)
        self.set_x(x)

    @property
    def accept_page_break(self):
        if self.col < 2:
            # Go to next column:
            self.set_col(self.col + 1)
            # Set ordinate to top:
            self.set_y(self.y0)
            # Stay on the same page:
            return False
        # Go back to first column:
        self.set_col(0)
        # Trigger a page break:
        return True

    def chapter_title(self, num, label):
        self.set_font("helvetica", "", 12)
        self.set_fill_color(200, 220, 255)
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            border="L",
            fill=True,
        )
        self.ln(4)
        # Saving ordinate position:
        self.y0 = self.get_y()
```

```
    def chapter_body(self, name):
        # Reading text file:
        with open(name, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing text in a 6cm width column:
        self.multi_cell(60, 5, txt)
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")
        # Start back at first column:
        self.set_col(0)

    def print_chapter(self, num, title, name):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(name)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto4.pdf")
```

Итоговый PDF

Текст Жюля Верна

Ключевым отличием от предыдущего урока является использование методов accept_page_break и set_col.

С помощью метода accept_page_break, в тот момент, когда ячейка пересекает нижнюю границу страницы, проверяется номер текущей колонки. Если он меньше 2 (мы решили разделить страницу на три колонки), то будет вызван метод set_col, увеличивающий номер колонки и изменяющий положение следующей колонки, чтобы текст мог быть продолжен в ней.

Как только будет достигнута нижняя граница третьей колонки, метод accept_page_break произведет сброс и возврат к первой колонке и инициирует разрыв страницы.

2.9.5 Руковдство 5 - Создание таблиц

В этом уроке мы расскажем, как можно с легкостью создавать таблицы.

Код создаст три различные таблицы, чтобы объяснить, чего можно достичь с помощью нескольких простых настроек.

```
import csv
from fpdf import FPDF


class PDF(FPDF):
    def basic_table(self, headings, rows):
        for heading in headings:
            self.cell(40, 7, heading, 1)
        self.ln()
        for row in rows:
            for col in row:
                self.cell(40, 6, col, 1)
            self.ln()

    def improved_table(self, headings, rows, col_widths=(42, 39, 35, 40)):
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C")
        self.ln()
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR")
            self.cell(col_widths[1], 6, row[1], border="LR")
            self.cell(col_widths[2], 6, row[2], border="LR", align="R")
            self.cell(col_widths[3], 6, row[3], border="LR", align="R")
            self.ln()
        # Closure line:
        self.cell(sum(col_widths), 0, "", border="T")

    def colored_table(self, headings, rows, col_widths=(42, 39, 35, 42)):
        # Colors, line width and bold font:
        self.set_fill_color(255, 100, 0)
        self.set_text_color(255)
        self.set_draw_color(255, 0, 0)
        self.set_line_width(0.3)
        self.set_font(style="B")
```

```
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C", fill=True)
        self.ln()
        # Color and font restoration:
        self.set_fill_color(224, 235, 255)
        self.set_text_color(0)
        self.set_font()
        fill = False
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR", align="L", fill=fill)
            self.cell(col_widths[1], 6, row[1], border="LR", align="L", fill=fill)
            self.cell(col_widths[2], 6, row[2], border="LR", align="R", fill=fill)
            self.cell(col_widths[3], 6, row[3], border="LR", align="R", fill=fill)
            self.ln()
            fill = not fill
        self.cell(sum(col_widths), 0, "", "T")


def load_data_from_csv(csv_filepath):
    headings, rows = [], []
    with open(csv_filepath, encoding="utf8") as csv_file:
        for row in csv.reader(csv_file, delimiter=","):
            if not headings:  # extracting column names from first row:
                headings = row
            else:
                rows.append(row)
    return headings, rows


col_names, data = load_data_from_csv("countries.txt")
pdf = PDF()
pdf.set_font("helvetica", size=14)
pdf.add_page()
pdf.basic_table(col_names, data)
pdf.add_page()
pdf.improved_table(col_names, data)
pdf.add_page()
pdf.colored_table(col_names, data)
pdf.output("tuto5.pdf")
```

Итоговый PDF - Список стран

Поскольку таблица - это просто набор ячеек, естественно построить таблицу из них.

Первый пример достигается самым простым способом: простые ячейки в рамке, все одинакового размера и выровненные по левому краю. Результат элементарен, но достигается очень быстро.

Вторая таблица имеет некоторые улучшения: каждый столбец имеет свою ширину, заголовки выровнены по центру, а цифры - по правому краю. Более того, горизонтальные линии были удалены. Это сделано с помощью параметра border метода Cell(), который указывает, какие стороны ячейки должны быть нарисованы. Здесь нам нужны левая (L) и правая (R). Теперь остается только проблема горизонтальной линии для завершения таблицы. Есть две возможности решить ее: проверить наличие последней строки в цикле, в этом случае мы используем LRB для параметра границы; или, как сделано здесь, добавить линию после завершения цикла.

Третья таблица похожа на вторую, но в ней используются цвета. Цвета заливки, текста и линий просто задаются. Альтернативная окраска строк достигается путем использования поочередно прозрачных и заполненных ячеек.

2.9.6 Руководство 6 - Создание ссылок и смешивание стилей текста

В этом уроке будет рассказано о нескольких способах вставки ссылок внутри pdf документа, а также о добавлении ссылок на внешние источники.

Также будет показано несколько способов использования различных стилей текста (жирный, курсив, подчеркивание) в одном и том же тексте.

```
from fpdf import FPDF


pdf = FPDF()

# First page:
pdf.add_page()
pdf.set_font("helvetica", size=20)
pdf.write(5, "To find out what's new in self tutorial, click ")
pdf.set_font(style="U")
link = pdf.add_link(page=2)
pdf.write(5, "here", link)
pdf.set_font()

# Second page:
```

```
pdf.add_page()
pdf.image(
    "../docs/fpdf2-logo.png", 10, 10, 50, 0, "", "https://pyfpdf.github.io/fpdf2/"
)
pdf.set_left_margin(60)
pdf.set_font_size(18)
pdf.write_html(
    """You can print text mixing different styles using HTML tags: <b>bold</b>, <i>italic</i>,
<u>underlined</u>, or <b><i><u>all at once</u></i></b>!
<br><br>You can also insert links on text, such as <a href="https://pyfpdf.github.io/fpdf2/">https://pyfpdf.github.io/fpdf2/</a>,
or on an image: the logo is clickable!"""
)
pdf.output("tuto6.pdf")
```

Итоговый PDF - fpdf2-logo

Новый метод, показанный здесь для печати текста - это write(). Он очень похож на multi_cell(), основные отличия заключаются в следующем:

- Конец строки находится на правом поле, а следующая строка начинается на левом поле.
- Текущая позиция перемещается в конец текста.

Таким образом, этот метод позволяет нам написать фрагмент текста, изменить стиль шрифта и продолжить с того самого места, на котором мы остановились. С другой стороны, его главный недостаток заключается в том, что мы не можем выровнять текст, как это делается при использовании метода multi_cell().

На первой странице примера мы использовали для этой цели write(). Начало предложения написано текстом обычного стиля, затем, используя метод set_font(), мы переключились на подчеркивание и закончили предложение.

Для добавления внутренней ссылки, указывающей на вторую страницу, мы использовали метод add_link(), который создает кликабельную область, названную нами "link", которая ведет в другое место внутри документа.

Чтобы создать внешнюю ссылку с помощью изображения, мы использовали метод image(). Этот метод имеет возможность передать ссылку в качестве одного из аргументов. Ссылка может быть как внутренней, так и внешней.

В качестве альтернативы для изменения стиля шрифта и добавления ссылок можно использовать метод `write_html()`. Это парсер html, который позволяет добавлять текст, изменять стиль шрифта и добавлять ссылки с помощью html.

2.10

fpdf2

Methods full documentation / : `fpdf.FPDF` API doc

- Tuto 1 -
- Tuto 2 - (Header), (Footer), (Page Break) (Image)
- Tuto 3 -
- Tuto 4 -
- Tuto 5 -
- Tuto 6 -

2.10.1 Tuto 1 -

:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_font("helvetica", "B", 16)
pdf.cell(40, 10, "Hello World!")
pdf.output("tuto1.pdf")
```

Resulting PDF

, `FPDF` FPDF

:

A4 :

```
pdf = FPDF(orientation="P", unit="mm", format="A4")
```

Ĺ) (`Letter` `Legal`)

(`pt` , `cm` , `in`)

, add_page

- 1 cm ; set_margins

, set_font , (Document)

Helvetica bold 16 :

```
pdf.set_font('helvetica', 'B', 16)
```

`I` (Italic) , `U` (Underlined)

( ) , (

); - `Times` , `Courier` , `Symbol` `ZapfDingbats`

cell cell print (cell) , ,

, ( ) , ,

(,)

, :

```
pdf.cell(40, 10, 'Hello World!', 1)
```

(centered text) (cell) , :

```
pdf.cell(60, 10, 'Powered by FPDF.', new_x="LMARGIN", new_y="NEXT", align='C')
```

: ln

, output. , `output()` PDF `bytearray`

2.10.2 Tuto 2 - (Header), (Footer), (Page Break) (Image)

(Header), (Footer) (Logo) :

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Rendering logo:
        self.image("../docs/fpdf2-logo.png", 10, 8, 33)
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Moving cursor to the right:
        self.cell(80)
        # Printing title:
        self.cell(30, 10, "Title", border=1, align="C")
        # Performing a line break:
        self.ln(20)

    def footer(self):
        # Position cursor at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Printing page number:
        self.cell(0, 10, f"Page {self.page_no()}/{{nb}}", align="C")


# Instantiation of inherited class
pdf = PDF()
pdf.add_page()
pdf.set_font("Times", size=12)
for i in range(1, 41):
    pdf.cell(0, 10, f"Printing line number {i}", new_x="LMARGIN", new_y="NEXT")
pdf.output("new-tuto2.pdf")
```

Resulting PDF

header footer header footer
(automatically) FPDF , class
override

Logo image -

(Page number) (print) , (cell width) (null value)

(right margin) ; (center)

page_no ; , `{nb}`
)

set_y ,

: the automatic page breaking. (
2),

(Header) (Footer) `Helvetica`) , body `Times`
set_auto_page_break

2.10.3 Tuto 3 -

Justified

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Calculating width of title and setting cursor position:
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        # Setting colors for frame, background and text:
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        # Setting thickness of the frame (1 mm)
        self.set_line_width(1)
        # Printing title:
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        # Performing a line break:
        self.ln(10)

    def footer(self):
        # Setting position at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Setting text color to gray:
        self.set_text_color(128)
        # Printing page number
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def chapter_title(self, num, label):
        # Setting font: helvetica 12
        self.set_font("helvetica", "", 12)
        # Setting background color
        self.set_fill_color(200, 220, 255)
        # Printing chapter name:
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            align="L",
            fill=True,
        )
        # Performing a line break:
        self.ln(4)

    def chapter_body(self, filepath):
        # Reading text file:
        with open(filepath, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing justified text:
        self.multi_cell(0, 5, txt)
        # Performing a line break:
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")

    def print_chapter(self, num, title, filepath):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(filepath)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto3.pdf")
```

Resulting PDF

Jules Verne text

get_string_width ,

(set_draw_color,) 1
(0.2)

(set_draw_color, set_fill_color set_text_color) set_line_width 1
(0.2) , (`true`
)

multi_cell cell carriage
return , current cell Text
Justified

: (set_title) (set_author).
, , - , -

2.10.4 Tuto 4 -

,

```
from fpdf import FPDF


class PDF(FPDF):
    def __init__(self):
        super().__init__()
        self.col = 0  # Current column
        self.y0 = 0  # Ordinate of column start

    def header(self):
        self.set_font("helvetica", "B", 15)
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        self.set_line_width(1)
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        self.ln(10)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def footer(self):
        self.set_y(-15)
        self.set_font("helvetica", "I", 8)
        self.set_text_color(128)
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def set_col(self, col):
        # Set column position:
        self.col = col
        x = 10 + col * 65
        self.set_left_margin(x)
        self.set_x(x)

    @property
    def accept_page_break(self):
        if self.col < 2:
            # Go to next column:
            self.set_col(self.col + 1)
            # Set ordinate to top:
            self.set_y(self.y0)
            # Stay on the same page:
            return False
        # Go back to first column:
        self.set_col(0)
        # Trigger a page break:
        return True

    def chapter_title(self, num, label):
        self.set_font("helvetica", "", 12)
```

```
        self.set_fill_color(200, 220, 255)
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            border="L",
            fill=True,
        )
        self.ln(4)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def chapter_body(self, name):
        # Reading text file:
        with open(name, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing text in a 6cm width column:
        self.multi_cell(60, 5, txt)
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")
        # Start back at first column:
        self.set_col(0)

    def print_chapter(self, num, title, name):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(name)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto4.pdf")
```

Resulting PDF

Jules Verne text

accept_page_break set_col

accept_page_break , ,
2 ( ) set_col ,
accept_page_break

2.10.5 Tuto 5 -

, -

```
import csv
from fpdf import FPDF


class PDF(FPDF):
    def basic_table(self, headings, rows):
        for heading in headings:
            self.cell(40, 7, heading, 1)
        self.ln()
        for row in rows:
            for col in row:
                self.cell(40, 6, col, 1)
            self.ln()

    def improved_table(self, headings, rows, col_widths=(42, 39, 35, 40)):
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C")
        self.ln()
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR")
            self.cell(col_widths[1], 6, row[1], border="LR")
            self.cell(col_widths[2], 6, row[2], border="LR", align="R")
            self.cell(col_widths[3], 6, row[3], border="LR", align="R")
            self.ln()
        # Closure line:
        self.cell(sum(col_widths), 0, "", border="T")
```

```
    def colored_table(self, headings, rows, col_widths=(42, 39, 35, 42)):
        # Colors, line width and bold font:
        self.set_fill_color(255, 100, 0)
        self.set_text_color(255)
        self.set_draw_color(255, 0, 0)
        self.set_line_width(0.3)
        self.set_font(style="B")
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C", fill=True)
        self.ln()
        # Color and font restoration:
        self.set_fill_color(224, 235, 255)
        self.set_text_color(0)
        self.set_font()
        fill = False
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR", align="L", fill=fill)
            self.cell(col_widths[1], 6, row[1], border="LR", align="L", fill=fill)
            self.cell(col_widths[2], 6, row[2], border="LR", align="R", fill=fill)
            self.cell(col_widths[3], 6, row[3], border="LR", align="R", fill=fill)
            self.ln()
            fill = not fill
        self.cell(sum(col_widths), 0, "", "T")


def load_data_from_csv(csv_filepath):
    headings, rows = [], []
    with open(csv_filepath, encoding="utf8") as csv_file:
        for row in csv.reader(csv_file, delimiter=","):
            if not headings:  # extracting column names from first row:
                headings = row
            else:
                rows.append(row)
    return headings, rows


col_names, data = load_data_from_csv("countries.txt")
pdf = PDF()
pdf.set_font("helvetica", size=14)
pdf.add_page()
pdf.basic_table(col_names, data)
pdf.add_page()
pdf.improved_table(col_names, data)
pdf.add_page()
pdf.colored_table(col_names, data)
pdf.output("tuto5.pdf")
```

Resulting PDF - Countries text

(Table) (Cells) (Collection) ,

: (simple framed cells, (same sized cells) (left aligned cells)

: ,
, Cell() ,
(L) (R) (Table) Finish

: , LRB ;
,

Fill, (Alternate)

2.10.6 Tuto 6 -

-
, (, ,)

```
from fpdf import FPDF


pdf = FPDF()

# First page:
pdf.add_page()
pdf.set_font("helvetica", size=20)
pdf.write(5, "To find out what's new in self tutorial, click ")
pdf.set_font(style="U")
```

```
link = pdf.add_link(page=2)
pdf.write(5, "here", link)
pdf.set_font()

# Second page:
pdf.add_page()
pdf.image(
    "../docs/fpdf2-logo.png", 10, 10, 50, 0, "", "https://pyfpdf.github.io/fpdf2/"
)
pdf.set_left_margin(60)
pdf.set_font_size(18)
pdf.write_html(
    """You can print text mixing different styles using HTML tags: <b>bold</b>, <i>italic</i>,
<u>underlined</u>, or <b><i><u>all at once</u></i></b>!
<br><br>You can also insert links on text, such as <a href="https://pyfpdf.github.io/fpdf2/">https://pyfpdf.github.io/fpdf2/</a>,
or on an image: the logo is clickable!"""
)
pdf.output("tuto6.pdf")
```

Resulting PDF - fpdf2-logo

write() multi_cell() , : -

-

,

, multi_cell()

, write() ,

set_font() ,

, add_link() ,

"Link"

Image , image()

, `write_html()` HTML ,

, html

2.11 מדריך

תיעוד מלא: API doc `fpdf.FPDF`

- מדריך
- 1 - דוגמא מינימלית
- 2 - כותרת עליונה, כותרת תחתונה, מעבר עמוד ותמונות
- 3 - שורות רווח וצבעים
- 4 - עמודות מרובות
- 5 - יצירת טבלאות
- 6 - יצירת קישורים וערבוב סגנונות טקסט

2.11.1 1 - דוגמא מינימלית

נתחיל בדוגמא קלאסית:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_font("helvetica", "B", 16)
pdf.cell(40, 10, "Hello World!")
pdf.output("tuto1.pdf")
```

תוצר

אחרי שכללנו את קובץ הספריה, יצרנו אובייקט `FPDF`. הבנאי של FPDF משתמש כאן בערכים דיפולטיביים: דפים בפורמט A4 לאורך והמידות במילימטרים. ניתן לציין זאת במפורש באמצעות:

```
pdf = FPDF(orientation="P", unit="mm", format="A4")
```

ניתן להגדיר את הPDF לרוחב (`L`) או להשתמש בתבניות שונות (כמו `Letter` או `Legal`) ומידות שונות (כמו `in` , `cm` , `pt`).

כרגע אין עמודים, נצטרך להוסיף אחד בעזרת add_page. המקור הוא בפינה השמאלית עליונה והפוזיציה הנוכחית בברירת המחדל היא סנטימטר אחד מהגבולות; ניתן לשנות את השוליים על ידי set_margins.

לפני שנוכל להדפיס טקסט, חובה לבחור גופן בעזרת set_font, אחרת המסמך לא יהיה תקין. אנחנו בוחרים בגופן helvetica מודגש בגודל 16:

```
pdf.set_font('helvetica', 'B', 16)
```

יכולנו לבחור הטייה עם `I` , קו תחתון עם `U` , או גופן רגיל עם מחרוזת ריקה (או כל שילוב של הנ"ל). שימו לב שגודל הגופן הוא בנקודות ולא מילימטרים או כל יחידת מידה אחרת. זה יוצא הדופן היחיד. הגופנים המובנים האחרים הם `Times` , `Courier` , `Symbol` , `ZapfDingbats` .

כעת נוכל להדפיס תא עם cell. תא הוא איזור מלבני, אולי ממוסגר, שמכיל טקסט. נוצר בפוזיציה הנוכחית. אנחנו מציינים את המידות שלו, טקסט (ממורכז או מיושר), האם לצייר גבולות, ולאן תזוז הפוזיציה הנוכחית לאחר התא (מימין, למטה או בתחילת השורה הבאה). כדי להוסיף מסגרת, נריץ:

```
pdf.cell(40, 10, 'Hello World!', 1)
```

כדי להוסיף ליד התא הקודם תא עם טקסט ממורכז ואז ללכת לשורה הבאה, נריץ:

```
pdf.cell(60, 10, 'Powered by FPDF.', new_x="LMARGIN", new_y="NEXT", align='C')
```

הערה: אפשר ליצור שורה רווח גם בעזרת ln. השיטה הזו מאפשרת גם לציין את גובה הרווח.

לבסוף, הקובץ נסגר ונשמר תחת הכתובת שסופקה באמצעות output. ללא פרמטרים נוספים, `output()` מחזיר את הבאפר `bytearray` של הPDF.

2.11.2 2 - כותרת עליונה, כותרת תחתונה, מעבר עמוד ותמונות

דוגמא בעלת שני עמודים עם כותרת עליונה, כותרת תחתונה ולוגו:

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Rendering logo:
        self.image("../docs/fpdf2-logo.png", 10, 8, 33)
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Moving cursor to the right:
        self.cell(80)
        # Printing title:
        self.cell(30, 10, "Title", border=1, align="C")
        # Performing a line break:
        self.ln(20)

    def footer(self):
        # Position cursor at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Printing page number:
        self.cell(0, 10, f"Page {self.page_no()}/{{nb}}", align="C")


# Instantiation of inherited class
pdf = PDF()
pdf.add_page()
pdf.set_font("Times", size=12)
for i in range(1, 41):
    pdf.cell(0, 10, f"Printing line number {i}", new_x="LMARGIN", new_y="NEXT")
pdf.output("new-tuto2.pdf")
```

תוצר

הדוגמא משתמשת במתודות header וfooter על מנת לעבד כותרות עמוד. הן נקראות אוטומטית. הן כבר קיימות במחלקה FPDF ולא עושות כלום, לכן נצטרך להרחיב את המחלקה ולדרוס אותן.

הלוגו מודפס עם מתודת הimage ע"י ציון הנקודה השמאלית-עליונה ואת הרוחב. הגובה מחושב אוטומטית לפי מידות התמונה.

על מנת להדפיס את מספר העמוד, ניתן להעביר ערך null כרוחב התא. כך התא יתרחב עד השול הימני של העמוד; זה שימושי כאשר צריך למרכז את הטקסט. מספר העמוד הנוכחי חוזר ממתודת הpage_no; לגבי מספר העמודים הכולל, ניתן להשיג נתון זה מהערך המיוחד `{nb}` שיוחלף בסגירת המסמך (ניתן לשנות ערך זה ע"י שימוש בalias_nb_pages()). שימו לב למתודה set_y שמאפשרת להגדיר פוזיציה אבסולוטית בדף, מראש או תחתית העמוד.

נעשה גם שימוש בפיצ'ר נוסף כאן: מעבר עמוד אוטומטי. ברגע שתא יחרוג מגבולות הדף (בברירת מחדל 2 סנטימטר מהסוף), מתבצע מעבר עמוד והגופן חוזר להיות מה שהוגדר עבור גוף העמוד. למרות שהכותרת העליונה והתחתונה משתמשות בגופן (`helvetica`), גוף העמוד ממשיך עם `Times`. המנגנון הזה תקף גם לגבי צבע ורוחב שורה. הגבול שמפעיל את מעבר העמוד האוטומטי ניתן לשינוי באמצעות set_auto_page_break.

2.11.3 - שורות רווח וצבעים 3

נמשיך עם דוגמא שמדפיסה פסקאות ומדגימה שימוש בצבעים.

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Calculating width of title and setting cursor position:
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        # Setting colors for frame, background and text:
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        # Setting thickness of the frame (1 mm)
        self.set_line_width(1)
        # Printing title:
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        # Performing a line break:
        self.ln(10)

    def footer(self):
```

```
        # Setting position at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Setting text color to gray:
        self.set_text_color(128)
        # Printing page number
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def chapter_title(self, num, label):
        # Setting font: helvetica 12
        self.set_font("helvetica", "", 12)
        # Setting background color
        self.set_fill_color(200, 220, 255)
        # Printing chapter name:
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            align="L",
            fill=True,
        )
        # Performing a line break:
        self.ln(4)

    def chapter_body(self, filepath):
        # Reading text file:
        with open(filepath, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing justified text:
        self.multi_cell(0, 5, txt)
        # Performing a line break:
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")

    def print_chapter(self, num, title, filepath):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(filepath)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto3.pdf")
```

תוצר

Jules Verne text

מתודת הget_string_width מאפשרת לקבוע אורך מחרוזת בגופן הנוכחי, שבדוגמא זו משמש כדי לחשב את הפוזיציה והרוחב של המסגרת המקיפה את הכותרת. לאחר מכן מוגדרים צבעים (באמצעות set_draw_color, set_fill_color ו set_text_color) ועובי השורה מוגדר למילימטר (בניגוד ל0.2 מילימטר כברירת מחדל) באמצעות set_line_width. לבסוף אנחנו מדפיסים את התא (הפרמטר האחרון true מעיד שהרקע צריך להיות מלא).

המתודה בה משתמשים להדפסת הפסקא היא multi_cell. טקסט נחתך אוטומטית בסוף השורה כברירת מחדל. בכל פעם ששורה מגיעה לקצה הימני של התא או שנמצא התו (`\n`), נוצרת שורה חדשה בתא חדש מתחת לנוכחי. הפסקת שורה אוטומטית נוצרת במיקום של הרווח הקרוב או תו בלתי-נראה (`\u00ad`) לפני סוף השורה. התו יוחלף במקף אם הופעלה הפסקת שורה.

שתי תכונות מסמך הוגדרו: שם המסמך (set_title) ויוצר (set_author). ניתן לצפות בתכונות בשני אופנים: אופציה ראשונה היא לפתוח את המסמך בAdobe Reader ואז ב'תפריט' לבחור 'תכונות מסמך'. אופציה שניה, זמינה גם באמצעות תוסף, זה לחצן ימני ואז לבחור תכונות מסמך.

2.11.4 4 - עמודות מרובות

הדוגמא הזו דומה לקודמת ומראה איך לפרוס טקסט על פני מספר עמודות.

```
from fpdf import FPDF


class PDF(FPDF):
    def __init__(self):
        super().__init__()
        self.col = 0  # Current column
        self.y0 = 0  # Ordinate of column start

    def header(self):
```

```
        self.set_font("helvetica", "B", 15)
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        self.set_line_width(1)
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        self.ln(10)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def footer(self):
        self.set_y(-15)
        self.set_font("helvetica", "I", 8)
        self.set_text_color(128)
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def set_col(self, col):
        # Set column position:
        self.col = col
        x = 10 + col * 65
        self.set_left_margin(x)
        self.set_x(x)

    @property
    def accept_page_break(self):
        if self.col < 2:
            # Go to next column:
            self.set_col(self.col + 1)
            # Set ordinate to top:
            self.set_y(self.y0)
            # Stay on the same page:
            return False
        # Go back to first column:
        self.set_col(0)
        # Trigger a page break:
        return True

    def chapter_title(self, num, label):
        self.set_font("helvetica", "", 12)
        self.set_fill_color(200, 220, 255)
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            border="L",
            fill=True,
        )
        self.ln(4)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def chapter_body(self, name):
        # Reading text file:
        with open(name, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing text in a 6cm width column:
        self.multi_cell(60, 5, txt)
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")
        # Start back at first column:
        self.set_col(0)

    def print_chapter(self, num, title, name):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(name)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto4.pdf")
```

תוצר

Jules Verne text

ההבדל העיקרי בין דוגמא זו לקודמת הוא השימוש במתודות accept_page_break וset_col

ע"י שימוש במתודה accept_page_break, ברגע שתא חורג מהגבול התחתון של הדף, המתודה בודקת את מספר העמודה הנוכחי. אם הוא קטן מ2 (בחרנו לחלק את הדף ל3 עמודות) תיקרא המתודה set_col, שמגדילה את מספר העמודה ומשנה את הפוזיציה של העמודה הבאה כך שהטקסט ימשיך בה.

ברגע שהגענו לגבול התחתון של העמודה השלישית, המתודה accept_page_break תאותחל, תחזור לעמודה הראשונה ותיצור מעבר עמוד.

2.11.5 5 - יצירת טבלאות

דוגמא זו מסבירה איך ליצור טבלאות בקלות.

הקוד ייצור שלוש טבלאות שונות על מנת להראות מה ניתן להשיג עם שינוים קלים.

```
import csv
from fpdf import FPDF


class PDF(FPDF):
    def basic_table(self, headings, rows):
        for heading in headings:
            self.cell(40, 7, heading, 1)
        self.ln()
        for row in rows:
            for col in row:
                self.cell(40, 6, col, 1)
            self.ln()

    def improved_table(self, headings, rows, col_widths=(42, 39, 35, 40)):
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C")
        self.ln()
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR")
            self.cell(col_widths[1], 6, row[1], border="LR")
            self.cell(col_widths[2], 6, row[2], border="LR", align="R")
            self.cell(col_widths[3], 6, row[3], border="LR", align="R")
            self.ln()
        # Closure line:
        self.cell(sum(col_widths), 0, "", border="T")

    def colored_table(self, headings, rows, col_widths=(42, 39, 35, 42)):
        # Colors, line width and bold font:
        self.set_fill_color(255, 100, 0)
        self.set_text_color(255)
        self.set_draw_color(255, 0, 0)
        self.set_line_width(0.3)
        self.set_font(style="B")
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C", fill=True)
        self.ln()
        # Color and font restoration:
        self.set_fill_color(224, 235, 255)
        self.set_text_color(0)
        self.set_font()
        fill = False
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR", align="L", fill=fill)
            self.cell(col_widths[1], 6, row[1], border="LR", align="L", fill=fill)
            self.cell(col_widths[2], 6, row[2], border="LR", align="R", fill=fill)
            self.cell(col_widths[3], 6, row[3], border="LR", align="R", fill=fill)
            self.ln()
            fill = not fill
        self.cell(sum(col_widths), 0, "", "T")


def load_data_from_csv(csv_filepath):
    headings, rows = [], []
    with open(csv_filepath, encoding="utf8") as csv_file:
        for row in csv.reader(csv_file, delimiter=","):
            if not headings:  # extracting column names from first row:
                headings = row
            else:
                rows.append(row)
    return headings, rows


col_names, data = load_data_from_csv("countries.txt")
pdf = PDF()
pdf.set_font("helvetica", size=14)
pdf.add_page()
pdf.basic_table(col_names, data)
pdf.add_page()
pdf.improved_table(col_names, data)
pdf.add_page()
```

```
pdf.colored_table(col_names, data)
pdf.output("tuto5.pdf")
```

תוצר - טקסט מתמשך

מאחר וטבלה היא בסה"כ אוסף של תאים, טבעי שכך נבנה טבלאות.

הדוגמא הראשונה נוצרת באופן הבסיסי ביותר שאפשר:תאים ממוסגרים, מיושרים לשמאל ובגדלים שווים. התוצאה היא בסיסית אבל קלה מאוד להשגה.

הטבלה השניה מציגה כמה שיפורים: לכל עמודה יש רוחב משלה, כותרות ממורכזות ותמונות מיושרות לימין. הוסרו קווים אופקיים. זה נעשה על ידי תכונות הגבול של המתודה Cell()‎, שמציינת איזה גבולות של התא להדפיס. כאן אנחנו רוצים את הגבול השמאלי (L) והימני (R). כעת נותרה הבעיה של הקווים האופקיים. ישנן שתי אפשרויות לפתור בעיה זו: לבדוק את הקו האחרון בלולאה, במקרה זה נשתמש בLRB עבור פרמטר הגבול; או לחלופין, כמו שעשינו כאן, להוסיף את הקו בסוף הלולאה.

הטבלה השלישית דומה לשניה אבל עושה שימוש בצבעים. צבעי המילוי, טקסט והקווים מצויינים במפורש. שינוי הצבעים נעשה על ידי שימוש בתאים שקופים ומלאים לסירוגין.

6 2.11.6 - יצירת קישורים וערבוב סגנונות טקסט

דוגמא זו מציגה מספר דרכים להוסיף קישורים למסמך וקישורים חיצוניים. בנוסף הדוגמא ממחישה שימוש בסגנונות שונים של עיצוב טקסט (מודגש, נטוי, קו תחתון) באותו טקסט.

```
from fpdf import FPDF


pdf = FPDF()

# First page:
pdf.add_page()
pdf.set_font("helvetica", size=20)
pdf.write(5, "To find out what's new in self tutorial, click ")
pdf.set_font(style="U")
link = pdf.add_link(page=2)
pdf.write(5, "here", link)
pdf.set_font()

# Second page:
pdf.add_page()
pdf.image(
    "../docs/fpdf2-logo.png", 10, 10, 50, 0, "", "https://pyfpdf.github.io/fpdf2/"
)
pdf.set_left_margin(60)
pdf.set_font_size(18)
pdf.write_html(
    """You can print text mixing different styles using HTML tags: <b>bold</b>, <i>italic</i>,
<u>underlined</u>, or <b><i><u>all at once</u></i></b>!
<br><br>You can also insert links on text, such as <a href="https://pyfpdf.github.io/fpdf2/">https://pyfpdf.github.io/fpdf2/</a>,
or on an image: the logo is clickable!"""
)
pdf.output("tuto6.pdf")
```

תוצר - fpdf2-logo

המתודה החדשה שמשומשת כאן כדי להדפיס טקסט היא write()‎. דומה מאוד לmulti_cell()‎, כאשר ההבדלים העיקריים הם:

- סוף השורה הוא בגבול הימני והשורה הבאה מתחילה בגבול השמאלי
- הפוזיציה הנוכחית זזה לסוף שורת הטקסט

לפיכך המתודה מאפשרת לנו לכתוב קטע טקסט, לשנות את סגנון הגופן, ולהמשיך מאותו מקום שעצרנו. מצד שני, החסרון העיקרי הוא שלא ניתן ליישר את הטקסט כמו במulti_cell()‎.

בעמוד הראשון של הדוגמא השתמשנו write()‎ למטרה זו. תחילת המשפט נכתב בסגנון טקסט רגיל ואז על ידי שימוש במתודה set_font()‎ החלפנו לטקסט עם קו תחתון לסיום המשפט.

כדי להוסיף קישור פנימי שמוביל לעמוד השני השתמשנו במתודה add_link()‎ שוצרת איזור ניתן להקלקה שנתנו לו את השם "קישור" שמוביל לאיזור אחר באותו המסמך.

על מנת ליצור קישור חיצני באמצעות תמונה, השתמשנו במתודה image()‎. למתודה יש אופציה לקבל קישור כאחד הפרמטרים שלה. הקישור יכול להיות פנימי או חיצוני.

ניתן גם להשתמש במתודה `write_html()` כדי לשנות סגנונות גופן ולהוסיף קישורים. זהו פארסר של html, שמאפשר להוסיף טקסט, לשנות את הסגנון ולהוסיף קישורים באמצעות html.

2.12

`fpdf.FPDF` API

-
- -
- -
- -
- -
- -

2.12.1 -

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_font("helvetica", "B", 16)
pdf.cell(40, 10, "Hello World!")
pdf.output("tuto1.pdf")
```

PDF

`FPDF` FPDF A4

```
pdf = FPDF(orientation="P", unit="mm", format="A4")
```

PDF (`L`) `Letter` `Legal` `pt` `cm` `in`

add_page 1 set_margins

set_font Helvetica 16

```
pdf.set_font('helvetica', 'B', 16)
```

`I` `U` `Times` `Courier` `Symbol` `ZapfDingbats`

cell

```
pdf.cell(40, 10, 'Hello World!', 1)
```

```
pdf.cell(60, 10, 'Powered by FPDF.', new_x="LMARGIN", new_y="NEXT", align='C')
```

ln

output `output()` PDF `bytearray`

2.12.2 -

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Rendering logo:
```

```
        self.image("../docs/fpdf2-logo.png", 10, 8, 33)
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Moving cursor to the right:
        self.cell(80)
        # Printing title:
        self.cell(30, 10, "Title", border=1, align="C")
        # Performing a line break:
        self.ln(20)

    def footer(self):
        # Position cursor at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Printing page number:
        self.cell(0, 10, f"Page {self.page_no()}/{{nb}}", align="C")


# Instantiation of inherited class
pdf = PDF()
pdf.add_page()
pdf.set_font("Times", size=12)
for i in range(1, 41):
    pdf.cell(0, 10, f"Printing line number {i}", new_x="LMARGIN", new_y="NEXT")
pdf.output("new-tuto2.pdf")
```

PDF

header footer FPDF

image

page_no `{nb}` `{nb}` alias_nb_pages())

set_y

2 `helvetica` `Times`

set_auto_page_break

2.12.3 -

```
from fpdf import FPDF


class PDF(FPDF):
    def header(self):
        # Setting font: helvetica bold 15
        self.set_font("helvetica", "B", 15)
        # Calculating width of title and setting cursor position:
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        # Setting colors for frame, background and text:
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        # Setting thickness of the frame (1 mm)
        self.set_line_width(1)
        # Printing title:
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
        )
        # Performing a line break:
        self.ln(10)

    def footer(self):
        # Setting position at 1.5 cm from bottom:
        self.set_y(-15)
        # Setting font: helvetica italic 8
        self.set_font("helvetica", "I", 8)
        # Setting text color to gray:
        self.set_text_color(128)
        # Printing page number
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def chapter_title(self, num, label):
        # Setting font: helvetica 12
```

```
        self.set_font("helvetica", "", 12)
        # Setting background color
        self.set_fill_color(200, 220, 255)
        # Printing chapter name:
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            align="L",
            fill=True,
        )
        # Performing a line break:
        self.ln(4)

    def chapter_body(self, filepath):
        # Reading text file:
        with open(filepath, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing justified text:
        self.multi_cell(0, 5, txt)
        # Performing a line break:
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")

    def print_chapter(self, num, title, filepath):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(filepath)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto3.pdf")
```

PDF

[·](https://github.com/PyFPDF/fpdf2/raw/mast / /20k_c1.txt

get_string_width set_draw_color set_fill_color set_text_color set_line_width
1 mm 0.2 true

multi_cell \n \u00ad

(set_title) (set_author) Acrobat

2.12.4 -

```
from fpdf import FPDF


class PDF(FPDF):
    def __init__(self):
        super().__init__()
        self.col = 0  # Current column
        self.y0 = 0  # Ordinate of column start

    def header(self):
        self.set_font("helvetica", "B", 15)
        width = self.get_string_width(self.title) + 6
        self.set_x((210 - width) / 2)
        self.set_draw_color(0, 80, 180)
        self.set_fill_color(230, 230, 0)
        self.set_text_color(220, 50, 50)
        self.set_line_width(1)
        self.cell(
            width,
            9,
            self.title,
            border=1,
            new_x="LMARGIN",
            new_y="NEXT",
            align="C",
            fill=True,
```

```
        )
        self.ln(10)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def footer(self):
        self.set_y(-15)
        self.set_font("helvetica", "I", 8)
        self.set_text_color(128)
        self.cell(0, 10, f"Page {self.page_no()}", align="C")

    def set_col(self, col):
        # Set column position:
        self.col = col
        x = 10 + col * 65
        self.set_left_margin(x)
        self.set_x(x)

    @property
    def accept_page_break(self):
        if self.col < 2:
            # Go to next column:
            self.set_col(self.col + 1)
            # Set ordinate to top:
            self.set_y(self.y0)
            # Stay on the same page:
            return False
        # Go back to first column:
        self.set_col(0)
        # Trigger a page break:
        return True

    def chapter_title(self, num, label):
        self.set_font("helvetica", "", 12)
        self.set_fill_color(200, 220, 255)
        self.cell(
            0,
            6,
            f"Chapter {num} : {label}",
            new_x="LMARGIN",
            new_y="NEXT",
            border="L",
            fill=True,
        )
        self.ln(4)
        # Saving ordinate position:
        self.y0 = self.get_y()

    def chapter_body(self, name):
        # Reading text file:
        with open(name, "rb") as fh:
            txt = fh.read().decode("latin-1")
        # Setting font: Times 12
        self.set_font("Times", size=12)
        # Printing text in a 6cm width column:
        self.multi_cell(60, 5, txt)
        self.ln()
        # Final mention in italics:
        self.set_font(style="I")
        self.cell(0, 5, "(end of excerpt)")
        # Start back at first column:
        self.set_col(0)

    def print_chapter(self, num, title, name):
        self.add_page()
        self.chapter_title(num, title)
        self.chapter_body(name)


pdf = PDF()
pdf.set_title("20000 Leagues Under the Seas")
pdf.set_author("Jules Verne")
pdf.print_chapter(1, "A RUNAWAY REEF", "20k_c1.txt")
pdf.print_chapter(2, "THE PROS AND CONS", "20k_c1.txt")
pdf.output("tuto4.pdf")
```

PDF

.

accept_page_break set_col

accept_page_break 2 set_col

accept_page_break

2.12.5 -

```
import csv
from fpdf import FPDF


class PDF(FPDF):
    def basic_table(self, headings, rows):
        for heading in headings:
            self.cell(40, 7, heading, 1)
        self.ln()
        for row in rows:
            for col in row:
                self.cell(40, 6, col, 1)
            self.ln()

    def improved_table(self, headings, rows, col_widths=(42, 39, 35, 40)):
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C")
        self.ln()
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR")
            self.cell(col_widths[1], 6, row[1], border="LR")
            self.cell(col_widths[2], 6, row[2], border="LR", align="R")
            self.cell(col_widths[3], 6, row[3], border="LR", align="R")
            self.ln()
        # Closure line:
        self.cell(sum(col_widths), 0, "", border="T")

    def colored_table(self, headings, rows, col_widths=(42, 39, 35, 42)):
        # Colors, line width and bold font:
        self.set_fill_color(255, 100, 0)
        self.set_text_color(255)
        self.set_draw_color(255, 0, 0)
        self.set_line_width(0.3)
        self.set_font(style="B")
        for col_width, heading in zip(col_widths, headings):
            self.cell(col_width, 7, heading, border=1, align="C", fill=True)
        self.ln()
        # Color and font restoration:
        self.set_fill_color(224, 235, 255)
        self.set_text_color(0)
        self.set_font()
        fill = False
        for row in rows:
            self.cell(col_widths[0], 6, row[0], border="LR", align="L", fill=fill)
            self.cell(col_widths[1], 6, row[1], border="LR", align="L", fill=fill)
            self.cell(col_widths[2], 6, row[2], border="LR", align="R", fill=fill)
            self.cell(col_widths[3], 6, row[3], border="LR", align="R", fill=fill)
            self.ln()
            fill = not fill
        self.cell(sum(col_widths), 0, "", "T")


def load_data_from_csv(csv_filepath):
    headings, rows = [], []
    with open(csv_filepath, encoding="utf8") as csv_file:
        for row in csv.reader(csv_file, delimiter=","):
            if not headings:  # extracting column names from first row:
                headings = row
            else:
                rows.append(row)
    return headings, rows


col_names, data = load_data_from_csv("countries.txt")
pdf = PDF()
pdf.set_font("helvetica", size=14)
pdf.add_page()
pdf.basic_table(col_names, data)
pdf.add_page()
pdf.improved_table(col_names, data)
pdf.add_page()
pdf.colored_table(col_names, data)
pdf.output("tuto5.pdf")
```

PDF -

`Cell()` `L)` `(R)`
`LRB` ;

2.12.6 -

pdf

```
from fpdf import FPDF


pdf = FPDF()

# First page:
pdf.add_page()
pdf.set_font("helvetica", size=20)
pdf.write(5, "To find out what's new in self tutorial, click ")
pdf.set_font(style="U")
link = pdf.add_link(page=2)
pdf.write(5, "here", link)
pdf.set_font()

# Second page:
pdf.add_page()
pdf.image(
    "../docs/fpdf2-logo.png", 10, 10, 50, 0, "", "https://pyfpdf.github.io/fpdf2/"
)
pdf.set_left_margin(60)
pdf.set_font_size(18)
pdf.write_html(
    """You can print text mixing different styles using HTML tags: <b>bold</b>, <i>italic</i>,
<u>underlined</u>, or <b><i><u>all at once</u></i></b>!
<br><br>You can also insert links on text, such as <a href="https://pyfpdf.github.io/fpdf2/">https://pyfpdf.github.io/fpdf2/</a>,
or on an image: the logo is clickable!"""
)
pdf.output("tuto6.pdf")
```

PDF - fpdf2

write() multi_cell()

-
-

multi_cell()

write() set_font()

add_link() “ ”

image()

`write_html()` html

3. Page Layout

3.1 Page format and orientation

By default, a `FPDF` document has a `A4` format with `portrait` orientation.

Other formats & orientation can be specified to `FPDF` constructor:

```
pdf = fpdf.FPDF(orientation="landscape", format="A5")
```

Currently supported formats are `a3`, `a4`, `a5`, `letter`, `legal` or a tuple `(width, height)`. Additional standard formats are welcome and can be suggested through pull requests.

3.1.1 Per-page format, orientation and background

`.set_page_background()` lets you set a background for all pages following this call until the background is removed. The value must be of type `str`, `io.BytesIO`, `PIL.Image.Image`, `drawing.DeviceRGB`, `tuple` or `None`

The following code snippet illustrates how to configure different page formats for specific pages as well as setting different backgrounds and then removing it:

```
from fpdf import FPDF

pdf = FPDF()
pdf.set_font("Helvetica")
pdf.set_page_background((252,212,255))
for i in range(9):
    if i == 6:
        pdf.set_page_background('image_path.png')
    pdf.add_page(format=(210 * (1 - i/10), 297 * (1 - i/10)))
    pdf.cell(txt=str(i))
pdf.set_page_background(None)
pdf.add_page(same=True)
pdf.cell(txt="9")
pdf.output("varying_format.pdf")
```

Similarly, an `orientation` parameter can be provided to the `add_page` method.

3.1.2 Page layout & zoom level

`set_display_mode()` allows to set the **zoom level**: pages can be displayed entirely on screen, occupy the full width of the window, use the real size, be scaled by a specific zooming factor or use the viewer default (configured in its *Preferences* menu).

The **page layout** can also be specified: single page at a time, continuous display, two columns or viewer default.

```
from fpdf import FPDF

pdf = FPDF()
pdf.set_display_mode(zoom="default", layout="TWO_COLUMN_LEFT")
pdf.set_font("helvetica", size=30)
pdf.add_page()
pdf.cell(txt="page 1")
pdf.add_page()
pdf.cell(txt="page 2")
pdf.output("two-column.pdf")
```

3.1.3 Viewer preferences

```
from fpdf import FPDF, ViewerPreferences

pdf = FPDF()
pdf.viewer_preferences = ViewerPreferences(
    hide_toolbar=True,
    hide_menubar=True,
    hide_window_u_i=True,
    fit_window=True,
    center_window=True,
    display_doc_title=True,
    non_full_screen_page_mode="USE_OUTLINES",
```

```
)
pdf.set_font("helvetica", size=30)
pdf.add_page()
pdf.cell(txt="page 1")
pdf.add_page()
pdf.cell(txt="page 2")
pdf.output("viewer-prefs.pdf")
```

3.1.4 Full screen

```
from fpdf import FPDF

pdf = FPDF()
pdf.page_mode = "FULL_SCREEN"
pdf.output("full-screen.pdf")
```

3.2 Margins

By default a `FPDF` document has a 2cm margin at the bottom, and 1cm margin on the other sides.

Those margins control the initial current X & Y position to render elements on a page, and also define the height limit that triggers automatic page breaks when they are enabled.

Margins can be completely removed:

```
pdf.set_margin(0)
```

Several methods can be used to set margins:

- set_margin
- set_left_margin
- set_right_margin
- set_top_margin
- set_margins
- set_auto_page_break

3.3 Introduction

Templates are predefined documents (like invoices, tax forms, etc.), or parts of such documents, where each element (text, lines, barcodes, etc.) has a fixed position (x1, y1, x2, y2), style (font, size, etc.) and a default text.

These elements can act as placeholders, so the program can change the default text "filling in" the document.

Besides being defined in code, the elements can also be defined in a CSV file or in a database, so the user can easily adapt the form to his printing needs.

A template is used like a dict, setting its items' values.

3.4 How to use Templates

There are two approaches to using templates.

3.4.1 Using Template()

The traditional approach is to use the Template() class, This class accepts one template definition, and can apply it to each page of a document. The usage pattern here is:

```
tmpl = Template(elements=elements)
# first page and content
tmpl.add_page()
tmpl[item_key_01] = "Text 01"
tmpl[item_key_02] = "Text 02"
...

# second page and content
tmpl.add_page()
tmpl[item_key_01] = "Text 11"
tmpl[item_key_02] = "Text 12"
...

# possibly more pages
...

# finalize document and write to file
tmpl.render(outfile="example.pdf")
```

The Template() class will create and manage its own FPDF() instance, so you don't need to worry about how it all works together. It also allows to set the page format, title of the document, measuring unit, and other metadata for the PDF file.

For the method signatures, see pyfpdf.github.io: class Template.

Setting text values for specific template items is done by treating the class as a dict, with the name of the item as the key:

```
Template["company_name"] = "Sample Company"
```

3.4.2 Using FlexTemplate()

When more flexibility is desired, then the FlexTemplate() class comes into play. In this case, you first need to create your own FPDF() instance. You can then pass this to the constructor of one or several FlexTemplate() instances, and have each of them load a template definition. For any page of the document, you can set text values on a template, and then render it on that page. After rendering, the template will be reset to its default values.

```
pdf = FPDF()
pdf.add_page()
# One template for the first page
fp_tmpl = FlexTemplate(pdf, elements=fp_elements)
fp_tmpl["item_key_01"] = "Text 01"
fp_tmpl["item_key_02"] = "Text 02"
...
fp_tmpl.render() # add template items to first page

# add some more non-template content to the first page
pdf.polyline(point_list, fill=False, polygon=False)
```

```
# second page
pdf.add_page()
# header for the second page
h_tmpl = FlexTemplate(pdf, elements=h_elements)
h_tmpl["item_key_HA"] = "Text 2A"
h_tmpl["item_key_HB"] = "Text 2B"
...
h_tmpl.render() # add header items to second page

# footer for the second page
f_tmpl = FlexTemplate(pdf, elements=f_elements)
f_tmpl["item_key_FC"] = "Text 2C"
f_tmpl["item_key_FD"] = "Text 2D"
...
f_tmpl.render() # add footer items to second page

# other content on the second page
pdf.set_dash_pattern(dash=1, gap=1)
pdf.line(x1, y1, x2, y2):
pdf.set_dash_pattern()

# third page
pdf.add_page()
# header for the third page, just reuse the same template instance after render()
h_tmpl["item_key_HA"] = "Text 3A"
h_tmpl["item_key_HB"] = "Text 3B"
...
h_tmpl.render() # add header items to third page

# footer for the third page
f_tmpl["item_key_FC"] = "Text 3C"
f_tmpl["item_key_FD"] = "Text 3D"
...
f_tmpl.render() # add footer items to third page

# other content on the third page
pdf.rect(x, y, w, h, style=None)

# possibly more pages
pdf.next_page()
...
...

# finally write everything to a file
pdf.output("example.pdf")
```

Evidently, this can end up quite a bit more involved, but there are hardly any limits on how you can combine templated and non-templated content on each page. Just think of the different templates as of building blocks, like configurable rubber stamps, which you can apply in any combination on any page you like.

Of course, you can just as well use a set of full-page templates, possibly differentiating between cover page, table of contents, normal content pages, and an index page, or something along those lines.

And here's how you can use a template several times on one page (and by extension, several times on several pages). When rendering with an `offsetx` and/or `offsety` argument, the contents of the template will end up in a different place on the page. A `rotate` argument will change its orientation, rotated around the origin of the template. The pivot of the rotation is the offset location. And finally, a `scale` argument allows you to insert the template larger or smaller than it was defined.

```
elements = [
    {"name":"box", "type":"B", "x1":0, "y1":0, "x2":50, "y2":50,},
    {"name":"d1", "type":"L", "x1":0, "y1":0, "x2":50, "y2":50,},
    {"name":"d2", "type":"L", "x1":0, "y1":50, "x2":50, "y2":0,},
    {"name":"label", "type":"T", "x1":0, "y1":52, "x2":50, "y2":57, "text":"Label",},
]
pdf = FPDF()
pdf.add_page()
templ = FlexTemplate(pdf, elements)
templ["label"] = "Offset: 50 / 50 mm"
templ.render(offsetx=50, offsety=50)
templ["label"] = "Offset: 50 / 120 mm"
templ.render(offsetx=50, offsety=120)
templ["label"] = "Offset: 120 / 50 mm, Scale: 0.5"
templ.render(offsetx=120, offsety=50, scale=0.5)
templ["label"] = "Offset: 120 / 120 mm, Rotate: 30°, Scale=0.5"
templ.render(offsetx=120, offsety=120, rotate=30.0, scale=0.5)
pdf.output("example.pdf")
```

For the method signatures, see pyfpdf.github.io: class FlexTemplate.

The dict syntax for setting text values is the same as above:

```
FlexTemplate["company_name"] = "Sample Company"
```

3.5 Details - Template definition

A template definition consists of a number of elements, which have the following properties (columns in a CSV, items in a dict, fields in a database). Dimensions (except font size, which always uses points) are given in user defined units (default: mm). Those are the units that can be specified when creating a `Template()` or a `FPDF()` instance.

- **name**: placeholder identification (unique text string)
- *mandatory*
- **type**:
- '**T**': Text - places one or several lines of text on the page
- '**L**': Line - draws a line from x1/y1 to x2/y2
- '**I**': Image - positions and scales an image into the bounding box
- '**B**': Box - draws a rectangle around the bounding box
- '**E**': Ellipse - draws an ellipse inside the bounding box
- '**BC**': Barcode - inserts an "Interleaved 2 of 5" type barcode
- '**C39**': Code 39 - inserts a "Code 39" type barcode
- Incompatible change: A previous implementation of this type used the non-standard element keys "x", "y", "w", and "h", which are now deprecated (but still work for the moment).
- '**W**': "Write" - uses the `FPDF.write()` method to add text to the page
- *mandatory*
- **x1, y1, x2, y2**: top-left, bottom-right coordinates, defining a bounding box in most cases
- for multiline text, this is the bounding box of just the first line, not the complete box
- for the barcodes types, the height of the barcode is `y2 - y1`, x2 is ignored.
- *mandatory* ("x2" *optional* for the barcode types)
- **font**: the name of a font type for the text types
- *optional*
- default: "helvetica"
- **size**: the size property of the element (float value)
- for text, the font size (in points!)
- for line, box, and ellipse, the line width
- for the barcode types, the width of one bar
- *optional*
- default: 10 for text, 2 for 'BC', 1.5 for 'C39'
- **bold, italic, underline**: text style properties
- in elements dict, enabled with True or equivalent value
- in csv, only int values, 0 as false, non-0 as true
- *optional*
- default: false
- **foreground, background**: text and fill colors (int value, commonly given in hex as 0xRRGGBB)
- *optional*
- default: foreground 0x000000 = black; background None/empty = transparent
- Incompatible change: Up to 2.4.5, the default background for text and box elements was solid white, with no way to make them transparent.
- **align**: text alignment, '**L**': left, '**R**': right, '**C**': center
- *optional*
- default: 'L'

- **text**: default string, can be replaced at runtime
- displayed text for 'T' and 'W'
- data to encode for barcode types
- *optional* (if missing for text/write, the element is ignored)
- default: empty
- **priority**: Z-order (int value)
- *optional*
- default: 0
- **multiline**: configure text wrapping
- in dicts, None for single line, True for multicells (multiple lines), False trims to exactly fit the space defined
- in csv, 0 for single line, >0 for multiple lines, <0 for exact fit
- *optional*
- default: single line
- **rotation**: rotate the element in degrees around the top left corner x1/y1 (float)
- *optional*
- default: 0.0 - no rotation

Fields that are not relevant to a specific element type will be ignored there, but if not left empty, they must still adhere to the specified data type (in dicts, string fields may be None).

3.6 How to create a template

A template can be created in 3 ways:

- By defining everything manually in a hardcoded way as a Python dictionary
- By using a template definition in a CSV document and parsing the CSV with Template.parse_dict()
- By defining the template in a database (this applies to [Web2Py] (Web2Py.md) integration)

3.7 Example - Hardcoded

```
from fpdf import Template

#this will define the ELEMENTS that will compose the template.
elements = [
    { 'name': 'company_logo', 'type': 'I', 'x1': 20.0, 'y1': 17.0, 'x2': 78.0, 'y2': 30.0, 'font': None, 'size': 0.0, 'bold': 0, 'italic': 0, 'underline': 0,
'align': 'C', 'text': 'logo', 'priority': 2, 'multiline': False},
    { 'name': 'company_name', 'type': 'T', 'x1': 17.0, 'y1': 32.5, 'x2': 115.0, 'y2': 37.5, 'font': 'helvetica', 'size': 12.0, 'bold': 1, 'italic': 0,
'underline': 0,'align': 'C', 'text': '', 'priority': 2, 'multiline': False},
    { 'name': 'multline_text', 'type': 'T', 'x1': 20, 'y1': 100, 'x2': 40, 'y2': 105, 'font': 'helvetica', 'size': 12, 'bold': 0, 'italic': 0, 'underline': 0,
'background': 0x88ff00, 'align': 'C', 'text': 'Lorem ipsum dolor sit amet, consectetur adipisici elit', 'priority': 2, 'multiline': True},
    { 'name': 'box', 'type': 'B', 'x1': 15.0, 'y1': 15.0, 'x2': 185.0, 'y2': 260.0, 'font': 'helvetica', 'size': 0.0, 'bold': 0, 'italic': 0, 'underline': 0,
'align': 'C', 'text': None, 'priority': 0, 'multiline': False},
    { 'name': 'box_x', 'type': 'B', 'x1': 95.0, 'y1': 15.0, 'x2': 105.0, 'y2': 25.0, 'font': 'helvetica', 'size': 0.0, 'bold': 1, 'italic': 0, 'underline': 0,
'align': 'C', 'text': None, 'priority': 2, 'multiline': False},
    { 'name': 'line1', 'type': 'L', 'x1': 100.0, 'y1': 25.0, 'x2': 100.0, 'y2': 57.0, 'font': 'helvetica', 'size': 0, 'bold': 0, 'italic': 0, 'underline': 0,
'align': 'C', 'text': None, 'priority': 3, 'multiline': False},
    { 'name': 'barcode', 'type': 'BC', 'x1': 20.0, 'y1': 246.5, 'x2': 140.0, 'y2': 254.0, 'font': 'Interleaved 2of5 NT', 'size': 0.75, 'bold': 0, 'italic': 0,
'underline': 0, 'align': 'C', 'text': '2000000000010001590533380165812008100 81', 'priority': 3, 'multiline': False},
]

#here we instantiate the template
f = Template(format="A4", elements=elements,
             title="Sample Invoice")
f.add_page()

#we FILL some of the fields of the template with the information we want
#note we access the elements treating the template instance as a "dict"
f["company_name"] = "Sample Company"
f["company_logo"] = "docs/fpdf2-logo.png"

#and now we render the page
f.render("./template.pdf")
```

See template.py or [Web2Py] (Web2Py.md) for a complete example.

3.8 Example - Elements defined in CSV file

You define your elements in a CSV file "mycsvfile.csv" that will look like:

```
line0;L;20.0;12.0;190.0;12.0;times;0.5;0;0;0;0;16777215;C;;0;0;0.0
line1;L;20.0;36.0;190.0;36.0;times;0.5;0;0;0;0;16777215;C;;0;0;0.0
name0;T;21.0;14.0;104.0;25.0;times;16.0;0;0;0;0;16777215;L;name;2;0;0.0
title0;T;21.0;26.0;104.0;30.0;times;10.0;0;0;0;0;16777215;L;title;2;0;0.0
multiline;T;21.0;50.0;28.0;54.0;times;10.5;0;0;0;0;0xffff00;L;multi line;0;1;0.0
numeric_text;T;21.0;80.0;100.0;84.0;times;10.5;0;0;0;0;;R;007;0;0;0.0
empty_fields;T;21.0;100.0;100.0;104.0
rotated;T;21.0;80.0;100.0;84.0;times;10.5;0;0;0;0;;R;ROTATED;0;0;30.0
```

Remember that each line represents an element and each field represents one of the properties of the element in the following order: ('name','type','x1','y1','x2','y2','font','size','bold','italic','underline','foreground','background','align','text','priority', 'multiline', 'rotate') As noted above, most fields may be left empty, so a line is valid with only 6 items. The "empty_fields" line of the example demonstrates all that can be left away. In addition, for the barcode types "x2" may be empty.

Then you can use the file like this:

```
def test_template():
    f = Template(format="A4",
                 title="Sample Invoice")
    f.parse_csv("mycsvfile.csv", delimiter=";")
    f.add_page()
    f["name0"] = "Joe Doe"
    return f.render("./template.pdf")
```

3.9 Tables

Tables can be built either using **cells** or with `write_html`.

3.9.1 Using cells

There is a method to build tables allowing for multilines content in cells:

```
from fpdf import FPDF

data = (
    ("First name", "Last name", "Age", "City"),
    ("Jules", "Smith", "34", "San Juan"),
    ("Mary", "Ramos", "45", "Orlando"),
    ("Carlson", "Banks", "19", "Los Angeles"),
    ("Lucas", "Cimon", "31", "Saint-Mahturin-sur-Loire"),
)

pdf = FPDF()
pdf.add_page()
pdf.set_font("Times", size=10)
line_height = pdf.font_size * 2.5
col_width = pdf.epw / 4  # distribute content evenly
for row in data:
    for datum in row:
        pdf.multi_cell(col_width, line_height, datum, border=1,
                new_x="RIGHT", new_y="TOP", max_line_height=pdf.font_size)
    pdf.ln(line_height)
pdf.output('table_with_cells.pdf')
```

3.9.2 Using write_html

An alternative method using `FPDF.write_html`, with the same `data` as above, and column widths defined as percent of the effective width:

```
from fpdf import FPDF

pdf = FPDF()
pdf.set_font_size(16)
pdf.add_page()
pdf.write_html(
    f"""<table border="1"><thead><tr>
    <th width="25%">{data[0][0]}</th>
    <th width="25%">{data[0][1]}</th>
    <th width="15%">{data[0][2]}</th>
    <th width="35%">{data[0][3]}</th>
</tr></thead><tbody><tr>
    <td>{'</td><td>'.join(data[1])}</td>
</tr><tr>
    <td>{'</td><td>'.join(data[2])}</td>
</tr><tr>
    <td>{'</td><td>'.join(data[3])}</td>
</tr><tr>
    <td>{'</td><td>'.join(data[4])}</td>
</tr></tbody></table>""",
    table_line_separators=True,
)
pdf.output('table_html.pdf')
```

Note that `write_html` has some limitations, notably regarding multi-lines cells.

3.9.3 Recipes

- our 5th tutorial provides examples on how to build tables: Tuto 5 - Creating Tables
- `@bvalgard` wrote a custom `table()` method: YouTube video - `create_table()` source code
- code snippet by @RubendeBruin to adapt row height to the highest cell
- detect if adding a table row will result in a page break: this can be done using `.offset_rendering()`

3.9.4 Repeat table header on each page

The following recipe demonstrates a solution to handle this requirement:

```
from fpdf import FPDF

TABLE_COL_NAMES = ("First name", "Last name", "Age", "City")
TABLE_DATA = (
    ("Jules", "Smith", "34", "San Juan"),
    ("Mary", "Ramos", "45", "Orlando"),
    ("Carlson", "Banks", "19", "Los Angeles"),
    ("Lucas", "Cimon", "31", "Angers"),
)

pdf = FPDF()
pdf.add_page()
pdf.set_font("Times", size=16)
line_height = pdf.font_size * 2
col_width = pdf.epw / 4  # distribute content evenly

def render_table_header():
    pdf.set_font(style="B")  # enabling bold text
    for col_name in TABLE_COL_NAMES:
        pdf.cell(col_width, line_height, col_name, border=1)
    pdf.ln(line_height)
    pdf.set_font(style="")  # disabling bold text

render_table_header()
for _ in range(10):  # repeat data rows
    for row in TABLE_DATA:
        if pdf.will_page_break(line_height):
            render_table_header()
        for datum in row:
            pdf.cell(col_width, line_height, datum, border=1)
        pdf.ln(line_height)

pdf.output("table_with_headers_on_every_page.pdf")
```

Note that if you want to use `multi_cell()` method instead of `cell()`, some extra code will be required: an initial call to `multi_cell` with `split_only=True` will be needed in order to compute the number of lines in the cell.

4. Text Content

4.1 Adding Text

There are several ways in fpdf to add text to a PDF document, each of which comes with its own special features and its own set of advantages and disadvantages. You will need to pick the right one for your specific task.

method	lines	markdown support	HTML support	accepts new current position	details
`.text()`	one	no	no	fixed	Inserts a single-line text string with a precise location on the base line of the font.
`.cell()`	one	yes	no	yes	Inserts a single-line text string within the boundaries of a given box, optionally with background and border.
`.multi_cell()`	several	yes	no	yes	Inserts a multi-line text string within the boundaries of a given box, optionally with background and border.
`.write()`	several	no	no	auto	Inserts a multi-line text string within the boundaries of the page margins, starting at the current x/y location (typically the end of the last inserted text).
`.write_html()`	several	no	yes	auto	From html.py. An extension to `.write()`, with additional parsing of basic HTML tags.

4.1.1 Typographical Limitations

There are a few advanced typesetting features that fpdf doesn't currently support.

- Automatic ligatures - Some writing systems (eg. most Indic scripts such as Devaganari, Tamil, Kannada) frequently combine a number of written characters into a single glyph. This would require advanced font analysis capabilities, which aren't currently implemented.
- Contextual forms - In some writing systems (eg. Arabic, Mongolian, etc.), characters may take a different shape, depending on whether they appear at the beginning, in the middle, or at the end of a word, or isolated. Fpdf will always use the same standard shape in those cases.
- Vertical writing - Some writing systems are meant to be written vertically. Doing so is not directly supported. In cases where this just means to stack characters on top of each other (eg. Chinese, Japanese, etc.), client software can implement this by placing each character individuall at the correct location. In cases where the characters are connected with each other (eg. Mongolian), this may be more difficult, if possible at all.
- Right-to-Left writing - Letters of scripts that are written right to left(eg. Arabic, Hebrew) appear in the wrong order
- Special Diacritics - Special diacritics that use separate code points (eg. in Diné Bizaad, Hebrew) appear displaced

Right-to-Left & Arabic Script workaround

For Arabic and RTL scripts there is a temporary solution (using two additional libraries `python-bidi` and `arabic-reshaper`) that works for most languages; only a few (rare) Arabic characters aren't supported. Using it on other scripts(eg. when the input is unknown or mixed scripts) does not affect them:

```
from arabic_reshaper import reshape
from bidi.algorithm import get_display

some_text = 'اَلْعَرَبِيَّةُ فِي סוֹפִית'
fixed_text = get_display(reshape(some_text))
```

4.1.2 Text Formatting

For all text insertion methods, the relevant font related properties (eg. font/style and foreground/background color) must be set before invoking them. This includes using:

- `.set_font()`
- `.set_text_color()`
- `.set_draw_color()` - for cell borders
- `.set_fill_color()` - for the background

In addition, some of the methods can optionally use markdown or HTML markup in the supplied text in order to change the font style (bold/italic/underline) of parts of the output.

4.1.3 Change in current position

`.cell()` and `.multi_cell()` let you specify where the current position (`.x`/`.y`) should go after the call. This is handled by the parameters `new_x` and `new_y`. Their values must one of the following enums values or an equivalent string:

- `XPos`
- `YPos`

4.1.4 .text()

Prints a single-line character string. In contrast to the other text methods, the position is given explicitly, and not taken from `.x`/`.y`. The origin is on the left of the first character, on the baseline. This method allows placing a string with typographical precision on the page, but it is usually easier to use the `.cell()`, `.multi_cell()` or `.write()` methods.

Signature and parameters for .text()

4.1.5 .cell()

Prints a cell (rectangular area) with optional borders, background color and character string. The upper-left corner of the cell corresponds to the current position. The text can be aligned or centered. After the call, the current position moves to the selected `new_x`/`new_y` position. It is possible to put a link on the text. If `markdown=True`, then minimal markdown styling is enabled, to render parts of the text in bold, italics, and/or underlined.

If automatic page breaking is enabled and the cell goes beyond the limit, a page break is performed before outputting.

Signature and parameters for.cell()

4.1.6 .multi_cell()

Allows printing text with line breaks. Those can be automatic (breaking at the most recent space or soft-hyphen character) as soon as the text reaches the right border of the cell, or explicit (via the `\\n` character). As many cells as necessary are stacked, one below the other. Text can be aligned, centered or justified. The cell block can be framed and the background painted.

Using `new_x="RIGHT", new_y="TOP", maximum height=pdf.font_size` can be useful to build tables with multiline text in cells.

In normal operation, returns a boolean indicating if page break was triggered. When `split_only == True`, returns `txt` split into lines in an array (with any markdown markup removed).

Signature and parameters for.multi_cell()

4.1.7 .write()

Prints multi-line text between the page margins, starting from the current position. When the right margin is reached, a line break occurs at the most recent space or soft-hyphen character, and text continues from the left margin. A manual break happens any time the \n character is met, Upon method exit, the current position is left near the end of the text, ready for the next call to continue without a gap, potentially with a different font or size set. Returns a boolean indicating if page break was triggered.

The primary purpose of this method is to print continuously wrapping text, where different parts may be rendered in different fonts or font sizes. This contrasts eg. with `.multi_cell()`, where a change in font family or size can only become effective on a new line.

Signature and parameters for.write()

4.1.8 .write_html()

This method is very similar to `.write()`, but accepts basic HTML formatted text as input. See html.py for more details and the supported HTML tags.

Note that when using data from actual web pages, the result may not look exactly as expected, because `.write_html()` prints all whitespace unchanged as it finds them, while webbrowsers rather collapse each run of consequitive whitespace into a single space character.

Signature and parameters for .write_html()

4.2 Line breaks

When using multi_cell() or write(), each time a line reaches the right extremity of the cell or a carriage return character (`\n`) is met, a line break is issued and a new line automatically created under the current one.

An automatic break is performed at the location of the nearest space or soft-hyphen (`\u00ad`) character before the right limit. A soft-hyphen will be replaced by a normal hyphen when triggering a line break, and ignored otherwise.

If the parameter `print_sh=False` in `multi_cell()` or `write()` is set to `True`, then they will print the soft-hyphen character to the document (as a normal hyphen with most fonts) instead of using it as a line break opportunity.

When using multi_cell(), the parameter `split_only=True` will perform word-wrapping only and return the resulting multi-lines as a list of strings. This can be used in conjunction with the cursor position and document height to determine if inserting a multi_cell() will result in a page break.

4.3 Page breaks

By default, `fpdf2` will automatically perform page breaks whenever a cell or the text from a `write()` is rendered at the bottom of a page with a height greater than the page bottom margin.

This behaviour can be controlled using the `set_auto_page_break` and `accept_page_break` methods.

4.3.1 Manually trigger a page break

Simply call `.add_page()`.

4.3.2 Inserting the final number of pages of the document

The special string `{nb}` will be substituted by the total number of pages on document closure. This special value can changed by calling alias_nb_pages().

4.3.3 will_page_break

`will_page_break(height)` lets you know if adding an element will trigger a page break, based on its `height` and the current ordinate (`y` position).

4.3.4 Unbreakable sections

In order to render content, like tables, with the insurance that no page break will be performed in it, on the can use the `FPDF.unbreakable()` context-manager:

```
pdf = fpdf.FPDF()
pdf.add_page()
pdf.set_font("Times", size=16)
line_height = pdf.font_size * 2
col_width = pdf.epw / 4  # distribute content evenly
for i in range(4):  # repeat table 4 times
    with pdf.unbreakable() as doc:
        for row in data:  # data comes from snippets on the Tables documentation page
            for datum in row:
                doc.cell(col_width, line_height, f"{datum} ({i})", border=1)
            doc.ln(line_height)
    print('page_break_triggered:', doc.page_break_triggered)
    pdf.ln(line_height * 2)
pdf.output("unbreakable_tables.pdf")
```

An alternative approach is `offset_rendering()` that allows to test the results of some operations on the global layout before performing them "for real":

```
with pdf.offset_rendering() as dummy:
    # Dummy rendering:
    dummy.multi_cell(...)
if dummy.page_break_triggered:
    # We trigger a page break manually beforehand:
    pdf.add_page()
    # We duplicate the section header:
    pdf.cell(txt="Appendix C")
# Now performing our rendering for real:
pdf.multi_cell(...)
```

4.4 Text styling

4.4.1 set_font()

Setting emphasis on text can be controlled by using `set_font(style=...)`:

- `style="B"` indicates **bold**
- `style="I"` indicates *italics*
- `style="U"` indicates underline
- `style="BI"` indicates ***bold italics***

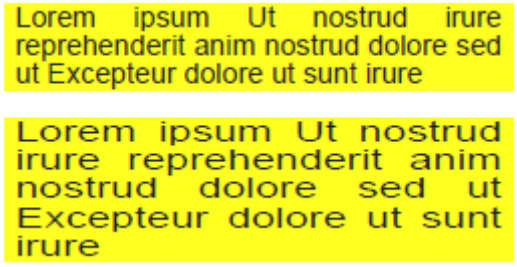
```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_font("Times", size=36)
pdf.cell(txt="This")
pdf.set_font(style="B")
pdf.cell(txt="is")
pdf.set_font(style="I")
pdf.cell(txt="a")
pdf.set_font(style="U")
pdf.cell(txt="PDF")
pdf.output("style.pdf")
```

4.4.2 .set_stretching(stretching=100)

Text can be stretched horizontally with this setting, measured in percent. If the argument is less than 100, then all characters are rendered proportionally narrower and the text string will take less space. If it is larger than 100, then the width of all characters will be expanded accordingly.

The example shows the same text justified to the same width, with stretching values of 100 and 150.

```
pdf = FPDF()
pdf.add_page()
pdf.set_font("Helvetica", "", 8)
pdf.set_fill_color(255, 255, 0)
pdf.multi_cell(w=50, txt=LOREM_IPSUM[:100], new_x="LEFT", fill=True)
pdf.ln()
pdf.set_stretching(150)
pdf.multi_cell(w=50, txt=LOREM_IPSUM[:100], new_x="LEFT", fill=True)
```



4.4.3 .set_char_spacing(spacing=0)

This method changes the distance between individual characters of a test string. Normally, characters are placed at a given distance according the width information in the font file. If spacing is larger than 0, then their distance will be larger, creating a gap in between. If it is less than 0, then their distance will be smaller, possibly resulting in an overlap. The change in distance is given in typographic points (Pica), which makes it easy to adapt it relative to the current font size.

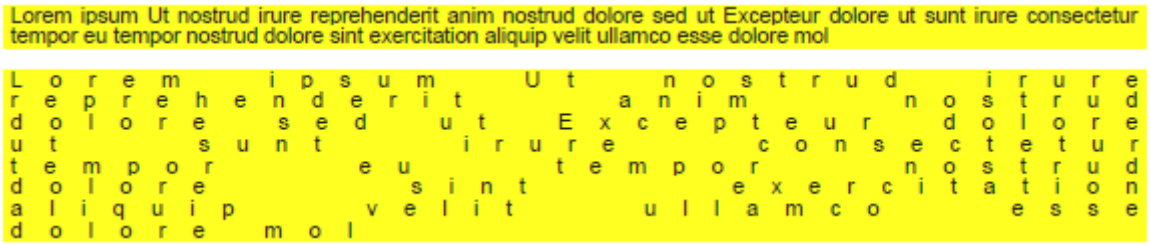
Character spacing works best for formatting single line text created by any method, or for highlighting individual words included in a block of text with `.write()`.

Limitations: Spacing will only be changed *within* a sequence of characters that `fpdf2` adds to the PDF in one go. This means that there will be no extra distance *eg.* between text parts that are placed successivly with `write()`. Also, if you apply different

font styles using the Markdown functionality of `.cell()` and `.multi_cell()` or by using `html_write()`, then any parts given different styles will have the original distance between them. This is so because `fpdf2` has to add each styled fragment to the PDF file seperately.

The example shows the same text justified to the same width, with char_spacing values of 0 and 10 (font size 8 pt).

```
pdf = FPDF()
pdf.add_page()
pdf.set_font("Helvetica", "", 8)
pdf.set_fill_color(255, 255, 0)
pdf.multi_cell(w=150, txt=LOREM_IPSUM[:200], new_x="LEFT", fill=True)
pdf.ln()
pdf.set_char_spacing(10)
pdf.multi_cell(w=150, txt=LOREM_IPSUM[:200], new_x="LEFT", fill=True)
```



4.4.4 Subscript, Superscript, and Fractional Numbers

The class attribute `.char_vpos` controls special vertical positioning modes for text:

- "LINE" - normal line text (default)
- "SUP" - superscript (exponent)
- "SUB" - subscript (index)
- "NOM" - nominator of a fraction with "/"
- "DENOM" - denominator of a fraction with "/"

For each positioning mode there are two parameters that can be configured. The defaults have been set to result in a decent layout with most fonts, and are given in parens.

The size multiplier for the font size:

- `.sup_scale` (0.7)
- `.sub_scale` (0.7)
- `.nom_scale` (0.75)
- `.denom_scale` (0.75)

The lift is given as fraction of the unscaled font size and indicates how much the glyph gets lifted above the base line (negative for below):

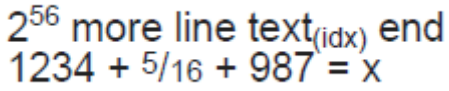
- `.sup_lift` (0.4)
- `.sub_lift` (-0.15)
- `.nom_lift` (0.2)
- `.denom_lift` (0.0)

Limitations: The individual glyphs will be scaled down as configured. This is not typographically correct, as it will also reduce the stroke width, making them look lighter than the normal text. Unicode fonts may include characters in the subscripts and superscripts range. In a high quality font, those glyphs will be smaller than the normal ones, but have a proportionally stronger stroke width in order to maintain the same visual density. If available in good quality, using Characters from this range is preferred and will look better. Unfortunately, many fonts either don't (fully) cover this range, or the glyphs are of unsatisfactory quality. In those cases, this feature of `fpdf2` offers a reliable workaround with suboptimal but consistent output quality.

Practical use is essentially limited to `.write()` and `html_write()`. The feature does technically work with `.cell()` and `.multi_cell`, but is of limited usefulness there, since you can't change font properties in the middle of a line (there is no markdown support). It currently gets completely ignored by `.text()`.

The example shows the most common use cases:

```
pdf = fpdf.FPDF()
pdf.add_page()
pdf.set_font("Helvetica", "", 20)
pdf.write(txt="2")
pdf.char_vpos = "SUP"
pdf.write(txt="56")
pdf.char_vpos = "LINE"
pdf.write(txt=" more line text")
pdf.char_vpos = "SUB"
pdf.write(txt="(idx)")
pdf.char_vpos = "LINE"
pdf.write(txt=" end")
pdf.ln()
pdf.write(txt="1234 + ")
pdf.char_vpos = "NOM"
pdf.write(txt="5")
pdf.char_vpos = "LINE"
pdf.write(txt="/")
pdf.char_vpos = "DENOM"
pdf.write(txt="16")
pdf.char_vpos = "LINE"
pdf.write(txt=" + 987 = x")
```



4.4.5 .text_mode

The PDF spec defines several text modes:

TABLE 5.3 Text rendering modes

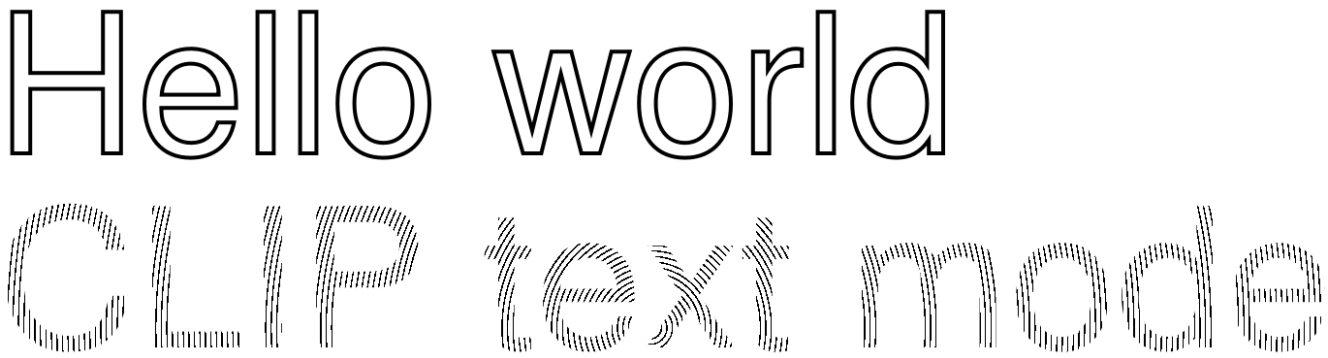
MODE	EXAMPLE	DESCRIPTION
0		Fill text.
1		Stroke text.
2		Fill, then stroke text.
3		Neither fill nor stroke text (invisible).
4		Fill text and add to path for clipping (see above).
5		Stroke text and add to path for clipping.
6		Fill, then stroke text and add to path for clipping.
7		Add text to path for clipping.

The text mode can be controlled with the `.text_mode` attribute. With `STROKE` modes, the line width is induced by `.line_width`, and its color can be configured with `set_draw_color()`. With `FILL` modes, the filling color can be controlled by `set_fill_color()` or `set_text_color()`.

With any of the 4 `CLIP` modes, the letters will be filled by vector drawings made afterwards, as can be seen in this example:

```
from fpdf import FPDF

pdf = FPDF(orientation="landscape")
pdf.add_page()
pdf.set_font("Helvetica", size=100)

with pdf.local_context(text_mode="STROKE", line_width=2):
    pdf.cell(txt="Hello world")
# Outside the local context, text_mode & line_width are reverted
```

```
# back to their original default values
pdf.ln()

with pdf.local_context(text_mode="CLIP"):
    pdf.cell(txt="CLIP text mode")
    for r in range(0, 250, 2):  # drawing concentric circles
        pdf.circle(x=130-r/2, y=70-r/2, r=r)

pdf.output("text-modes.pdf")
```



More examples from `test_text_mode.py`:

- text_modes.pdf
- clip_text_modes.pdf

4.4.6 markdown=True

An optional `markdown=True` parameter can be passed to the `cell()` & `multi_cell()` methods in order to enable basic Markdown-like styling: `**bold**, __italics__, --underlined--`

Bold & italics require using dedicated fonts for each style.

For the standard fonts (Courier, Helvetica & Times), those dedicated fonts are configured by default. Using other fonts means that their variants (bold, italics) must be registered using `add_font` (with `style="B"` and `style="I"`).

```
from fpdf import FPDF

pdf = fpdf.FPDF()
pdf.add_page()
pdf.set_font("Times", size=60)
pdf.cell(txt="**Lorem** __Ipsum__ --dolor--", markdown=True)
pdf.output("markdown-styled.pdf")
```

4.4.7 write_html

`write_html` allows to set emphasis on text through the `<b>`, `<i>` and `<u>` tags:

```
pdf.write_html("""<B>bold</B>
                  <I>italic</I>
                  <U>underlined</U>
                  <B><I><U>all at once!</U></I></B>"""
)
```

4.5 Unicode

- Unicode
- Right-to-Left & Arabic Script workaround
- Example
- Free Font Pack and Copyright Restrictions

The FPDF class was modified adding UTF-8 support. Moreover, it embeds only the necessary parts of the fonts that are used in the document, making the file size much smaller than if the whole fonts were embedded. These features were originally developed for the mPDF project, and ported from Ian Back's sFPDF LGPL PHP version.

Before you can use UTF-8, you have to install at least one Unicode font in the font directory (or system font folder). Some free font packages are available for download (extract them into the font folder):

- DejaVu family: Sans, Sans Condensed, Serif, Serif Condensed, Sans Mono (Supports more than 200 languages)
- GNU FreeFont family: FreeSans, FreeSerif, FreeMono
- Indic (ttf-indic-fonts Debian and Ubuntu package) for Bengali, Devanagari, Gujarati, Gurmukhi (including the variants for Punjabi), Kannada, Malayalam, Oriya, Tamil, Telugu, Tibetan
- AR PL New Sung (firefly): The Open Source Chinese Font (also supports other east Asian languages)
- Alee (ttf-alee Arch Linux package): General purpose Hangul Truetype fonts that contain Korean syllable and Latin9 (iso8859-15) characters.
- Fonts-TLWG (formerly ThaiFonts-Scalable)

These fonts are included with this library's installers; see Free Font Pack for FPDF below for more information.

Then, to use a Unicode font in your script, pass `True` as the fourth parameter of `add_font`.

Notes on non-latin languages

Some users may encounter a problem where some characters displayed incorrectly. For example, using Thai language in the picture below

The solution is to find and use a font that covers the characters of your language. From the error in the image above, Thai characters can be fixed using fonts from Fonts-TLWG which can be downloaded from this link. The example shown below.

fonts/Kinnari.ttf - ที่ นั้น นี่ ทั้ง มั้ง บุหรี่

fonts/Waree.ttf - ที่ นั้น นี่ ทั้ง มั้ง บุหรี่

fonts/Garuda.ttf - ที่ นั้น นี่ ทั้ง มั้ง บุหรี่

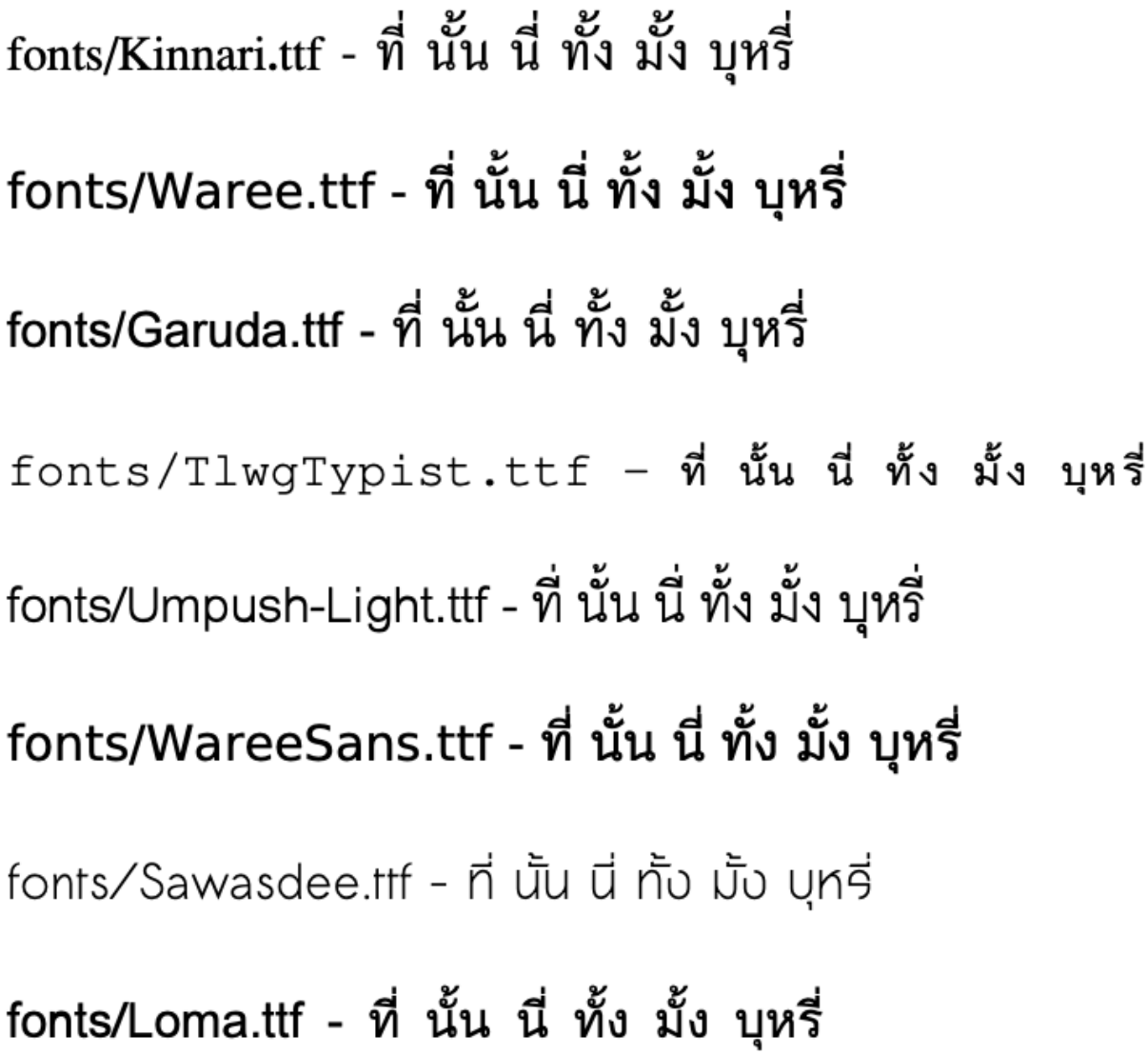
fonts/TlwgTypist.ttf - ที่ นั้น นี่ ทั้ง มั้ง บุหรี่

fonts/Umpush-Light.ttf - ที่ นั้น นี่ ทั้ง มั้ง บุหรี่

fonts/WareeSans.ttf - ที่ นั้น นี่ ทั้ง มั้ง บุหรี่

fonts/Sawasdee.ttf - ที่ นั้น นี่ ทั้ง มั้ง บุหรี่

fonts/Loma.ttf - ที่ นั้น นี่ ทั้ง มั้ง บุหรี่



Right-to-Left & Arabic Script workaround

For Arabic and RTL scripts there is a temporary solution (using two additional libraries `python-bidi` and `arabic-reshaper`) that works for most languages; only a few (rare) Arabic characters aren't supported. Using it on other scripts(eg. when the input is unknown or mixed scripts) does not affect them:

```
from arabic_reshaper import reshape
from bidi.algorithm import get_display

some_text = 'اَلْعَرَبِيَّةُ כַּף סוֹפִית'
fixed_text = get_display(reshape(some_text))
```

4.5.1 Example

This example uses several free fonts to display some Unicode strings. Be sure to install the fonts in the `font` directory first.

```
#!/usr/bin/env python
# -*- coding: utf8 -*-

from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
```

```
# Add a DejaVu Unicode font (uses UTF-8)
# Supports more than 200 languages. For a coverage status see:
# http://dejavu.svn.sourceforge.net/viewvc/dejavu/trunk/dejavu-fonts/langcover.txt
pdf.add_font(fname='DejaVuSansCondensed.ttf')
pdf.set_font('DejaVuSansCondensed', size=14)

text = u"""
English: Hello World
Greek: Γειά σου Κόσμος
Polish: Witaj świecie
Portuguese: Olá mundo
Russian: Здравствуй, Мир
Vietnamese: Xin chào thế giới
Arabic: مرحبا العالم
Hebrew: שלום עולם
"""

for txt in text.split('\n'):
    pdf.write(8, txt)
    pdf.ln(8)

# Add a Indic Unicode font (uses UTF-8)
# Supports: Bengali, Devanagari, Gujarati,
#           Gurmukhi (including the variants for Punjabi)
#           Kannada, Malayalam, Oriya, Tamil, Telugu, Tibetan
pdf.add_font(fname='gargi.ttf')
pdf.set_font('gargi', size=14)
pdf.write(8, u'Hindi:              ')
pdf.ln(20)

# Add a AR PL New Sung Unicode font (uses UTF-8)
# The Open Source Chinese Font (also supports other east Asian languages)
pdf.add_font(fname='fireflysung.ttf')
pdf.set_font('fireflysung', size=14)
pdf.write(8, u'Chinese:     \n')
pdf.write(8, u'Japanese:        \n')
pdf.ln(10)

# Add a Alee Unicode font (uses UTF-8)
# General purpose Hangul truetype fonts that contain Korean syllable
# and Latin9 (iso8859-15) characters.
pdf.add_font(fname='Eunjin.ttf')
pdf.set_font('Eunjin', size=14)
pdf.write(8, u'Korean:      ')
pdf.ln(20)

# Add a Fonts-TLWG (formerly ThaiFonts-Scalable) (uses UTF-8)
pdf.add_font(fname='Waree.ttf')
pdf.set_font('Waree', size=14)
pdf.write(8, u'Thai:             ')
pdf.ln(20)

# Select a standard font (uses windows-1252)
pdf.set_font('helvetica', size=14)
pdf.ln(10)
pdf.write(5, 'This is standard built-in font')

pdf.output("unicode.pdf")
```

View the result here: unicode.pdf

4.5.2 Free Font Pack and Copyright Restrictions

For your convenience, this library collected 96 TTF files in an optional "Free Unicode TrueType Font Pack for FPDF", with useful fonts commonly distributed with GNU/Linux operating systems (see above for a complete description). This pack is included in the Windows installers, or can be downloaded separately (for any operating system).

You could use any TTF font file as long embedding usage is allowed in the licence. If not, a runtime exception will be raised saying: "ERROR - Font file filename.ttf cannot be embedded due to copyright restrictions."

4.6 Emojis, Symbols & Dingbats

- Emojis, Symbols & Dingbats
- Emojis
- Symbols
- Dingbats

4.6.1 Emojis

Displaying emojis requires the use of a Unicode font file. Here is an example using the DejaVu font:

```
import fpdf

pdf = fpdf.FPDF()
pdf.add_font(fname="DejaVuSans.ttf")
pdf.set_font("DejaVuSans", size=64)
pdf.add_page()
pdf.multi_cell(0, txt="".join([chr(0x1F600 + x) for x in range(68)]))
pdf.set_font_size(32)
pdf.text(10, 270, "".join([chr(0x1F0A0 + x) for x in range(15)]))
pdf.output("fonts_emoji_glyph.pdf")
```

This code produces this PDF file: fonts_emoji_glyph.pdf

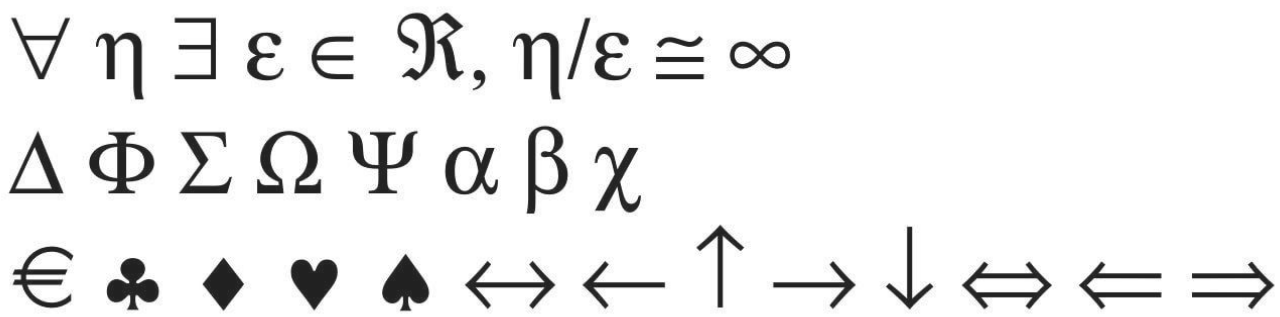
Another font supporting emojis is: twemoji

4.6.2 Symbols

The **Symbol** font is one of the built-in fonts in the PDF format. Hence you can include its symbols very easily:

```
import fpdf

pdf = fpdf.FPDF()
pdf.add_page()
pdf.set_font("symbol", size=36)
pdf.cell(h=16, txt="\u0022 \u0068 \u0024 \u0065 \u00ce \u00c2, \u0068/\u0065 \u0040 \u00a5",
        new_x="LMARGIN", new_y="NEXT")
pdf.cell(h=16, txt="\u0044 \u0046 \u0053 \u0057 \u0059 \u0061 \u0062 \u0063",
        new_x="LMARGIN", new_y="NEXT")
pdf.cell(h=16, txt="\u00a0 \u00a7 \u00a8 \u00a9 \u00aa \u00ab \u00ac \u00ad \u00ae \u00af \u00db \u00dc \u00de",
        new_x="LMARGIN", new_y="NEXT")
pdf.output("symbol.pdf")
```

This results in:



The following table will help you find which characters map to which symbol: symbol.pdf. For reference, it was built using this script: symbol.py.

4.6.3 Dingbats

The **ZapfDingbats** font is one of the built-in fonts in the PDF format. Hence you can include its dingbats very easily:

```
import fpdf

pdf = fpdf.FPDF()
pdf.add_page()
pdf.set_font("zapfdingbats", size=36)
pdf.cell(txt="+ 3 8 A r \u00a6 } \u00a8 \u00a9 \u00aa \u00ab ~")
pdf.output("zapfdingbat.pdf")
```

This results in:

The following table will help you find which characters map to which dingbats: zapfdingbats.pdf. For reference, it was built using this script: zapfdingbats.py.

4.7 HTML

`fpdf2` supports basic rendering from HTML.

This is implemented by using `html.parser.HTMLParser` from the Python standard library. The whole HTML 5 specification is **not** supported, and neither is CSS, but bug reports & contributions are very welcome to improve this. *cf.* Supported HTML features below for details on its current limitations.

For a more robust & feature-full HTML-to-PDF converter in Python, you may want to check Reportlab (or xhtml2pdf based on it), WeasyPrint or borb.

4.7.1 write_html usage example

HTML rendering require the use of `write_html` method:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.write_html("""
  <dl>
      <dt>Description title</dt>
      <dd>Description Detail</dd>
  </dl>
  <h1>Big title</h1>
  <section>
    <h2>Section title</h2>
    <p><b>Hello</b> world. <u>I am</u> <i>tired</i>.</p>
    <p><a href="https://github.com/PyFPDF/fpdf2">PyFPDF/fpdf2 GitHub repo</a></p>
    <p align="right">right aligned text</p>
    <p>i am a paragraph <br />in two parts.</p>
    <font color="#00ff00"><p>hello in green</p></font>
    <font size="7"><p>hello small</p></font>
    <font face="helvetica"><p>hello helvetica</p></font>
    <font face="times"><p>hello times</p></font>
  </section>
  <section>
    <h2>Other section title</h2>
    <ul><li>unordered</li><li>list</li><li>items</li></ul>
    <ol><li>ordered</li><li>list</li><li>items</li></ol>
    <br>
    <br>
    <pre>i am preformatted text.</pre>
    <br>
    <blockquote>hello blockquote</blockquote>
    <table width="50%">
      <thead>
        <tr>
          <th width="30%">ID</th>
          <th width="70%">Name</th>
        </tr>
      </thead>
      <tbody>
        <tr>
          <td>1</td>
          <td>Alice</td>
        </tr>
        <tr>
          <td>2</td>
          <td>Bob</td>
        </tr>
      </tbody>
    </table>
  </section>
""")
pdf.output("html.pdf")
```

4.7.2 Supported HTML features

- `<h1>` to `<h8>`: headings (and `align` attribute)
- `<p>`: paragraphs (and `align`, `line-height` attributes)
- `<b>`, `<i>`, `<u>`: bold, italic, underline
- `<font>`: (and `face`, `size`, `color` attributes)
- `<center>` for aligning

- `<a>`: links (and `href` attribute)
- `<pre>` & `<code>` tags
- `<img>`: images (and `src`, `width`, `height` attributes)
- `<ol>`, `<ul>`, `<li>`: ordered, unordered and list items (can be nested)
- `<dl>`, `<dt>`, `<dd>`: description list, title, details (can be nested)
- `<sup>`, `<sub>`: superscript and subscript text
- `<table>`: (and `border`, `width` attributes)
- `<thead>`: header (opens each page)
- `<tfoot>`: footer (closes each page)
- `<tbody>`: actual rows
- `<tr>`: rows (with `bgcolor` attribute)
- `<th>`: heading cells (with `align`, `bgcolor`, `width` attributes)
- `<td>`: cells (with `align`, `bgcolor`, `width` attributes)

Notes:

- tables should have at least a first `<th>` row with a `width` attribute.
- currently **table cells can only contain a single line**, *cf.* issue 91. Contributions are welcome to add support for multi-line text in them! 😊

5. Graphics Content

5.1 Images

When rendering an image, its size on the page can be specified in several ways:

- explicit width and height (expressed in user units)
- one explicit dimension, the other being calculated automatically in order to keep the original proportions
- no explicit dimension, in which case the image is put at 72 dpi

Note that if an image is displayed several times, only one copy is embedded in the file.

5.1.1 Simple example

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.image("docs/fpdf2-logo.png", x=20, y=60)
pdf.output("pdf-with-image.pdf")
```

By default an image is rendered with a resolution of 72 dpi, but you can control its dimension on the page using the `w=` & `h=` parameters of the `image()` method.

5.1.2 Alpha / transparency

`fpdf2` allows to embed images with alpha pixels.

Technically, it is implemented by extracting an `/SMask` from images with transparency, and inserting it along with the image data in the PDF document. Related code is in the image_parsing module.

5.1.3 Assembling images

The following code snippets provide examples of some basic layouts for assembling images into PDF files.

Side by side images, full height, landscape page

```
from fpdf import FPDF

pdf = FPDF(orientation="landscape")
pdf.set_margin(0)
pdf.add_page()
pdf.image("imgA.png", h=pdf.eph, w=pdf.epw/2)               # full page height, half page width
pdf.set_y(0)
pdf.image("imgB.jpg", h=pdf.eph, w=pdf.epw/2, x=pdf.epw/2)  # full page height, half page width, right half of the page
pdf.output("side-by-side.pdf")
```

Blending images

You can control the color blending mode of overlapping images. Valid values for `blend_mode` are `Normal`, `Multiply`, `Screen`, `Overlay`, `Darken`, `Lighten`, `ColorDodge`, `ColorBurn`, `HardLight`, `SoftLight`, `Difference`, `Exclusion`, `Hue`, `Saturation`, `Color` and `Luminosity`.

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.image("imgA.png", ...)
with pdf.local_context(blend_mode="ColorBurn"):
    pdf.image("imgB.jpg", ...)
pdf.output("blended-images.pdf")
```

Demo of all color blend modes: blending_images.pdf

5.1.4 Image clipping

You can select only a portion of the image to render using clipping methods:

- `rect_clip()`:
- example code
- resulting PDF
- `round_clip()`:
- example code
- resulting PDF
- `elliptic_clip()`:
- example code
- resulting PDF

5.1.5 Alternative description

A textual description of the image can be provided, for accessibility purposes:

```
pdf.image("docs/fpdf2-logo.png", x=20, y=60, alt_text="Snake logo of the fpdf2 library")
```

5.1.6 Usage with Pillow

You can perform image manipulations using the Pillow library, and easily embed the result:

```
from fpdf import FPDF
from PIL import Image

pdf = FPDF()
pdf.add_page()
img = Image.open("docs/fpdf2-logo.png")
img = img.crop((10, 10, 490, 490)).resize((96, 96), resample=Image.NEAREST)
pdf.image(img, x=80, y=100)
pdf.output("pdf-with-image.pdf")
```

5.1.7 SVG images

SVG images passed to the `image()` method will be embedded as PDF paths:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
```

```
pdf.image("SVG_logo.svg", w=100)
pdf.output("pdf-with-vector-image.pdf")
```

5.1.8 Retrieve images from URLs

URLs to images can be directly passed to the `image()` method:

```
pdf.image("https://upload.wikimedia.org/wikipedia/commons/7/70/Example.png")
```

5.1.9 Image compression

By default, `fpdf2` will avoid altering your images : no image conversion from / to PNG / JPEG is performed.

However, you can easily tell `fpdf2` to embed all images as JPEGs in order to reduce your PDF size, using `set_image_filter()` :

```
from fpdf import FPDF

pdf = FPDF()
pdf.set_image_filter("DCTDecode")
pdf.add_page()
pdf.image("docs/fpdf2-logo.png", x=20, y=60)
pdf.output("pdf-with-image.pdf")
```

Beware that "flattening" images into JPEGs this way will fill transparent areas of your images with color (usually black).

The allowed `image_filter` values are listed in the image_parsing module and are currently: `FlateDecode` (lossless zlib/deflate compression), `DCTDecode` (lossy compression with JPEG) and `JPXDecode` (lossy compression with JPEG2000).

5.1.10 Oversized images detection & downscaling

If the resulting PDF size is a concern, you may want to check if some inserted images are *oversized*, meaning their resolution is unnecessarily high given the size they are displayed.

There is how to enable this detection mechanism with `fpdf2` :

```
pdf.oversized_images = "WARN"
```

After setting this property, a `WARNING` log will be displayed whenever an oversized image is inserted.

`fpdf2` is also able to automatically downscale such oversized images:

```
pdf.oversized_images = "DOWNSCALE"
```

After this, oversized images will be automatically resized, generating `DEBUG` logs like this:

```
OVERSIZED: Generated new low-res image with name=lowres-test.png dims=(319, 451) id=2
```

For finer control, you can set `pdf.oversized_images_ratio` to set the threshold determining if an image is oversized.

If the concepts of "image compression" or "image resolution" are a bit obscure for you, this article is a recommended reading: The 5 minute guide to image quality

5.1.11 Disabling transparency

By default images transparency is preserved: alpha channels are extracted and converted to an embedded `SMask` . This can be disabled by setting `.allow_images_transparency` , *e.g.* to allow compliance with PDF/A-1:

```
from fpdf import FPDF

pdf = FPDF()
pdf.allow_images_transparency = False
pdf.set_font("Helvetica", size=15)
pdf.cell(w=pdf.epw, h=30, txt="Text behind. " * 6)
pdf.image("docs/fpdf2-logo.png", x=0)
pdf.output("pdf-including-image-without-transparency.pdf")
```

This will fill transparent areas of your images with color (usually black).

cf. also documentation on controlling transparency.

5.1.12 Page background

cf. Per-page format, orientation and background

5.1.13 Sharing the image cache among FPDF instances

Image parsing is often the most CPU & memory intensive step when inserting pictures in a PDF.

If you create several PDF files that use the same illustrations, you can share the images cache among FPDF instances:

```
images_cache = {}

for ... # loop
    pdf = FPDF()
    pdf.images = images_cache
    ... # build the PDF
    pdf.output(...)
    # Reset the "usages" count, to avoid ALL images to be inserted in subsequent PDFs:
    for img in images_cache.values():
        img["usages"] = 0
```

This recipe is valid for `fpdf2` v2.5.7+. For previous versions of `fpdf2`, a *deepcopy* of `.images` must be made, (*cf.* issue #501).

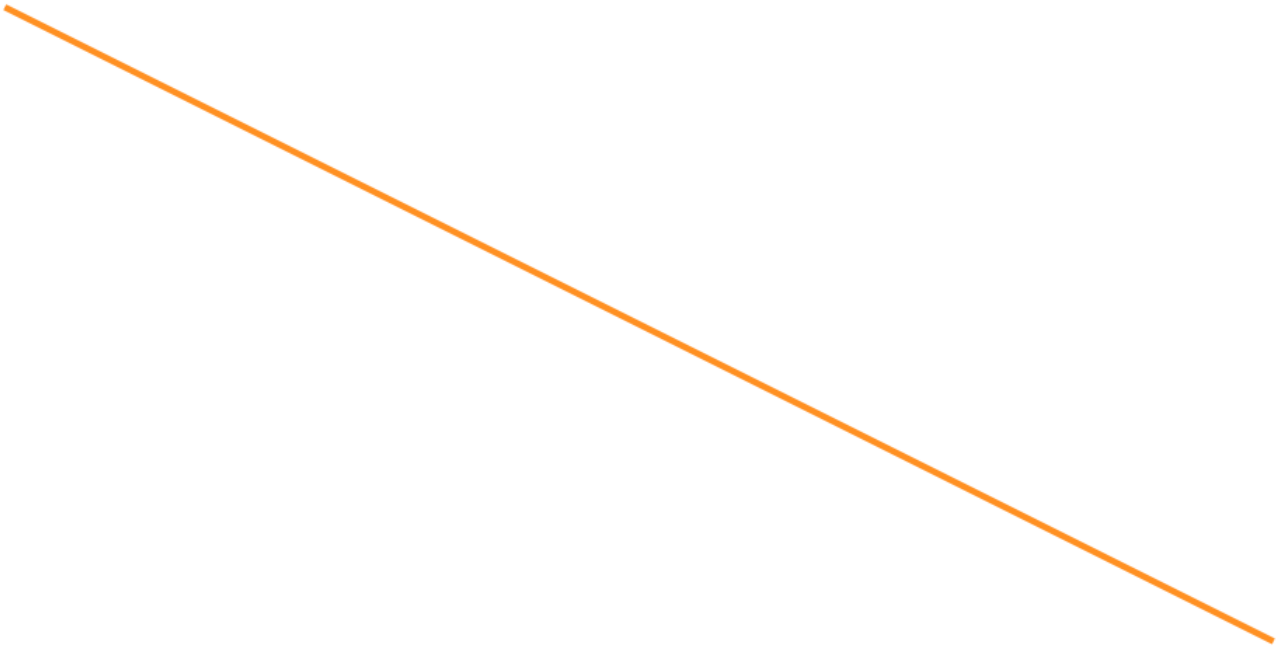
5.2 Shapes

The following code snippets show examples of rendering various shapes.

5.2.1 Lines

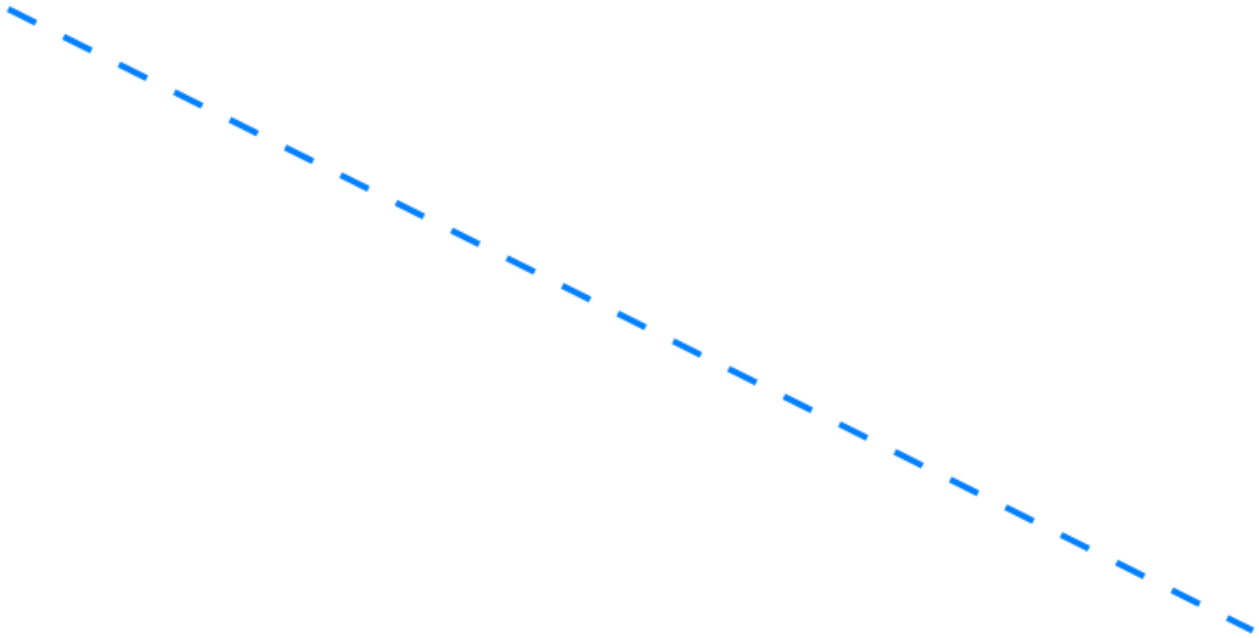
Using `line()` to draw a thin plain orange line:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_line_width(0.5)
pdf.set_draw_color(r=255, g=128, b=0)
pdf.line(x1=50, y1=50, x2=150, y2=100)
pdf.output("orange_plain_line.pdf")
```



Drawing a dashed light blue line:

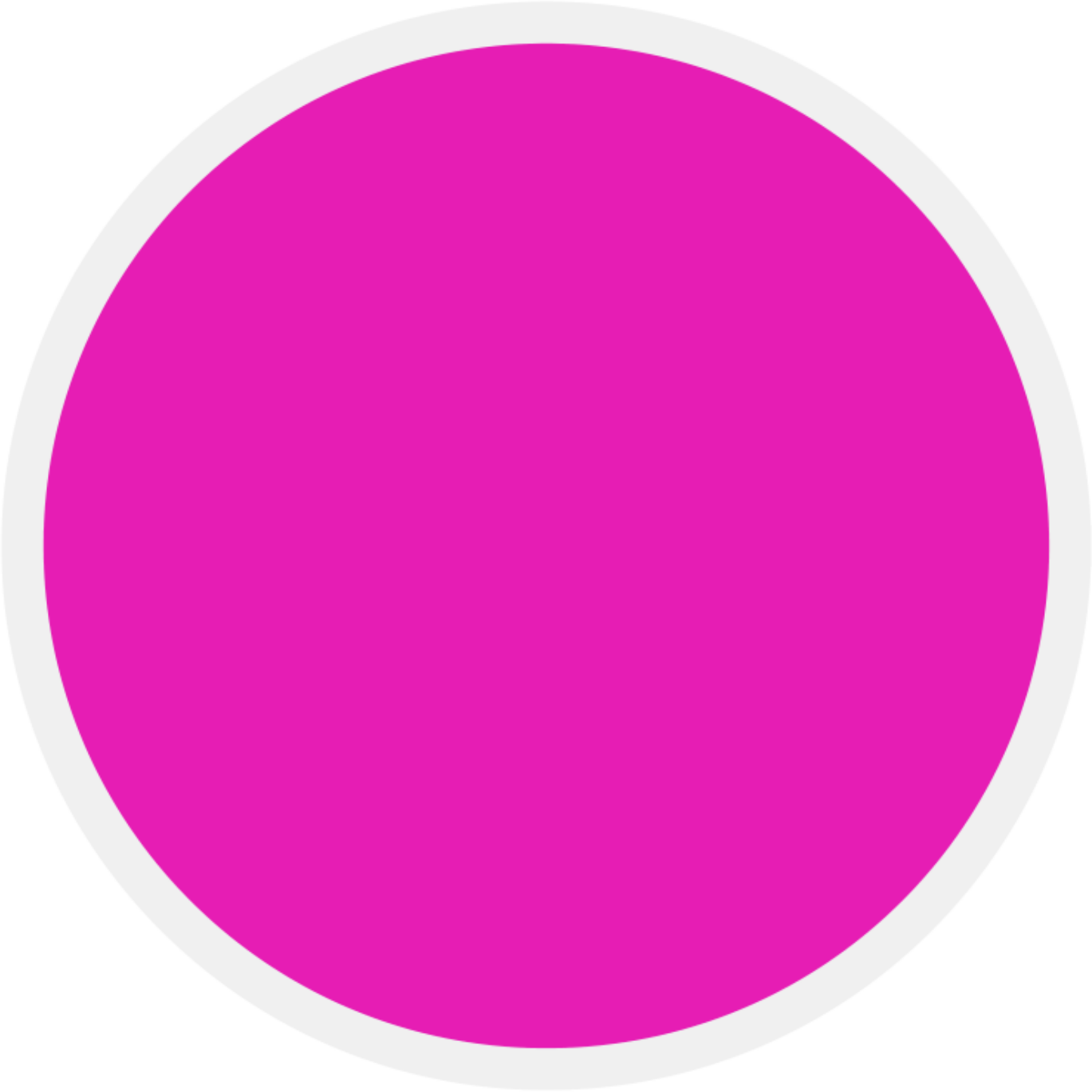
```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_line_width(0.5)
pdf.set_draw_color(r=0, g=128, b=255)
pdf.set_dash_pattern(dash=2, gap=3)
pdf.line(x1=50, y1=50, x2=150, y2=100)
pdf.output("blue_dashed_line.pdf")
```



5.2.2 Circle

Using `circle()` to draw a disc filled in pink with a grey outline:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_line_width(2)
pdf.set_draw_color(240)
pdf.set_fill_color(r=230, g=30, b=180)
pdf.circle(x=50, y=50, r=50, style="FD")
pdf.output("circle.pdf")
```



5.2.3 Ellipse

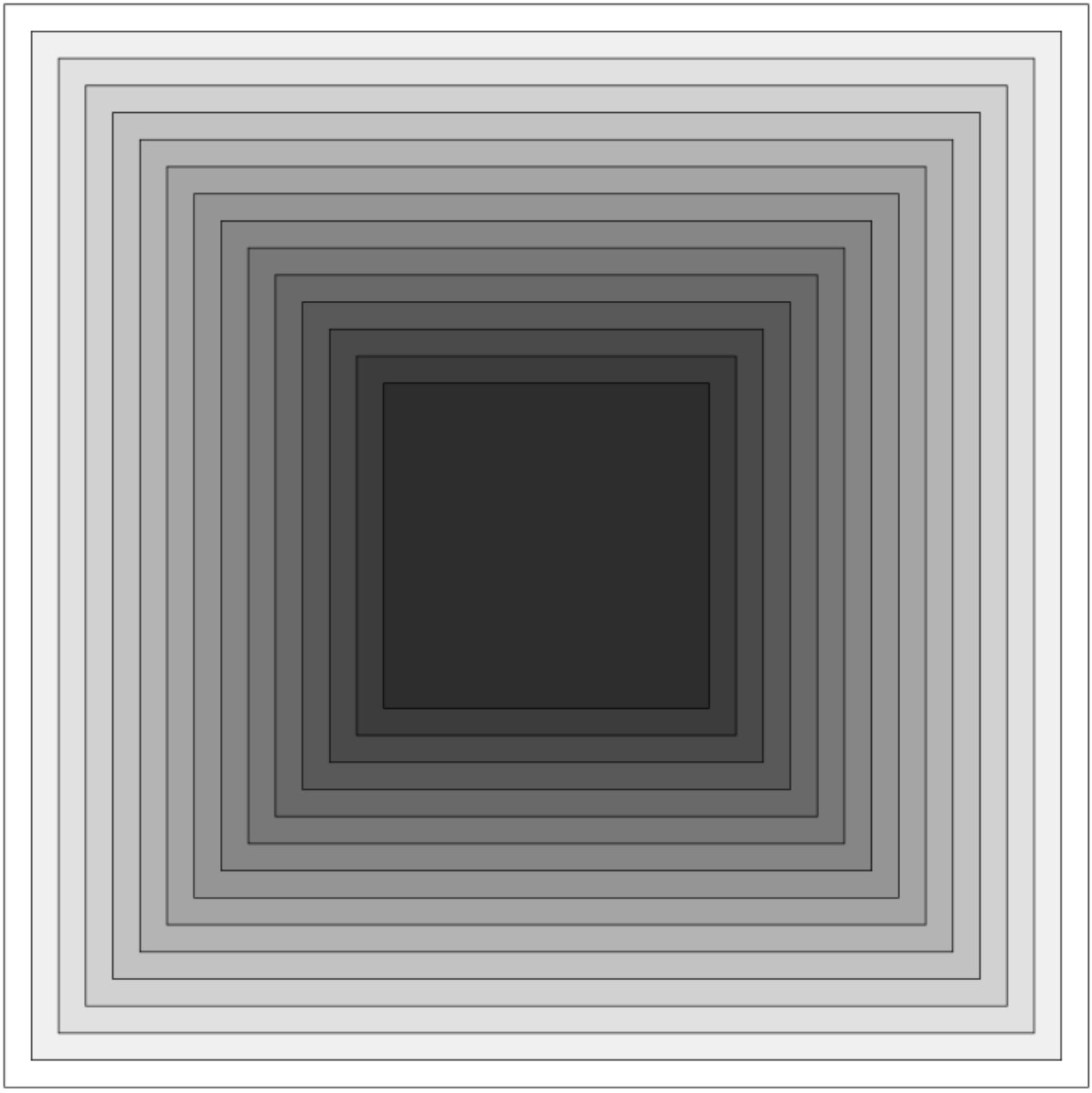
Using `ellipse()`, filled in grey with a pink outline:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_line_width(2)
pdf.set_draw_color(r=230, g=30, b=180)
pdf.set_fill_color(240)
pdf.ellipse(x=50, y=50, w=100, h=50, style="FD")
pdf.output("ellipse.pdf")
```

5.2.4 Rectangle

Using `rect()` to draw nested squares:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
for i in range(15):
    pdf.set_fill_color(255 - 15*i)
    pdf.rect(x=5+5*i, y=5+5*i, w=200-10*i, h=200-10*i, style="FD")
pdf.output("squares.pdf")
```



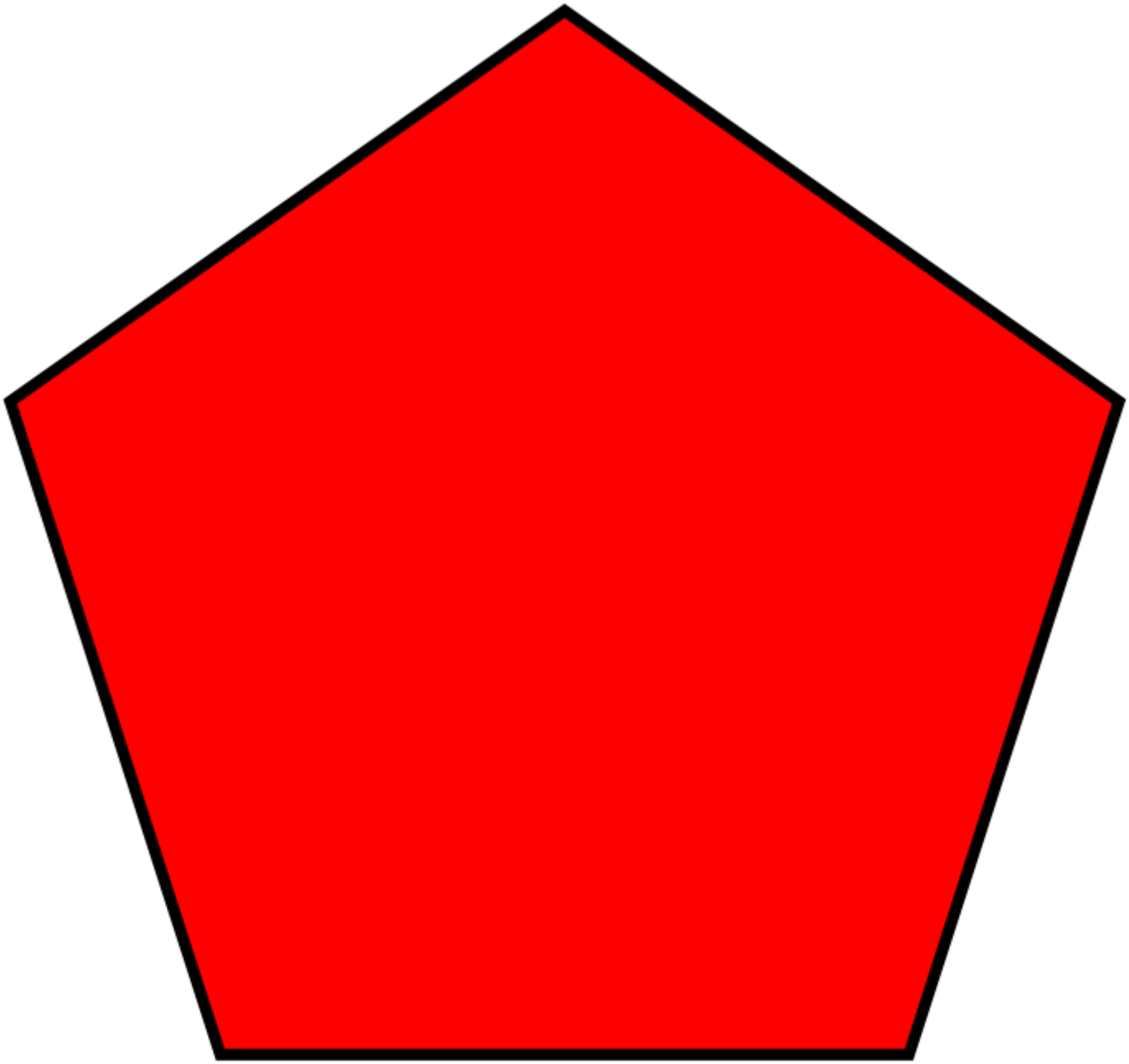
Using `rect()` to draw rectangles with round corners:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_draw_color(200)
y = 10
pdf.rect(60, y, 33, 28, round_corners=True, style="D")

pdf.set_fill_color(0, 255, 0)
pdf.rect(100, y, 50, 10, round_corners=("BOTTOM_RIGHT"), style="DF")

pdf.set_fill_color(255, 255, 0)
pdf.rect(160, y, 10, 10, round_corners=("TOP_LEFT", "BOTTOM_LEFT"), style="F")
pdf.output("round_corners_rectangles.pdf")
```

5.2.5 Polygon

Using `polygon()`:

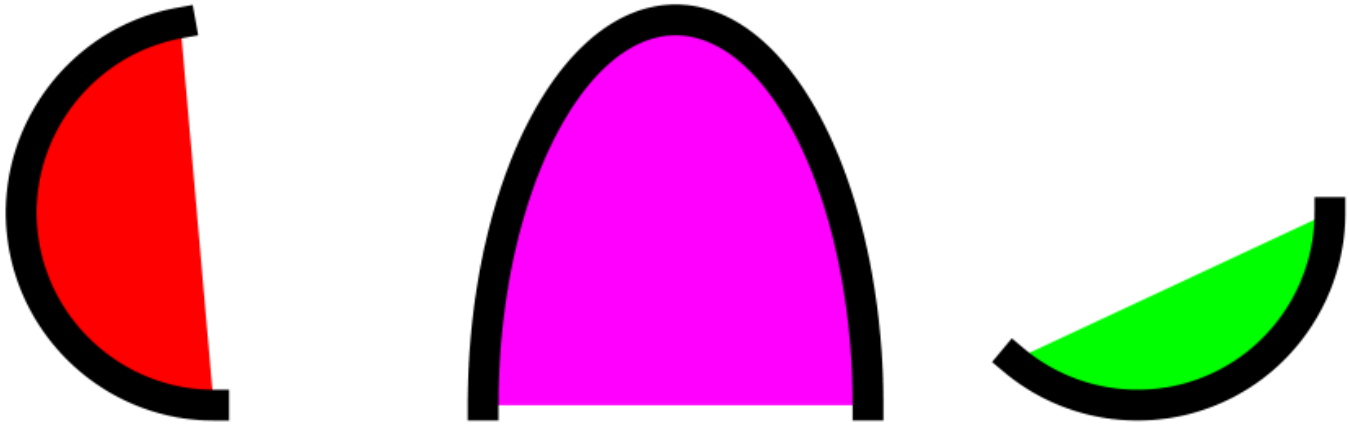
```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_line_width(2)
pdf.set_fill_color(r=255, g=0, b=0)
coords = ((100, 0), (5, 69), (41, 181), (159, 181), (195, 69))
pdf.polygon(coords, style="DF")
pdf.output("polygon.pdf")
```



5.2.6 Arc

Using `arc()`:

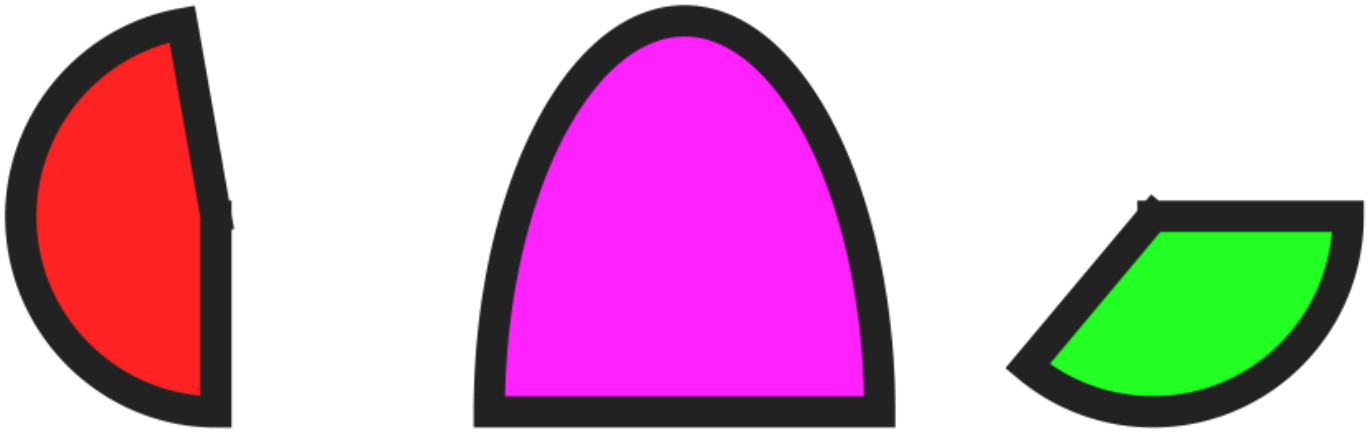
```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_line_width(2)
pdf.set_fill_color(r=255, g=0, b=0)
pdf.arc(x=75, y=75, a=25, b=25, start_angle=90, end_angle=260, style="FD")

pdf.set_fill_color(r=255, g=0, b=255)
pdf.arc(x=105, y=75, a=25, b=50, start_angle=180, end_angle=360, style="FD")

pdf.set_fill_color(r=0, g=255, b=0)
pdf.arc(x=135, y=75, a=25, b=25, start_angle=0, end_angle=130, style="FD")

pdf.output("arc.pdf")
```



5.2.7 Solid arc

Using `solid_arc()`:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_line_width(2)
pdf.set_fill_color(r=255, g=0, b=0)
pdf.solid_arc(x=75, y=75, a=25, b=25, start_angle=90, end_angle=260, style="FD")

pdf.set_fill_color(r=255, g=0, b=255)
pdf.solid_arc(x=105, y=75, a=25, b=50, start_angle=180, end_angle=360, style="FD")

pdf.set_fill_color(r=0, g=255, b=0)
pdf.solid_arc(x=135, y=75, a=25, b=25, start_angle=0, end_angle=130, style="FD")

pdf.output("solid_arc.pdf")
```

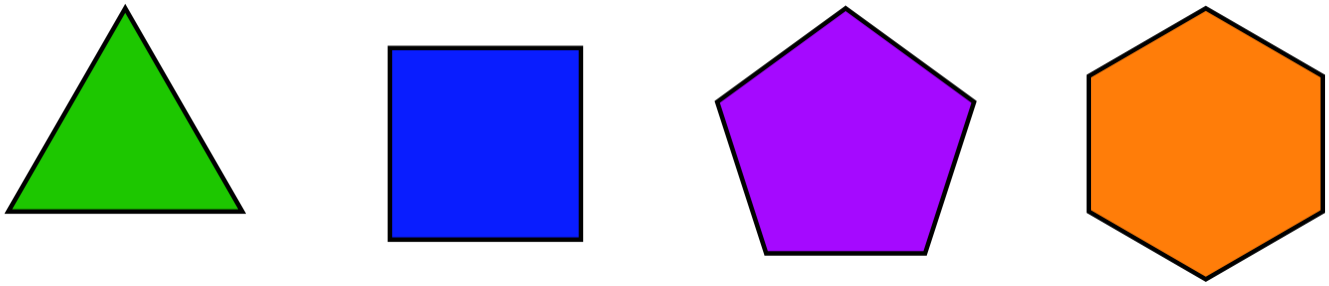


5.2.8 Regular Polygon

Using `regular_polygon()`:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_line_width(0.5)

pdf.set_fill_color(r=30, g=200, b=0)
pdf.regular_polygon(x=40, y=80, polyWidth=30, rotateDegrees=270, numSides=3, style="FD")

pdf.set_fill_color(r=10, g=30, b=255)
pdf.regular_polygon(x=80, y=80, polyWidth=30, rotateDegrees=135, numSides=4, style="FD")

pdf.set_fill_color(r=165, g=10, b=255)
pdf.regular_polygon(x=120, y=80, polyWidth=30, rotateDegrees=198, numSides=5, style="FD")
```

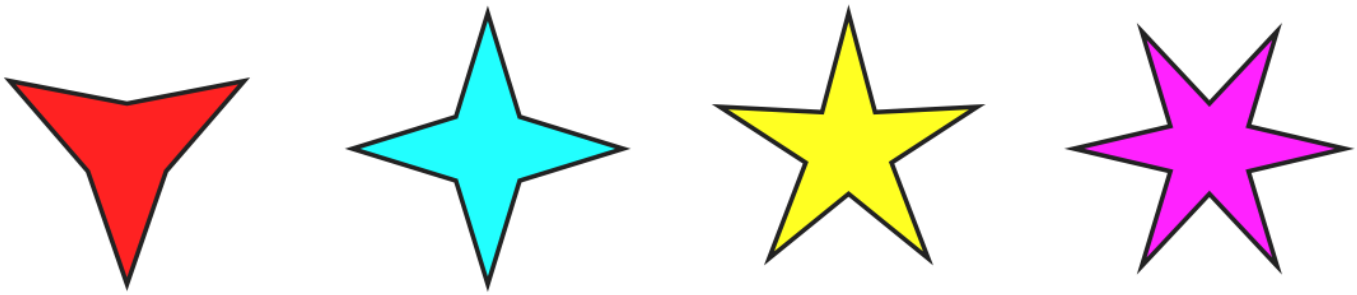
```
pdf.set_fill_color(r=255, g=125, b=10)
pdf.regular_polygon(x=160, y=80, polyWidth=30, rotateDegrees=270, numSides=6, style="FD")
pdf.output("regular_polygon.pdf")
```



5.2.9 Regular Star

Using `star()`:

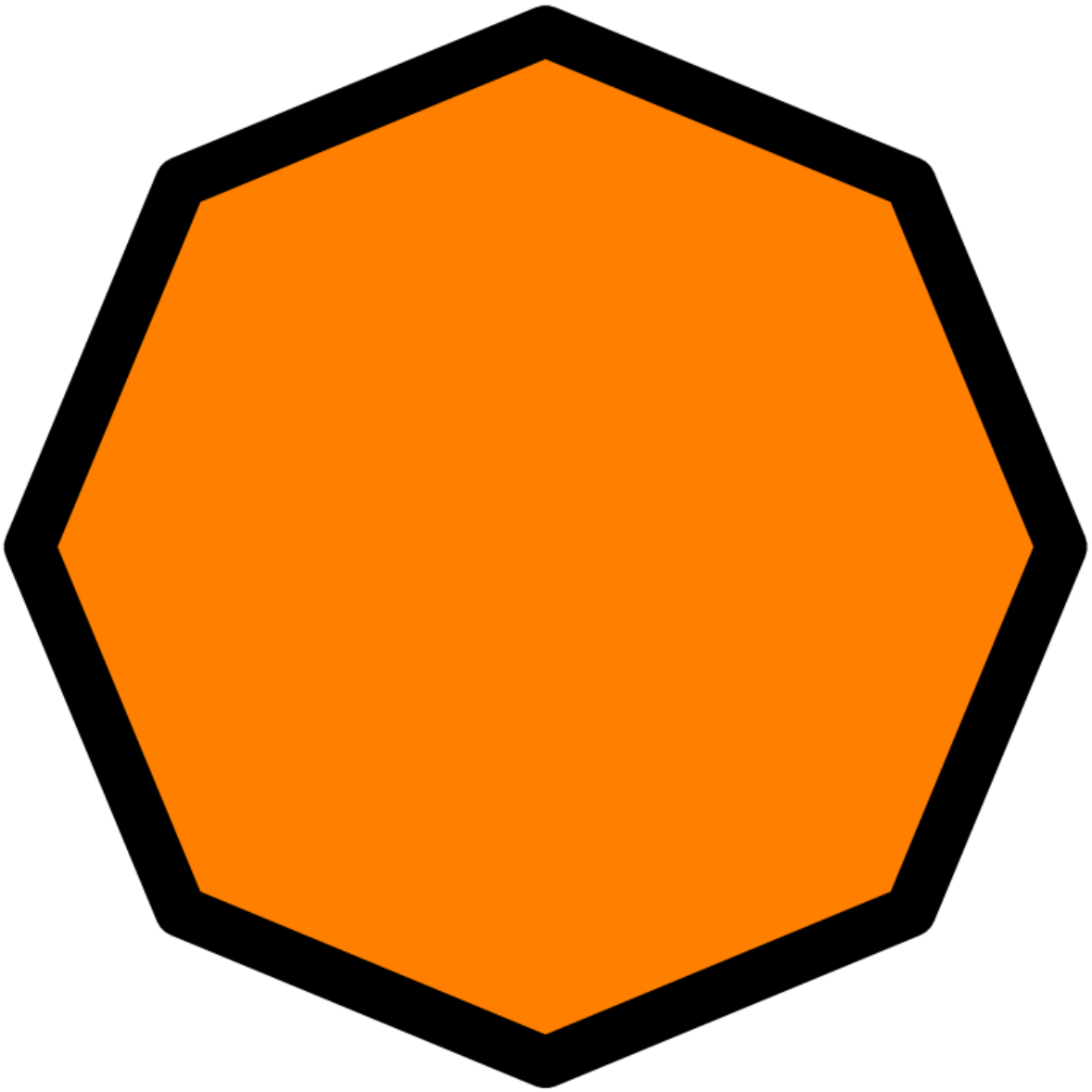
```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_line_width(0.5)

pdf.set_fill_color(r=255, g=0, b=0)
pdf.star(x=40, y=80, r_in=5, r_out=15, rotate_degrees=0, corners=3, style="FD")

pdf.set_fill_color(r=0, g=255, b=255)
pdf.star(x=80, y=80, r_in=5, r_out=15, rotate_degrees=90, corners=4, style="FD")

pdf.set_fill_color(r=255, g=255, b=0)
pdf.star(x=120, y=80, r_in=5, r_out=15, rotate_degrees=180, corners=5, style="FD")

pdf.set_fill_color(r=255, g=0, b=255)
pdf.star(x=160, y=80, r_in=5, r_out=15, rotate_degrees=270, corners=6, style="FD")
pdf.output("star.pdf")
```



5.2.10 Path styling

- `line_width` specifies the thickness of the line used to stroke a path
- `stroke_join_style` defines how the corner joining two path components should be rendered:

```
from fpdf import FPDF
from fpdf.enums import StrokeJoinStyle

pdf = FPDF()
pdf.add_page()
pdf.set_line_width(5)
pdf.set_fill_color(r=255, g=128, b=0)
with pdf.local_context(stroke_join_style=StrokeJoinStyle.ROUND):
    pdf.regular_polygon(x=50, y=120, polyWidth=100, numSides=8, style="FD")
pdf.output("regular_polygon_rounded.pdf")
```



- `stroke_cap_style` defines how the end of a stroke should be rendered. This affects the ends of the segments of dashed strokes, as well.

```
from fpdf import FPDF
from fpdf.enums import StrokeCapStyle

pdf = FPDF()
pdf.add_page()
pdf.set_line_width(5)
pdf.set_fill_color(r=255, g=128, b=0)
with pdf.local_context(stroke_cap_style=StrokeCapStyle.ROUND):
    pdf.line(x1=50, y1=50, x2=150, y2=100)
pdf.output("line_with_round_ends.pdf")
```

There are even more specific path styling settings supported: `dash_pattern`, `stroke_opacity`, `stroke_miter_limit`...

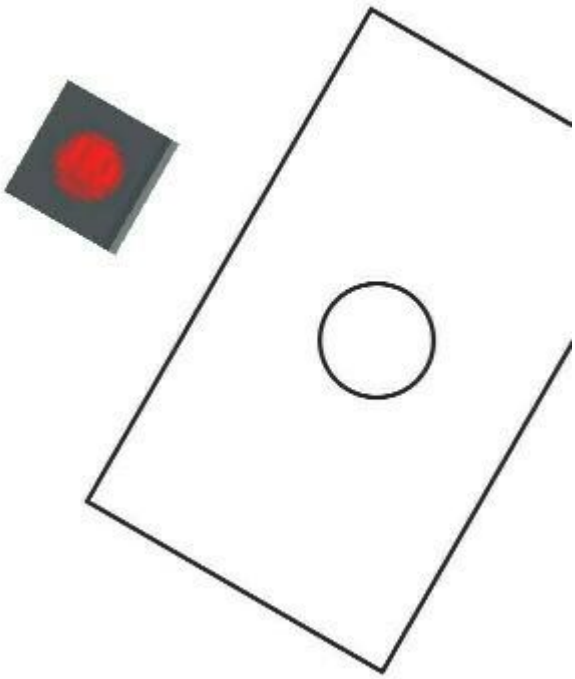
All of those settings can be set in a `local_context()`.

5.3 Transformations

5.3.1 Rotation

The `rotation()` context-manager will apply a rotation to all objects inserted in its indented block:

```
from fpdf import FPDF

pdf = FPDF(format=(40, 40))
pdf.add_page()
x, y = 15, 15
with pdf.rotation(60, x=x, y=y):
    pdf.circle(x=x, y=y+15, r=5)
    # Inserting a small base64-encoded image:
    pdf.image("
x=x, y=y)
    pdf.rect(x=x-10, y=y+10, w=25, h=15)
pdf.output("rotations.pdf")
```



5.3.2 Skew

`skew` creates a skewing transformation of magnitude `ax` in the horizontal axis and `ay` in the vertical axis. The transformation originates from `x`, `y` and will use a default origin unless specified otherwise:

```
with pdf.skew(ax=0, ay=10):
    pdf.cell(txt="text skewed on the y-axis")
```

text skewed on the y-axis

```
with pdf.skew(ax=10, ay=0):
    pdf.cell(txt="text skewed on the x-axis")
```

text skewed on the x-axis

```
pdf.set_line_width(2)
pdf.set_draw_color(240)
pdf.set_fill_color(r=230, g=30, b=180)
with pdf.skew(ax=-45, ay=0, x=100, y=170):
    pdf.circle(x=100, y=170, r=10, style="FD")
```

5.4 Transparency

The alpha opacity of text, shapes and even images can be controlled through `stroke_opacity` (for lines) & `fill_opacity` (for all other content types):

```
pdf = FPDF()
pdf.set_font("Helvetica", "B", 24)
pdf.set_line_width(1.5)
pdf.add_page()

# Draw an opaque red square:
pdf.set_fill_color(255, 0, 0)
pdf.rect(10, 10, 40, 40, "DF")

# Set alpha to semi-transparency for shape lines & filled areas:
with pdf.local_context(fill_opacity=0.5, stroke_opacity=0.5):
    # Draw a green square:
    pdf.set_fill_color(0, 255, 0)
    pdf.rect(20, 20, 40, 40, "DF")

# Set transparency for images & text:
with pdf.local_context(fill_opacity=0.25):
    # Insert an image:
    pdf.image(HERE / "../docs/fpdf2-logo.png", 30, 30, 40)
    # Print some text:
    pdf.text(22, 29, "You are...")

# Print some text with full opacity:
pdf.text(30, 45, "Over the top")

# Produce the resulting PDF:
pdf.output("transparency.pdf")
```

Results in:

You are...
fpdf2
Over the top

5.5 Barcodes

5.5.1 Code 39

Here is an example on how to generate a Code 39 barcode:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.code39("*fpdf2*", x=30, y=50, w=4, h=20)
pdf.output("code39.pdf")
```

Output preview:

5.5.2 Interleaved 2 of 5

Here is an example on how to generate an Interleaved 2 of 5 barcode:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.interleaved2of5("1337", x=50, y=50, w=4, h=20)
pdf.output("interleaved2of5.pdf")
```

Output preview:

5.5.3 PDF-417

Here is an example on how to generate a PDF-417 barcode using the `pdf417` lib:

```
from fpdf import FPDF
from pdf417 import encode, render_image

pdf = FPDF()
```

```
pdf.add_page()
img = render_image(encode("Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed non risus. Suspendisse lectus tortor, dignissim sit amet, adipiscing
nec, ultricies sed, dolor. Cras elementum ultrices diam."))
pdf.image(img, x=10, y=50)
pdf.output("pdf417.pdf")
```

Output preview:

5.5.4 QRCode

Here is an example on how to generate a QR Code using the `python-qrcode` lib:

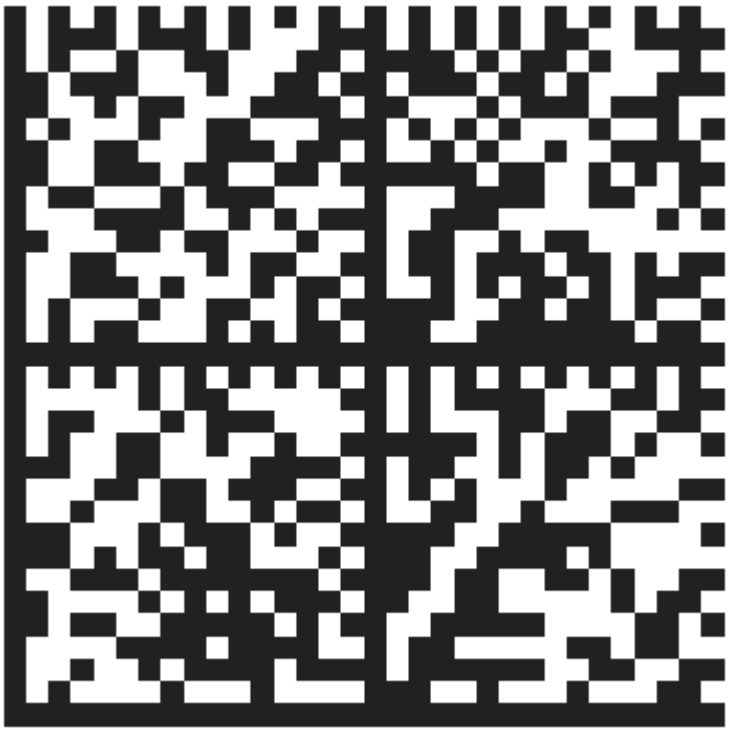
```
from fpdf import FPDF
import qrcode

pdf = FPDF()
pdf.add_page()
img = qrcode.make("fpdf2")
pdf.image(img.get_image(), x=50, y=50)
pdf.output("qrcode.pdf")
```

Output preview:

5.5.5 DataMatrix

`fpdf2` can be combined with the `pystrich` library to generate DataMatrix barcodes: `pystrich` generates pilimages, which can then be inserted into the PDF file via the `FPDF.image()` method.

```
from fpdf import FPDF
from pystrich.datamatrix import DataMatrixEncoder, DataMatrixRenderer


# Define the properties of the barcode
positionX = 10
positionY = 10
width = 57
height = 57
cellsize = 5

# Prepare the datamatrix renderer that will be used to generate the pilimage
encoder = DataMatrixEncoder("[Text to be converted to a datamatrix barcode]")
encoder.width = width
encoder.height = height
renderer = DataMatrixRenderer(encoder.matrix, encoder.regions)

# Generate a pilimage and move it into the memory stream
img = renderer.get_pilimage(cellsize)

# Draw the barcode image into a PDF file
pdf = FPDF()
pdf.add_page()
pdf.image(img, positionX, positionY, width, height)
```



Extend FPDF with a datamatrix() method

The code above could be added to the FPDF class as an extension method in the following way:

```
from fpdf import FPDF
from pystrich.datamatrix import DataMatrixEncoder, DataMatrixRenderer

class PDF(FPDF):
    def datamatrix(self, text, w, h=None, x=None, y=None, cellsize=5):
        if x is None: x = self.x
        if y is None: y = self.y
```

```
        if h is None: h = w
        encoder = DataMatrixEncoder(text)
        encoder.width = w
        encoder.height = h
        renderer = DataMatrixRenderer(encoder.matrix, encoder.regions)
        img = renderer.get_pilimage(cellsize)
        self.image(img, x, y, w, h)

# Usage example:
pdf = PDF()
pdf.add_page()
pdf.set_font("Helvetica", size=24)
pdf.datamatrix("Hello world!", w=100)
pdf.output("datamatrix.pdf")
```

5.6 Drawing

The `fpdf.drawing` module provides an API for composing paths out of an arbitrary sequence of straight lines and curves. This allows fairly low-level control over the graphics primitives that PDF provides, giving the user the ability to draw pretty much any vector shape on the page.

The drawing API makes use of features (notably transparency and blending modes) that were introduced in PDF 1.4. Therefore, use of the features of this module will automatically set the output version to 1.4 (fpdf normally defaults to version 1.3. Because the PDF 1.4 specification was originally published in 2001, this version should be compatible with all viewers currently in general use).

5.6.1 Getting Started

The easiest way to add a drawing to the document is via `fpdf.FPDF.new_path`. This is a context manager that takes care of serializing the path to the document once the context is exited.

Drawings follow the fpdf convention that the origin (that is, coordinate(0, 0)), is at the top-left corner of the page. The numbers specified to the various path commands are interpreted in the document units.

```
import fpdf

pdf = fpdf.FPDF(unit='mm', format=(10, 10))
pdf.add_page()

with pdf.new_path() as path:
    path.move_to(2, 2)
    path.line_to(8, 8)
    path.horizontal_line_relative(-6)
    path.line_relative(6, -6)
    path.close()

pdf.output("drawing-demo.pdf")
```

This example draws an hourglass shape centered on the page:

view as PDF

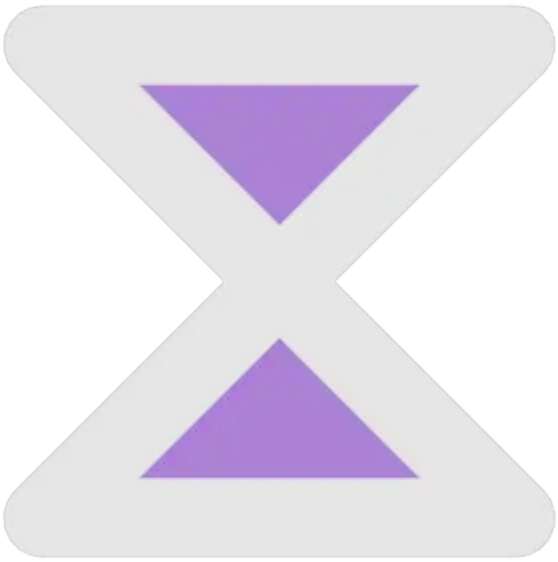
5.6.2 Adding Some Style

Drawings can be styled, changing how they look and blend with other drawings. Styling can change the color, opacity, stroke shape, and other attributes of a drawing.

Let's add some color to the above example:

```
import fpdf

pdf = fpdf.FPDF(unit='mm', format=(10, 10))
pdf.add_page()

with pdf.new_path() as path:
    path.style.fill_color = '#A070D0'
    path.style.stroke_color = fpdf.drawing.gray8(210)
    path.style.stroke_width = 1
    path.style.stroke_opacity = 0.75
    path.style.stroke_join_style = 'round'

    path.move_to(2, 2)
    path.line_to(8, 8)
    path.horizontal_line_relative(-6)
    path.line_relative(6, -6)
    path.close()

pdf.output("drawing-demo.pdf")
```

If you make color choices like these, it's probably not a good idea to quit your day job to become a graphic designer. Here's what the output should look like:



view as PDF

5.6.3 Transforms And You

Transforms provide the ability to manipulate the placement of points within a path without having to do any pesky math yourself. Transforms are composable using python's matrix multiplication operator (`@`), so, for example, a transform that both rotates and scales an object can be create by matrix multiplying a rotation transform with a scaling transform.

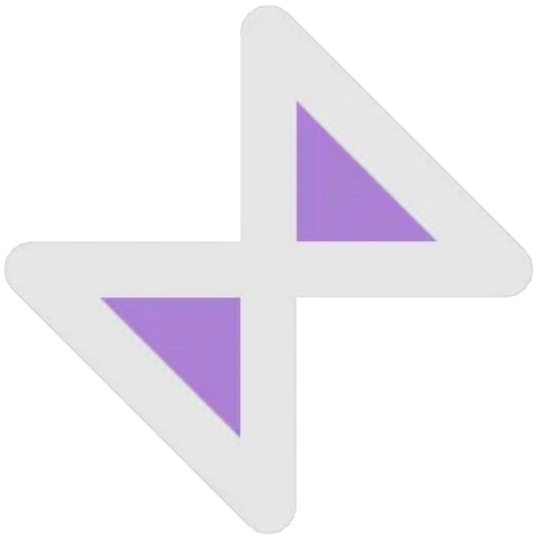
An important thing to note about transforms is that the result is order dependent, which is to say that something like performing a rotation followed by scaling will not, in the general case, result in the same output as performing the same scaling followed by the same rotation.

Additionally, it's not generally possible to deconstruct a composed transformation (representing an ordered sequence of translations, scaling, rotations, shearing) back into the sequence of individual transformation functions that produced it. That's okay, because this isn't important unless you're trying to do something like animate transforms after they've been composed, which you can't do in a PDF anyway.

All that said, let's take the example we've been working with for a spin (the pun is intended, you see, because we're going to rotate the drawing). Explaining the joke does make it better.

An easy way to apply a transform to a path is through the `path.transform` property.

```
import fpdf

pdf = fpdf.FPDF(unit="mm", format=(10, 10))
pdf.add_page()

with pdf.new_path() as path:
    path.style.fill_color = "#A070D0"
    path.style.stroke_color = fpdf.drawing.gray8(210)
    path.style.stroke_width = 1
    path.style.stroke_opacity = 0.75
    path.style.stroke_join_style = "round"
    path.transform = fpdf.drawing.Transform.rotation_d(45).scale(0.707).about(5, 5)

    path.move_to(2, 2)
    path.line_to(8, 8)
    path.horizontal_line_relative(-6)
    path.line_relative(6, -6)

    path.close()

pdf.output("drawing-demo.pdf")
```



view as PDF

The transform in the above example rotates the path 45 degrees clockwise and scales it by `1/sqrt(2)` around its center point. This transform could be equivalently written as:

```
import fpdf
T = fpdf.drawing.Transform

T.translation(-5, -5) @ T.rotation_d(45) @ T.scaling(0.707) @ T.translation(5, 5)
```

Because all transforms operate on points relative to the origin, if we had rotated the path without first centering it on the origin, we would have rotated it partway off of the page. Similarly, the size-reduction from the scaling would have moved it closer to the origin. By bracketing the transforms with the two translations, the placement of the drawing on the page is preserved.

5.6.4 Clipping Paths

The clipping path is used to define the region that the normal path is actually painted. This can be used to create drawings that would otherwise be difficult to produce.

```
import fpdf

pdf = fpdf.FPDF(unit="mm", format=(10, 10))
pdf.add_page()

clipping_path = fpdf.drawing.ClippingPath()
clipping_path.rectangle(x=2.5, y=2.5, w=5, h=5, rx=1, ry=1)

with pdf.new_path() as path:
    path.style.fill_color = "#A070D0"
    path.style.stroke_color = fpdf.drawing.gray8(210)
    path.style.stroke_width = 1
    path.style.stroke_opacity = 0.75
    path.style.stroke_join_style = "round"

    path.clipping_path = clipping_path

    path.move_to(2, 2)
    path.line_to(8, 8)
    path.horizontal_line_relative(-6)
    path.line_relative(6, -6)

    path.close()

pdf.output("drawing-demo.pdf")
```

view as PDF

5.6.5 Next Steps

The presented API style is designed to make it simple to produce shapes declaratively in your Python scripts. However, paths can just as easily be created programmatically by creating instances of the `fpdf.drawing.PaintedPath` for paths and `fpdf.drawing.GraphicsContext` for groups of paths.

Storing paths in intermediate objects allows reusing them and can open up more advanced use-cases. The `fpdf.svg` SVG converter, for example, is implemented using the `fpdf.drawing` interface.

5.7 Scalable Vector Graphics (SVG)

`fpdf2` supports basic conversion of SVG paths into PDF paths, which can be inserted into an existing PDF document or used as the contents of a new PDF document.

Not all SVGs will convert correctly. Please see the list of unsupported features for more information about what to look out for.

5.7.1 Basic usage

SVG files can be directly inserted inside a PDF file using the image() method:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.image("vector.svg")
pdf.output("doc-with-svg.pdf")
```

Either the embedded `.svg` file must includes `width` and/or `height` attributes (absolute or relative), or some dimensions must be provided to `.image()` through its `w=` and/or `h=` parameters.

5.7.2 Detailed example

The following script will create a PDF that consists only of the graphics contents of the provided SVG file, filling the whole page:

```
import fpdf

svg = fpdf.svg.SVGObject.from_file("my_file.svg")

pdf = fpdf.FPDF(unit="pt", format=(svg.width, svg.height))
pdf.add_page()
svg.draw_to_page(pdf)

pdf.output("my_file.pdf")
```

Because this takes the PDF document size from the source SVG, it does assume that the width/height of the SVG are specified in absolute units rather than relative ones (i.e. the top-level `<svg>` tag has something like `width="5cm"` and not `width=50%`). In this case, if the values are percentages, they will be interpreted as their literal numeric value (i.e. `100%` would be treated as `100 pt`). The next example uses `transform_to_page_viewport`, which will scale an SVG with a percentage based `width` to the pre-defined PDF page size.

The converted SVG object can be returned as an fpdf.drawing.GraphicsContext collection of drawing directives for more control over how it is rendered:

```
import fpdf

svg = fpdf.svg.SVGObject.from_file("my_file.svg")

pdf = FPDF(unit="in", format=(8.5, 11))
pdf.add_page()

# We pass align_viewbox=False because we want to perform positioning manually
# after the size transform has been computed.
width, height, paths = svg.transform_to_page_viewport(pdf, align_viewbox=False)
# note: transformation order is important! This centers the svg drawing at the
# origin, rotates it 90 degrees clockwise, and then repositions it to the
# middle of the output page.
paths.transform = paths.transform @ fpdf.drawing.Transform.translation(
    -width / 2, -height / 2
).rotate_d(90).translate(pdf.w / 2, pdf.h / 2)

pdf.draw_path(paths)

pdf.output("my_file.pdf")
```

5.7.3 Supported SVG Features

- groups
- paths

- basic shapes (rect, circle, ellipse, line, polyline, polygon)
- basic cross-references
- stroke & fill coloring and opacity
- basic stroke styling
- Inline CSS styling via `style="..."` attributes.

5.7.4 Currently Unsupported Notable SVG Features

Everything not listed as supported is unsupported, which is a lot. SVG is a ridiculously complex format that has become increasingly complex as it absorbs more of the entire browser rendering stack into its specification. However, there are some pretty commonly used features that are unsupported that may cause unexpected results (up to and including a normal-looking SVG rendering as a completely blank PDF). It is very likely that off-the-shelf SVGs will not be converted fully correctly without some preprocessing.

In addition to that:

- text/tspan/textPath
- symbols
- markers
- patterns
- gradients
- a lot of attributes
- embedded images or other content (including nested SVGs)
- CSS styling via `<style>` tags or external *.css files.

5.8 Charts & graphs

5.8.1 Charts

Using Matplotlib

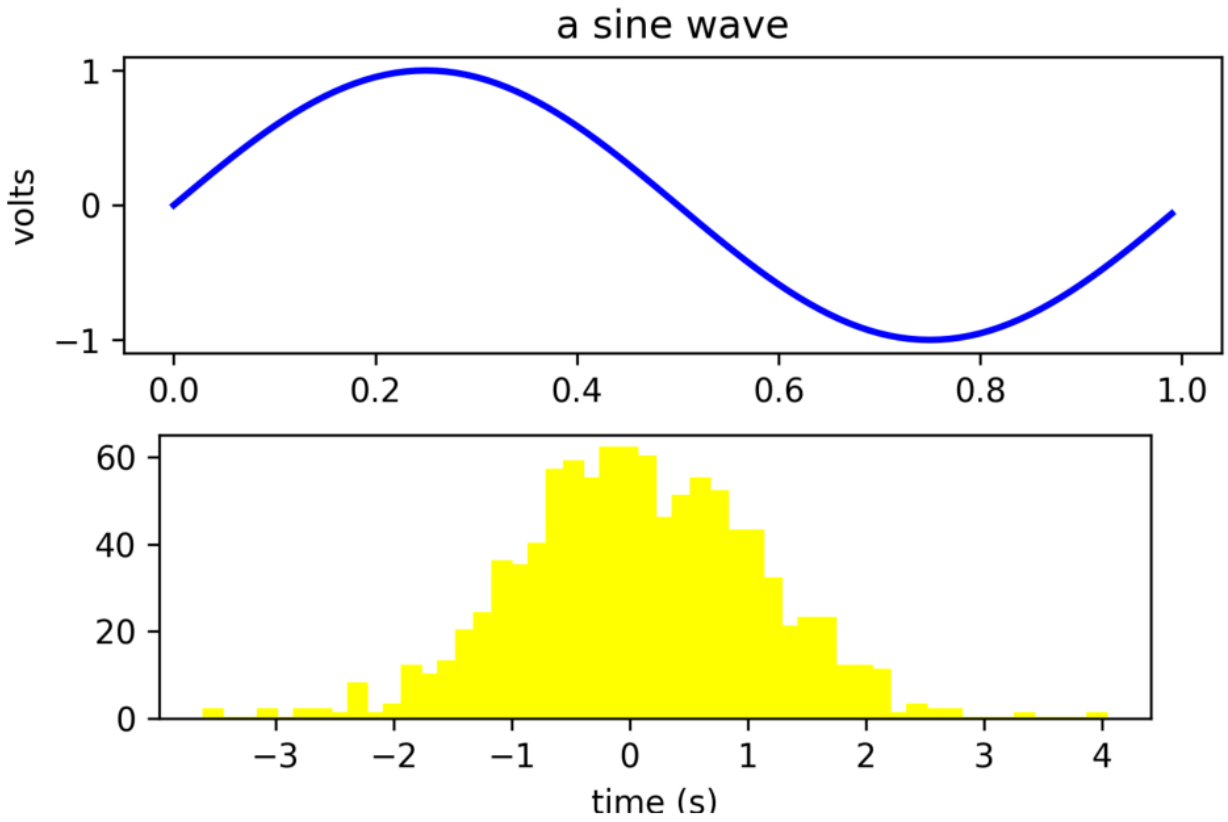
Before running this example, please install the required dependencies using the command below:

```
pip install fpdf2 matplotlib
```

Example taken from Matplotlib artist tutorial:

```
from fpdf import FPDF
from matplotlib.backends.backend_agg import FigureCanvasAgg as FigureCanvas
from matplotlib.figure import Figure
import numpy as np
from PIL import Image

fig = Figure(figsize=(6, 4), dpi=300)
fig.subplots_adjust(top=0.8)
ax1 = fig.add_subplot(211)
ax1.set_ylabel("volts")
ax1.set_title("a sine wave")

t = np.arange(0.0, 1.0, 0.01)
s = np.sin(2 * np.pi * t)
(line,) = ax1.plot(t, s, color="blue", lw=2)

# Fixing random state for reproducibility
np.random.seed(19680801)

ax2 = fig.add_axes([0.15, 0.1, 0.7, 0.3])
n, bins, patches = ax2.hist(
    np.random.randn(1000), 50, facecolor="yellow", edgecolor="yellow"
)
ax2.set_xlabel("time (s)")

# Converting Figure to an image:
canvas = FigureCanvas(fig)
canvas.draw()
img = Image.fromarray(np.asarray(canvas.buffer_rgba()))

pdf = FPDF()
pdf.add_page()
pdf.image(img, w=pdf.epw)  # Make the image full width
pdf.output("matplotlib.pdf")
```

Result:



You can also embed a figure as SVG:

```
from fpdf import FPDF
import matplotlib.pyplot as plt
import numpy as np

plt.figure(figsize=[2, 2])
x = np.arange(0, 10, 0.00001)
y = x*np.sin(2* np.pi * x)
plt.plot(y)
plt.savefig("figure.svg", format="svg")

pdf = FPDF()
pdf.add_page()
pdf.image("figure.svg")
pdf.output("doc-with-figure.pdf")
```

Using Pandas

The dependencies required for the following examples can be installed using this command:

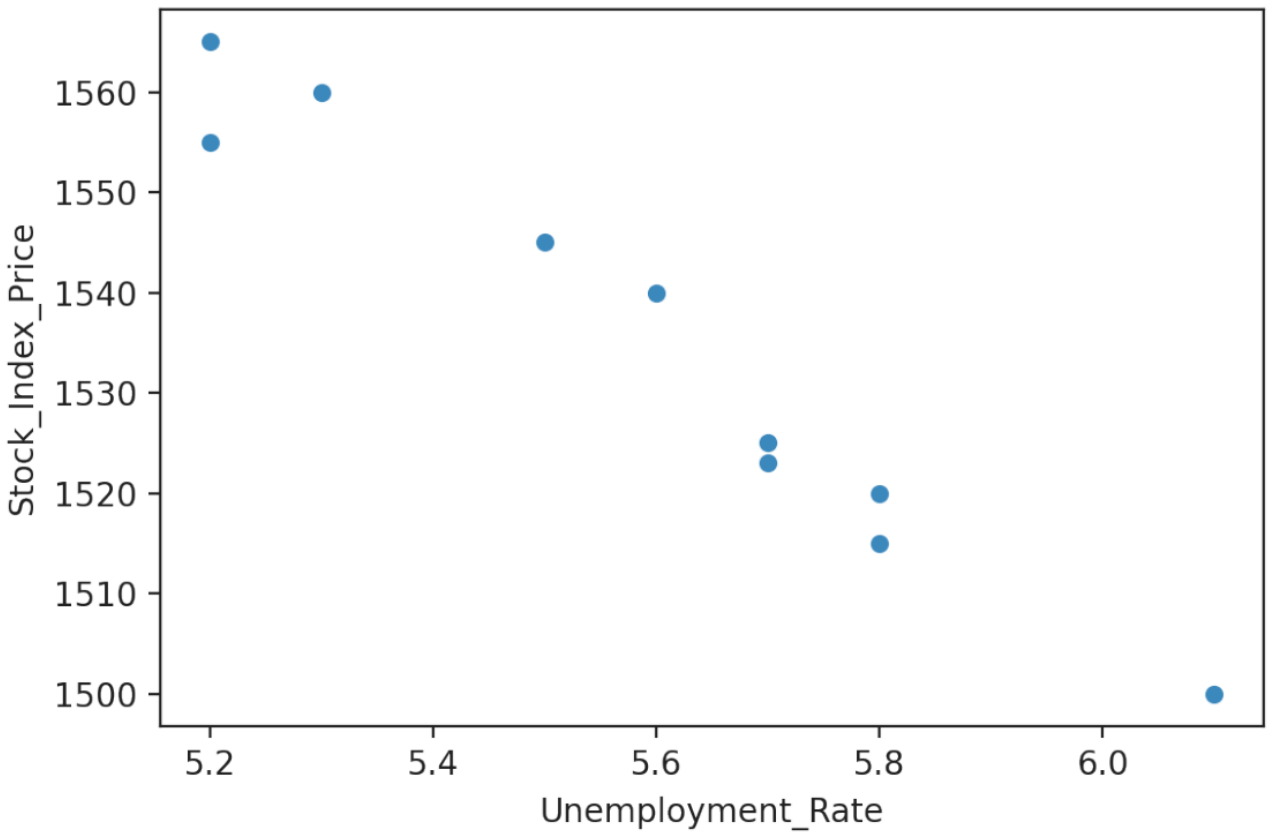
```
pip install fpdf2 matplotlib pandas
```

Create a plot using pandas.DataFrame.plot:

```
from io import BytesIO
from fpdf import FPDF
import pandas as pd
import matplotlib.pyplot as plt
import io

data = {
    "Unemployment_Rate": [6.1, 5.8, 5.7, 5.7, 5.8, 5.6, 5.5, 5.3, 5.2, 5.2],
    "Stock_Index_Price": [1500, 1520, 1525, 1523, 1515, 1540, 1545, 1560, 1555, 1565],
}

plt.figure()  # Create a new figure object
df = pd.DataFrame(data, columns=["Unemployment_Rate", "Stock_Index_Price"])
df.plot(x="Unemployment_Rate", y="Stock_Index_Price", kind="scatter")
```

```
# Converting Figure to an image:
img_buf = BytesIO()  # Create image object
plt.savefig(img_buf, dpi=200)  # Save the image

pdf = FPDF()
pdf.add_page()
pdf.image(img_buf, w=pdf.epw) # Make the image full width
pdf.output("pandas.pdf")
img_buf.close()
```

Result:



Create a table with pandas DataFrame:

```
from fpdf import FPDF
import pandas as pd

df = pd.DataFrame(
    {
        "First name": ["Jules", "Mary", "Carlson", "Lucas"],
        "Last name": ["Smith", "Ramos", "Banks", "Cimon"],
        "Age": [34, 45, 19, 31],
        "City": ["San Juan", "Orlando", "Los Angeles", "Saint-Mahturin-sur-Loire"],
    }
)

df = df.applymap(str)  # Convert all data inside dataframe into string type

columns = [list(df)]  # Get list of dataframe columns
rows = df.values.tolist()  # Get list of dataframe rows
data = columns + rows  # Combine columns and rows in one list

# Start pdf creating
pdf = FPDF()
pdf.add_page()
pdf.set_font("Times", size=10)
line_height = pdf.font_size * 2.5
col_width = pdf.epw / 4  # distribute content evenly

for row in data:
    for datum in row:
        pdf.multi_cell(
            col_width,
            line_height,
            datum,
            border=1,
```

```
            new_y="TOP",
            max_line_height=pdf.font_size,
        )
    pdf.ln(line_height)
pdf.output("table_with_cells.pdf")
```

Result:

First name	Last name	Age	City
Jules	Smith	34	San Juan
Mary	Ramos	45	Orlando
Carlson	Banks	19	Los Angeles
Lucas	Cimon	31	Saint-Mahturin-sur-Loire

5.8.2 Mathematical formulas

`fpdf2` can only insert mathematical formula in the form of **images**. The following sections will explaing how to generate and embed such images.

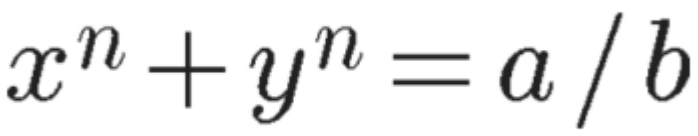
Using Google Charts API

Official documentation: Google Charts Infographics - Mathematical Formulas.

Example:

```
from io import BytesIO
from urllib.parse import quote
from urllib.request import urlopen
from fpdf import FPDF

formula = "x^n + y^n = a/b"
height = 170
url = f"https://chart.googleapis.com/chart?cht=tx&chs={height}&chl={quote(formula)}"
with urlopen(url) as img_file:
    img = BytesIO(img_file.read())

pdf = FPDF()
pdf.add_page()
pdf.image(img, w=30)
pdf.output("equation-with-gcharts.pdf")
```

Result:



Using LaTeX & Matplotlib

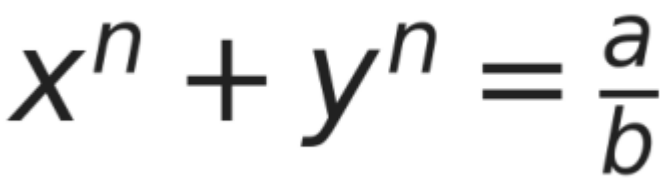
Matplotlib can render **LaTeX**: Text rendering With LaTeX.

Example:

```
from io import BytesIO
from fpdf import FPDF
from matplotlib.figure import Figure
```

```
fig = Figure(figsize=(6, 2))
gca = fig.gca()
gca.text(0, 0.5, r"$x^n + y^n = \frac{a}{b}$", fontsize=60)
gca.axis("off")

# Converting Figure to a SVG image:
img = BytesIO()
fig.savefig(img, format="svg")

pdf = FPDF()
pdf.add_page()
pdf.image(img, w=100)
pdf.output("equation-with-matplotlib.pdf")
```

Result:



If you have trouble with the SVG export, you can also render the matplotlib figure as pixels:

```
from fpdf import FPDF
from matplotlib.backends.backend_agg import FigureCanvasAgg as FigureCanvas
from matplotlib.figure import Figure
import numpy as np
from PIL import Image

fig = Figure(figsize=(6, 2), dpi=300)
gca = fig.gca()
gca.text(0, 0.5, r"$x^n + y^n = \frac{a}{b}$", fontsize=60)
gca.axis("off")

canvas = FigureCanvas(fig)
canvas.draw()
img = Image.fromarray(np.asarray(canvas.buffer_rgba()))

...
```

6. PDF Features

6.1 Links

`fpdf2` can generate both **internal** links (to other pages in the document) & **hyperlinks** (links to external URLs that will be opened in a browser).

6.1.1 Hyperlink with FPDF.cell

This method makes the whole cell clickable (not only the text):

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_font("helvetica", size=24)
pdf.cell(w=40, h=10, txt="Cell link", border=1, align="C", link="https://github.com/PyFPDF/fpdf2")
pdf.output("hyperlink.pdf")
```

6.1.2 Hyperlink with FPDF.link

The `FPDF.link` is a low-level method that defines a rectangular clickable area.

There is an example showing how to place such rectangular link over some text:

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_font("helvetica", size=36)
line_height = 10
text = "Text link"
pdf.text(x=0, y=line_height, txt=text)
width = pdf.get_string_width(text)
pdf.link(x=0, y=0, w=width, h=line_height, link="https://github.com/PyFPDF/fpdf2")
pdf.output("hyperlink.pdf")
```

6.1.3 Hyperlink with write_html

An alternative method using `FPDF.write_html`:

```
from fpdf import FPDF

pdf = FPDF()
pdf.set_font_size(16)
pdf.add_page()
pdf.write_html('<a href="https://github.com/PyFPDF/fpdf2">Link defined as HTML</a>')
pdf.output("hyperlink.pdf")
```

The hyperlinks defined this way will be rendered in blue with underline.

6.1.4 Internal links

Using `FPDF.cell`:

```
from fpdf import FPDF

pdf = FPDF()
pdf.set_font("helvetica", size=24)
pdf.add_page()
# Displaying a full-width cell with centered text:
pdf.cell(w=pdf.epw, txt="Welcome on first page!", align="C")
pdf.add_page()
link = pdf.add_link(page=1)
pdf.cell(txt="Internal link to first page", border=1, link=link)
pdf.output("internal_link.pdf")
```

Similarly, `FPDF.link` can be used instead of `FPDF.cell`, however `write_html` does not allow to define internal links.

6.1.5 Alternative description

An optional textual description of the link can be provided, for accessibility purposes:

```
pdf.link(x=0, y=0, w=width, h=line_height, link="https://github.com/PyFPDF/fpdf2",
         alt_text="GitHub page for fpdf2")
```

6.2 Metadata

The PDF specification contain two types of metadata, the newer XMP (Extensible Metadata Platform, XML-based) and older `DocumentInformation` dictionary. The PDF 2.0 specification removes the `DocumentInformation` dictionary.

Currently, the following methods on `fpdf.FPDF` allow to set metadata information in the `DocumentInformation` dictionary:

- `set_title`
- `set_lang`
- `set_subject`
- `set_author`
- `set_keywords`
- `set_producer`
- `set_creator`
- `set_creation_date`
- `set_xmp_metadata`, that requires you to craft the necessary XML string

For a more user-friendly API to set metadata, we recommend using `pikepdf` that will set both XMP & `DocumentInformation` metadata:

```
import sys
from datetime import datetime

import pikepdf
from fpdf import FPDF_VERSION

with pikepdf.open(sys.argv[1], allow_overwriting_input=True) as pdf:
    with pdf.open_metadata(set_pikepdf_as_editor=False) as meta:
        meta["dc:title"] = "Title"
        meta["dc:description"] = "Description"
        meta["dc:creator"] = ["Author1", "Author2"]
        meta["pdf:Keywords"] = "keyword1 keyword2 keyword3"
        meta["pdf:Producer"] = f"PyFPDF/fpdf{FPDF_VERSION}"
        meta["xmp:CreatorTool"] = __file__
        meta["xmp:MetadataDate"] = datetime.now(datetime.utcnow().astimezone().tzinfo).isoformat()
    pdf.save()
```

6.3 Annotations

The PDF format allows to add various annotations to a document.

6.3.1 Text annotations

They are rendered this way by Sumatra PDF reader:

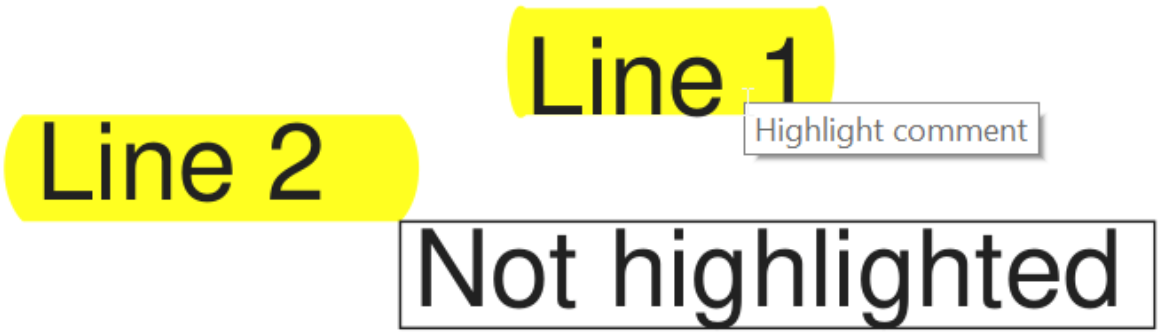
```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_font("Helvetica", size=24)
pdf.text(x=60, y=140, txt="Some text.")
pdf.text_annotation(
    x=100,
    y=130,
    text="This is a text annotation.",
)
pdf.output("text_annotation.pdf")
```

Method documentation: `FPDF.text_annotation`

6.3.2 Highlights

```
from fpdf import FPDF

pdf = FPDF()
pdf.add_page()
pdf.set_font("Helvetica", size=24)
with pdf.highlight("Highlight comment"):
    pdf.text(50, 50, "Line 1")
    pdf.set_y(50)
    pdf.multi_cell(w=30, txt="Line 2")
pdf.cell(w=60, txt="Not highlighted", border=1)
pdf.output("highlighted.pdf")
```

Rendering by Sumatra PDF reader:



Method documentation: `FPDF.highlight`

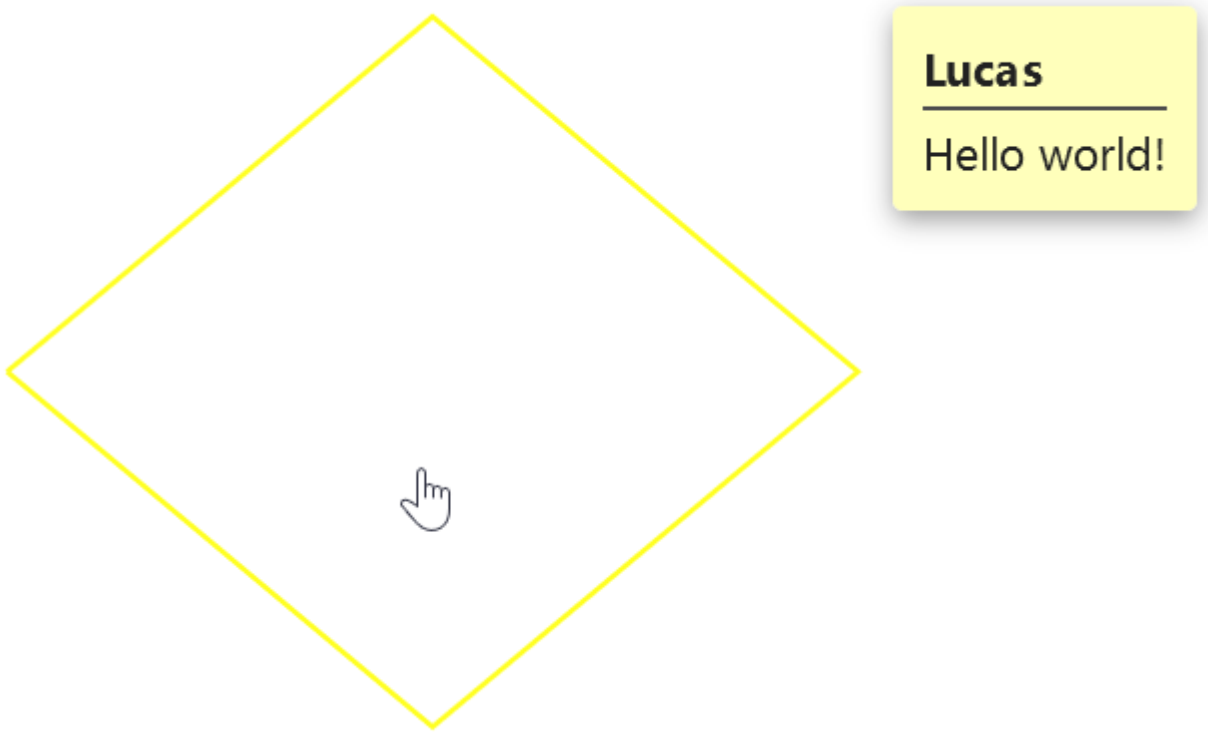
The appearance of the "highlight effect" can be controlled through the `type` argument: it can be `Highlight` (default), `Underline`, `Squiggly` or `StrikeOut`.

6.3.3 Ink annotations

Those annotations allow to draw paths around parts of a document to highlight them:

```
from fpdf import FPDF

pdf = FPDF()
pdf.ink_annotation([(100, 200), (200, 100), (300, 200), (200, 300), (100, 200)],
                   title="Lucas", contents="Hello world!")
pdf.output("ink_annotation_demo.pdf")
```

Rendering by Firefox internal PDF viewer:



Method documentation: `FPDF.ink_annotation`

6.3.4 File attachments

cf. the dedicated page: File attachments

6.3.5 Named actions

The four standard PDF named actions provide some basic navigation relative to the current page: `NextPage`, `PrevPage`, `FirstPage` and `LastPage`.

```
from fpdf import FPDF
from fpdf.actions import NamedAction

pdf = FPDF()
pdf.set_font("Helvetica", size=24)
pdf.add_page()
pdf.text(x=80, y=140, txt="First page")
pdf.add_page()
pdf.underline = True
for x, y, named_action in ((40, 80, "NextPage"), (120, 80, "PrevPage"), (40, 200, "FirstPage"), (120, 200, "LastPage")):
    pdf.text(x=x, y=y, txt=named_action)
    pdf.add_action(
        NamedAction(named_action),
        x=x,
        y=y - pdf.font_size,
        w=pdf.get_string_width(named_action),
```

```
        h=pdf.font_size,
    )
pdf.underline = False
pdf.add_page()
pdf.text(x=80, y=140, txt="Last page")
pdf.output("named_actions.pdf")
```

6.3.6 Launch actions

Used to launch an application or open or print a document:

```
from fpdf import FPDF
from fpdf.actions import LaunchAction

pdf = FPDF()
pdf.set_font("Helvetica", size=24)
pdf.add_page()
x, y, text = 80, 140, "Launch action"
pdf.text(x=x, y=y, txt=text)
pdf.add_action(
    LaunchAction("another_file_in_same_directory.pdf"),
    x=x,
    y=y - pdf.font_size,
    w=pdf.get_string_width(text),
    h=pdf.font_size,
)
pdf.output("launch_action.pdf")
```

6.4 Presentations

Presentation mode can usually be enabled with the `CTRL + L` shortcut.

As of june 2021, the features described below are onored by Adobe Acrobat reader, but ignored by Sumatra PDF reader.

6.4.1 Page display duration

Pages can be associated with a "display duration" until when the viewer application automatically advances to the next page:

```
from fpdf import FPDF

pdf = fpdf.FPDF()
pdf.set_font("Helvetica", size=120)
pdf.add_page(duration=3)
pdf.cell(txt="Page 1")
pdf.page_duration = .5
pdf.add_page()
pdf.cell(txt="Page 2")
pdf.add_page()
pdf.cell(txt="Page 3")
pdf.output("presentation.pdf")
```

It can also be configured globally through the `page_duration` FPDF property.

6.4.2 Transitions

Pages can be associated with visual transitions to use when moving from another page to the given page during a presentation:

```
from fpdf import FPDF
from fpdf.transitions import *

pdf = fpdf.FPDF()
pdf.set_font("Helvetica", size=120)
pdf.add_page()
pdf.text(x=40, y=150, txt="Page 0")
pdf.add_page(transition=SplitTransition("V", "O"))
pdf.text(x=40, y=150, txt="Page 1")
pdf.add_page(transition=BlindsTransition("H"))
pdf.text(x=40, y=150, txt="Page 2")
pdf.add_page(transition=BoxTransition("I"))
pdf.text(x=40, y=150, txt="Page 3")
pdf.add_page(transition=WipeTransition(90))
pdf.text(x=40, y=150, txt="Page 4")
pdf.add_page(transition=DissolveTransition())
pdf.text(x=40, y=150, txt="Page 5")
pdf.add_page(transition=GlitterTransition(315))
pdf.text(x=40, y=150, txt="Page 6")
pdf.add_page(transition=FlyTransition("H"))
pdf.text(x=40, y=150, txt="Page 7")
pdf.add_page(transition=PushTransition(270))
pdf.text(x=40, y=150, txt="Page 8")
pdf.add_page(transition=CoverTransition(270))
pdf.text(x=40, y=150, txt="Page 9")
pdf.add_page(transition=UncoverTransition(270))
pdf.text(x=40, y=150, txt="Page 10")
pdf.add_page(transition=FadeTransition())
pdf.text(x=40, y=150, txt="Page 11")
pdf.output("transitions.pdf")
```

It can also be configured globally through the `page_transition` FPDF property.

6.5 Document outline & table of contents

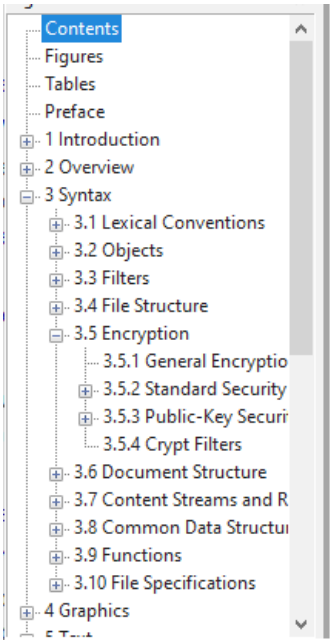
Quoting Wikipedia, a **table of contents** is:

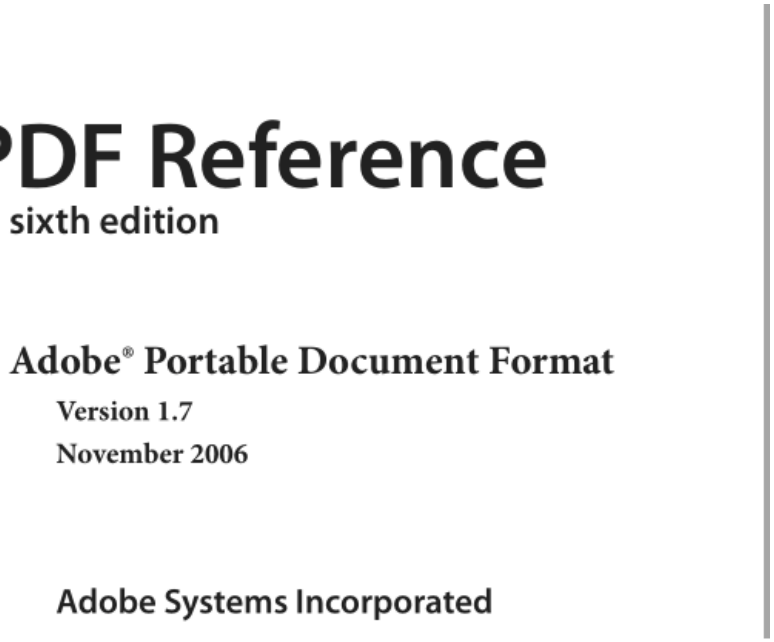
> a list, usually found on a page before the start of a written work, of its chapter or section titles or brief descriptions with their commencing page numbers.

Now quoting the 6th edition of the PDF format reference (v1.7 - 2006) :

> A PDF document may optionally display a **document outline** on the screen, allowing the user to navigate interactively from one part of the document to another. The outline consists of a tree-structured hierarchy of outline items (sometimes called bookmarks), which serve as a visual table of contents to display the document's structure to the user.

For example, there is how a document outline looks like in Sumatra PDF Reader:





Since `fpdf2.3.3`, both features are supported through the use of the `start_section` method, that adds an entry in the internal "outline" table used to render both features.

Note that by default, calling `start_section` only records the current position in the PDF and renders nothing. However, you can configure **global title styles** by calling `set_section_title_styles`, after which call to `start_section` will render titles visually using the styles defined.

To provide a document outline to the PDF you generate, you just have to call the `start_section` method for every hierarchical section you want to define.

If you also want to insert a table of contents somewhere, call `insert_toc_placeholder` wherever you want to put it. Note that a page break will always be triggered after inserting the table of contents.

6.5.1 With HTML

When using `FPDF.write_html`, a document outline is automatically built. You can insert a table of content with the special `<toc>` tag.

Custom styling of the table of contents can be achieved by overriding the `render_toc` method in a subclass of `FPDF`:

```
from fpdf import FPDF, HTML2FPDF

class CustomHTML2FPDF(HTML2FPDF):
    def render_toc(self, pdf, outline):
        pdf.cell(txt='Table of contents:', new_x="LMARGIN", new_y="NEXT")
```

```
        for section in outline:
            pdf.cell(txt=f'* {section.name} (page {section.page_number})', new_x="LMARGIN", new_y="NEXT")

class PDF(FPDF):
    HTML2FPDF_CLASS = CustomHTML2FPDF

pdf = PDF()
pdf.add_page()
pdf.write_html("""<toc></toc>
    <h1>Level 1</h1>
    <h2>Level 2</h2>
    <h3>Level 3</h3>
    <h4>Level 4</h4>
    <h5>Level 5</h5>
    <h6>Level 6</h6>
    <p>paragraph<p>""")
pdf.output("html_toc.pdf")
```

6.5.2 Code samples

The regression tests are a good place to find code samples.

For example, the `test_simple_outline` test function generates the PDF document simple_outline.pdf.

Similarly, `test_html_toc` generates test_html_toc.pdf.

6.6 Encryption

New in 2.6.1

A PDF document can be encrypted to protect its contents.

An owner password is mandatory. Using the owner password anyone can perform any change on the document, including removing all encryption and access permissions.

The optional parameters are user password, access permissions and encryption method.

6.6.1 Password locking

User password is optional. If none is provided the document content is accessible for everyone.

If a user password is set, the content of the document will be encrypted and a password prompt displayed when a user opens the document. The document will only be displayed after either the user or owner password is entered.

```
pdf.set_encryption(
    owner_password="foo",
    user_password="bar"
)
```

6.6.2 Access permissions

Using access permissions flags you can restrict how the user interact with the document. The available access permission flags are:

- `PRINT_LOW_RES` Print the document, limiting the quality of the printed version.
- `PRINT_HIGH_RES` Print the document at the highest quality.
- `MODIFY` Modify the contents of the document.
- `COPY` Copy or extract text and graphics from the document.
- `ANNOTATION` Add or modify text annotations.
- `FILL_FORMS` Fill in existing interactive form fields.
- `COPY_FOR_ACCESSIBILITY` Extract text and graphics in support of accessibility to users with disabilities
- `ASSEMBLE` Insert, rotate or delete pages and create bookmarks or thumbnail images.

The flags can be combined using `|`:

```
from fpdf import FPDF
from fpdf.enums import AccessPermission

pdf = FPDF()
pdf.add_page()
pdf.set_font("helvetica", size=12)
pdf.cell(txt="hello world")

pdf.set_encryption(
    owner_password="98765421",
    permissions=AccessPermission.PRINT_LOW_RES | AccessPermission.PRINT_HIGH_RES
)

pdf.output("output.pdf")
```

The method `all()` grants all permissions and `none()` denies all permissions.

```
pdf.set_encryption(
    owner_password="xyz",
    permissions=AccessPermission.all()
)
```

If no permission is specified it will default to `all()`.

6.6.3 Encryption method

There are 3 available encryption methods:

- `NO_ENCRYPTION` Data is not encrypted, only add the access permission flags.
- `RC4` (default) Default PDF encryption algorithm.
- `AES_128` Encrypts the data with AES algorithm. Requires the `cryptography` package.

```
from fpdf import FPDF
from fpdf.enums import AccessPermission, EncryptionMethod

pdf = FPDF()
pdf.add_page()
pdf.set_font("helvetica", size=12)
pdf.cell(txt="hello world")

pdf.set_encryption(
    owner_password="123",
    encryption_method=EncryptionMethod.AES_128,
    permissions=AccessPermission.none()
)

pdf.output("output.pdf")
```

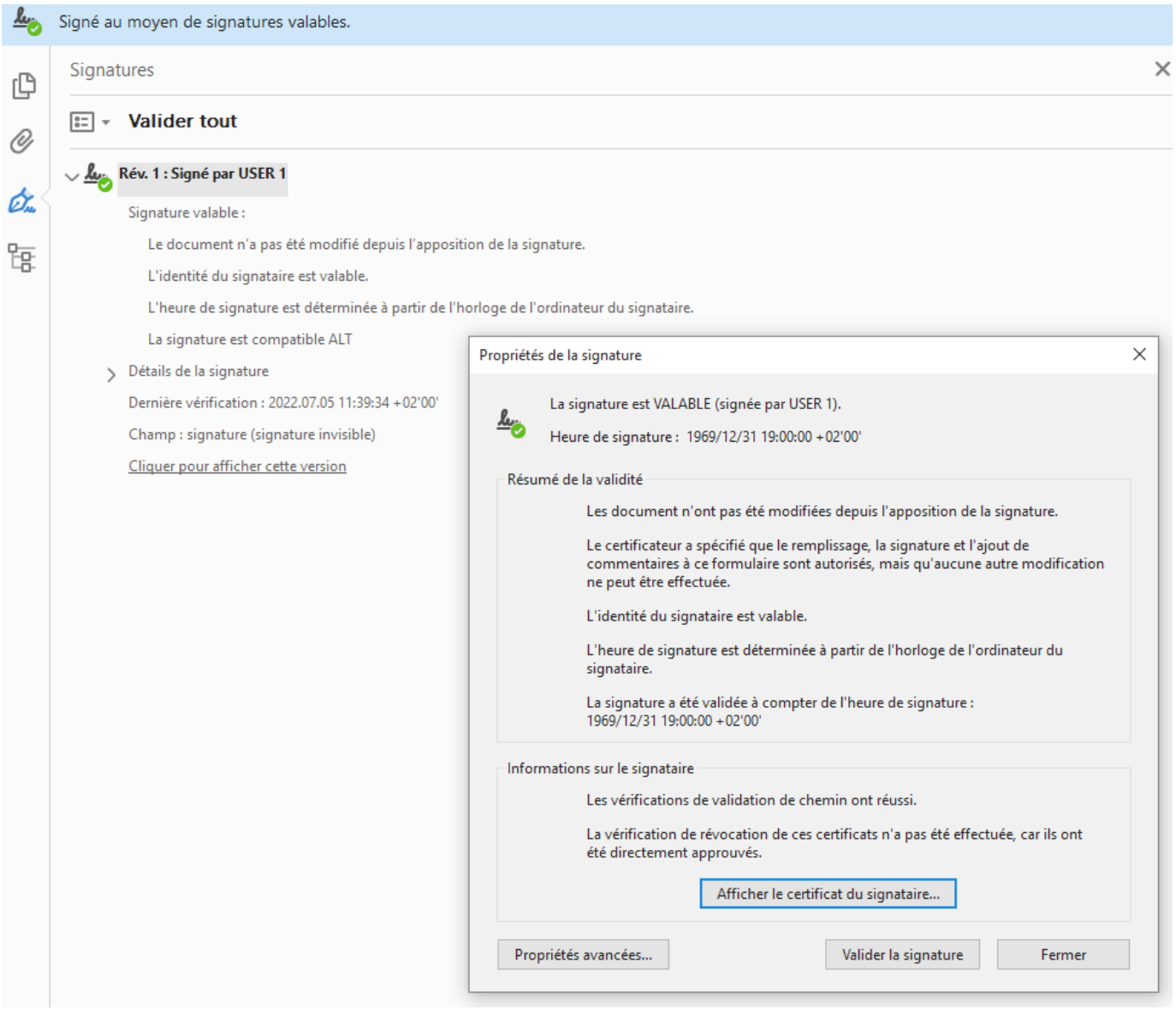
6.7 Signing

A digital signature may be used to authenticate the identity of a user and the document's contents. It stores information about the signer and the state of the document when it was signed.

`fpdf2` allows to **sign** documents using PKCS#12 certificates (RFC 7292).

The endesive package is **required** to do so.

```
pdf = FPDF()
pdf.add_page()
pdf.sign_pkcs12("certs.p12", password=b"1234")
pdf.output("signed_doc.pdf")
```



The lower-level sign() method allows to add a signature based on arbitrary key & certificates, not necessarily from a PKCS#12 file.

`endesive` also provides basic code to check PDFs signatures. examples/pdf-verify.py or the `check_signature()` function used in `fpdf2` unit tests can be good starting points for you, if you want to perform PDF signature control.

6.8 File attachments

6.8.1 Embedded file streams

Embedded file streams [allow] the contents of referenced files to be embedded directly within the body of the PDF file. This makes the PDF file a self-contained unit that can be stored or transmitted as a single entity.

`fpdf2` gives access to this feature through the method `embed_file()`:

```
pdf = FPDF()
pdf.add_page()
pdf.embed_file(__file__, desc="Source Python code", compress=True)
pdf.output("embedded_file.pdf")
```

6.8.2 Annotations

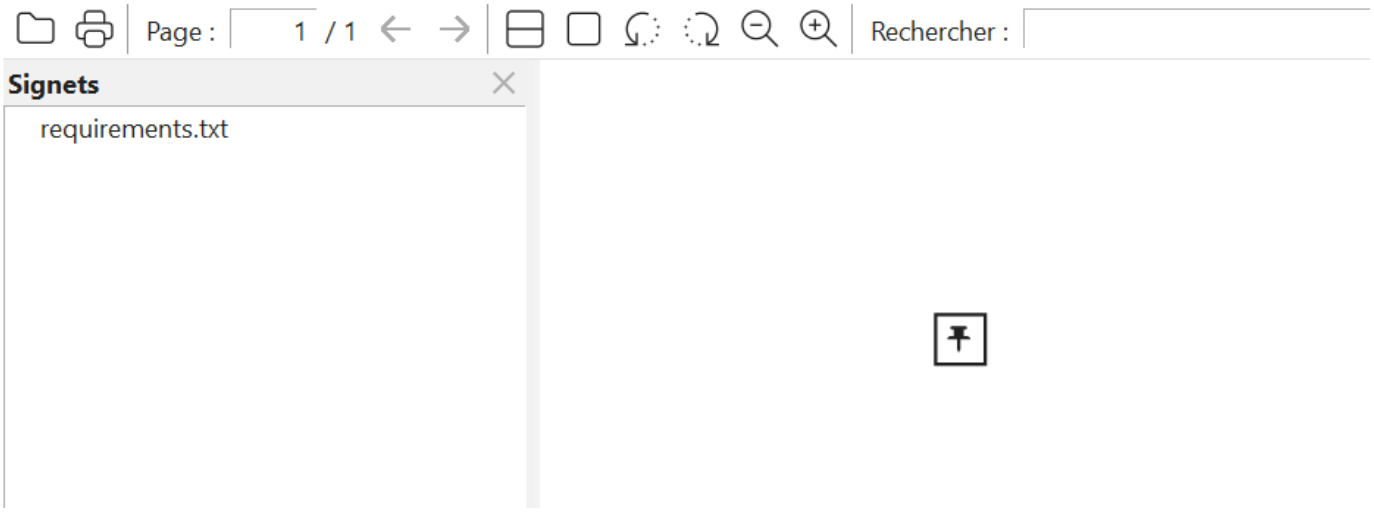
A file attachment annotation contains a reference to a file, which typically shall be embedded in the PDF file.

`fpdf2` gives access to this feature through the method `file_attachment_annotation()`:

```
pdf = FPDF()
pdf.add_page()
pdf.file_attachment_annotation(__file__, x=50, y=50)
pdf.output("file_attachment_annotation.pdf")
```

Resulting PDF: file_attachment_annotation.pdf

Browser PDF viewers do not usually display embedded files & file attachment annotations, so you may want to download this file and open it with your desktop PDF viewer in order to visualize the file attachments.



7. Mixing other libs

7.1 borb

Joris Schellekens made another excellent pure-Python library dedicated to reading & write PDF: borb. He even wrote a very detailed e-book about it, available publicly there: borb-examples.

The maintainer of `fpdf2` wrote an article comparing it with `borb`: borb vs fpdf2.

7.1.1 Creating a document with `fpdf2` and transforming it into a `borb.pdf.document.Document`

```
from io import BytesIO
from borb.pdf.pdf import PDF
from fpdf import FPDF

pdf = FPDF()
pdf.set_title('Initiating a borb doc from a FPDF instance')
pdf.set_font('helvetica', size=12)
pdf.add_page()
pdf.cell(txt="Hello world!")

doc = PDF.loads(BytesIO(pdf.output()))
print(doc.get_document_info().get_title())
```

7.2 Combine with pdfrw

`fpdf2` cannot **parse** existing PDF files.

However, other Python libraries can be combined with `fpdf2` in order to add new content to existing PDF files.

This page provides several examples of using `fpdf2` with `pdfrw`, a great zero-dependency pure Python library dedicated to reading & writing PDFs, with numerous examples and a very clean set of classes modelling the PDF internal syntax.

7.2.1 Adding content onto an existing PDF page

```
import sys
from fpdf import FPDF
from pdfrw import PageMerge, PdfReader, PdfWriter
from pdfrw.pagemerge import RectXObj

IN_FILEPATH = sys.argv[1]
OUT_FILEPATH = sys.argv[2]
ON_PAGE_INDEX = 1
UNDERNEATH = False  # if True, new content will be placed underneath page (painted first)

reader = PdfReader(IN_FILEPATH)
area = RectXObj(reader.pages[0])

def new_content():
    fpdf = FPDF(format=(area.w, area.h))
    fpdf.add_page()
    fpdf.set_font("helvetica", size=36)
    fpdf.text(50, 50, "Hello!")
    reader = PdfReader(fdata=bytes(fpdf.output()))
    return reader.pages[0]

writer = PdfWriter()
writer.pagearray = reader.Root.Pages.Kids
PageMerge(writer.pagearray[ON_PAGE_INDEX]).add(new_content(), prepend=UNDERNEATH).render()
writer.write(OUT_FILEPATH)
```

7.2.2 Adding a page to an existing PDF

```
import sys
from fpdf import FPDF
from pdfrw import PdfReader, PdfWriter
from pdfrw.pagemerge import RectXObj

IN_FILEPATH = sys.argv[1]
OUT_FILEPATH = sys.argv[2]
NEW_PAGE_INDEX = 1  # set to None to append at the end

reader = PdfReader(IN_FILEPATH)
area = RectXObj(reader.pages[0])

def new_page():
    fpdf = FPDF(format=(area.w, area.h))
    fpdf.add_page()
    fpdf.set_font("helvetica", size=36)
    fpdf.text(50, 50, "Hello!")
    reader = PdfReader(fdata=bytes(fpdf.output()))
    return reader.pages[0]

writer = PdfWriter(trailer=PdfReader(IN_FILEPATH))
writer.addpage(new_page(), at_index=NEW_PAGE_INDEX)
writer.write(OUT_FILEPATH)
```

This example relies on pdfrw *Pull Request* #216. Until it is merged, you can install a forked version of `pdfrw` including the required patch:

```
pip install git+https://github.com/PyFPDF/pdfrw.git@addpage_at_index
```

7.2.3 Altering with pdfrw a document generated with fpdf2

A document created with `fpdf2` can the be edited with `pdfrw` by passing its `.output()` to a `pdfrw.PdfReader`:

```
import io
from fpdf import FPDF
from pdfrw import PdfReader
```

```
pdf = FPDF()
pdf.add_page()
pdf.set_font('times', 'B', 19)
pdf.text(50, 10, 'Hello World!')

reader = PdfReader(io.BytesIO(pdf.output()))
```

7.3 Combine with PyPDF2

`fpdf2` cannot **parse** existing PDF files.

However, other Python libraries can be combined with `fpdf2` in order to add new content to existing PDF files.

This page provides several examples of doing so using `PyPDF2`.

7.3.1 Adding content onto an existing PDF page

In this code snippet, new content will be added on top of existing content:

```
import io, sys

from fpdf import FPDF
from PyPDF2 import PdfReader, PdfWriter

IN_FILEPATH = sys.argv[1]
OUT_FILEPATH = sys.argv[2]
ON_PAGE_INDEX = 0  # Index of the target page (starts at zero)

def new_content():
    pdf = FPDF()
    pdf.add_page()
    pdf.set_font('times', 'B', 30)
    pdf.text(50, 150, 'Hello World!')
    return pdf.output()

reader = PdfReader(IN_FILEPATH)
page_overlay = PdfReader(io.BytesIO(new_content())).getPage(0)
reader.getPage(ON_PAGE_INDEX).merge_page(page2=page_overlay)

writer = PdfWriter()
writer.append_pages_from_reader(reader)
writer.write(OUT_FILEPATH)
```

7.3.2 Adding a page to an existing PDF

```
import io, sys

from fpdf import FPDF
from PyPDF2 import PdfMerger

IN_FILEPATH = sys.argv[1]
OUT_FILEPATH = sys.argv[2]
ON_PAGE_INDEX = 2  # Index at which the page will be inserted (starts at zero)

def new_page():
    pdf = FPDF()
    pdf.add_page()
    pdf.set_font('times', 'B', 19)
    pdf.text(50, 10, 'Hello World!')
    return io.BytesIO(pdf.output())

merger = PdfMerger()
merger.merge(position=0, fileobj=IN_FILEPATH)
merger.merge(position=ON_PAGE_INDEX, fileobj=new_page())
merger.write(OUT_FILEPATH)
```

7.3.3 Altering with PyPDF2 a document generated with fpdf2

A document created with `fpdf2` can the be edited with `PyPDF2` by passing its `.output()` to a `PyPDF2.PdfReader`:

```
import io
from fpdf import FPDF
from PyPDF2 import PdfReader

pdf = FPDF()
pdf.add_page()
pdf.set_font('times', 'B', 19)
pdf.text(50, 10, 'Hello World!')

reader = PdfReader(io.BytesIO(pdf.output()))
```

7.4 Templating with Jinja

Jinja is a fast, expressive, extensible templating engine.

7.4.1 Combining Jinja & write_html

```
from fpdf import FPDF
from jinja2 import Environment

template = Environment().from_string("""
<h1>{{ title | escape }}</h1>
<ul>
{% for item in items %}
  <li>{{ item }}</li>
{% endfor %}
</ul>
""")

title = "HTML & Jinja demo"
items = [
    "FIRST",
    "SECOND",
    "LAST"
]

pdf = FPDF()
pdf.add_page()
pdf.write_html(template.render(**globals()))
pdf.output("templating_with_jinja.pdf")
```

More details about the supported HTML features: HTML

7.5 Usage in web APIs

Note that `FPDF` instance objects are not designed to be reusable: **content cannot be added** once `output()` has been called.

Hence, even if the `FPDF` class should be thread-safe, we recommend that you either **create an instance for every request**, or if you want to use a global / shared object, to only store the bytes returned from `output()`.

7.5.1 Django

Django is:

> a high-level Python web framework that encourages rapid development and clean, pragmatic design

There is how you can return a PDF document from a Django view:

```
from django.http import HttpResponse
from fpdf import FPDF

def report(request):
    pdf = FPDF()
    pdf.add_page()
    pdf.set_font("Helvetica", size=24)
    pdf.cell(txt="hello world")
    return HttpResponse(bytes(pdf.output()), content_type="application/pdf")
```

7.5.2 Flask

Flask is a micro web framework written in Python.

The following code can be placed in a `app.py` file and launched using `flask run`:

```
from flask import Flask, make_response
from fpdf import FPDF

app = Flask(__name__)

@app.route("/")
def hello_world():
    pdf = FPDF()
    pdf.add_page()
    pdf.set_font("Helvetica", size=24)
    pdf.cell(txt="hello world")
    response = make_response(pdf.output())
    response.headers["Content-Type"] = "application/pdf"
    return response
```

7.5.3 AWS lambda

The following code demonstrates some minimal AWS lambda handler function that returns a PDF file as binary output:

```
from base64 import b64encode
from fpdf import FPDF

def handler(event, context):
    pdf = FPDF()
    pdf.add_page()
    pdf.set_font("Helvetica", size=24)
    pdf.cell(txt="hello world")
    return {
        'statusCode': 200,
        'headers': {
            'Content-Type': 'application/json',
        },
        'body': b64encode(pdf.output()).decode('utf-8'),
        'isBase64Encoded': True
    }
```

This AWS lambda function can then be linked to a HTTP endpoint using API Gateway, or simply exposed as a Lambda Function URL. More information on those pages:

- Tutorial: Creating a Lambda function with a function URL
- Return binary media from a Lambda

For reference, the test lambda function was initiated using the following AWS CLI commands:

eating & uploading a lambda layer

```
pyv=3.8
pip${pyv} install fpdf2 -t python/lib/python${pyv}/site-packages/
# We use a distinct layer for Pillow:
rm -r python/lib/python${pyv}/site-packages/{PIL,Pillow}*
zip -r fpdf2-deps.zip python > /dev/null
aws lambda publish-layer-version --layer-name fpdf2-deps \
    --description "Dependencies for fpdf2 lambda" \
    --zip-file fileb://fpdf2-deps.zip --compatible-runtimes python${pyv}
```

eating the lambda

```
AWS_ACCOUNT_ID=...
AWS_REGION=eu-west-3
zip -r fpdf2-test.zip lambda.py
aws lambda create-function --function-name fpdf2-test --runtime python${pyv} \
    --zip-file fileb://fpdf2-test.zip --handler lambda.handler \
    --role arn:aws:iam::${AWS_ACCOUNT_ID}:role/lambda-fpdf2-role \
    --layers arn:aws:lambda:${AWS_REGION}:770693421928:layer:Klayers-python${pyv/./}-Pillow:15 \
             arn:aws:lambda:${AWS_REGION}:${AWS_ACCOUNT_ID}:layer:fpdf2-deps:1
aws lambda create-function-url-config --function-name fpdf2-test --auth-type NONE
```

Those commands do not cover the creation of the `lambda-fpdf2-role` role, nor configuring the lambda access permissions, for example with a `FunctionURLAllowPublicAccess` resource-based policy.

7.5.4 streamlit

streamlit is:

> a Python library that makes it easy to create and share custom web apps for data science

The following code demonstrates how to display a PDF and add a button allowing to download it:

```
from base64 import b64encode
from fpdf import FPDF
import streamlit as st

st.title("Demo of fpdf2 usage with streamlit")

@st.cache
def gen_pdf():
    pdf = FPDF()
    pdf.add_page()
    pdf.set_font("Helvetica", size=24)
    pdf.cell(txt="hello world")
    return bytes(pdf.output())

# Embed PDF to display it:
base64_pdf = b64encode(gen_pdf()).decode("utf-8")
pdf_display = f'<embed src="data:application/pdf; base64,{base64_pdf}" width="700" height="400" type="application/pdf">'
st.markdown(pdf_display, unsafe_allow_html=True)

# Add a download button:
st.download_button(
    label="Download PDF",
    data=gen_pdf(),
    file_name="file_name.pdf",
    mime="application/pdf",
)
```

7.5.5 Jupyter

Check tutorial/notebook.ipynb

7.5.6 web2py

Usage of the original PyFPDF lib with web2py is described here: https://github.com/reingart/pyfpdf/blob/master/docs/Web2Py.md

`v1.7.2` of PyFPDF is included in `web2py` since release `1.85.2`: https://github.com/web2py/web2py/tree/master/gluon/contrib/fpdf

7.6 Database storage

7.6.1 SQLAlchemy

The following snippet demonstrates how to store PDFs built with `fpdf2` in a database, an then retrieve them, using SQLAlchemy:

```
from fpdf import FPDF
from sqlalchemy import create_engine, Column, Integer, LargeBinary, String
from sqlalchemy.orm import declarative_base, sessionmaker

Base = declarative_base()

class User(Base):
    __tablename__ = 'users'
    id = Column(Integer, primary_key=True)
    name = Column(String(50))
    pdf = Column(LargeBinary)

engine = create_engine('sqlite:///:memory:', echo=True)
Base.metadata.create_all(engine)

pdf = FPDF()
pdf.add_page()
pdf.set_font("Helvetica", size=24)
pdf.cell(txt="My name is Bobby")
new_user = User(name="Bobby", pdf=pdf.output())

Session = sessionmaker(bind=engine)
session = Session()

session.add(new_user)

user = session.query(User).filter_by(name="Bobby").first()
with open("user.pdf", "wb") as pdf_file:
    pdf_file.write(user.pdf)
```

Note that storing large binary data in a database is usually not recommended... You might be better off dynamically generating your PDFs from structured data in your database.

8. Development

8.1 Development

This page has summary information about developing the PyPDF library.

- Development
- History
- Usage
- Repository structure
- Installing fpdf2 from a local git repository
- Code auto-formatting
- Linting
- Pre-commit hook
- Testing
- Running tests
- Why is a test failing?
- assert_pdf_equal & writing new tests
- GitHub pipeline
- Release checklist
- Documentation
- PDF spec & new features
- Useful tools to manipulate PDFs
- qpdf
- set_pdf_xref.py

8.1.1 History

This project, `fpdf2` is a *fork* of the `PyFPDF` project, which can be found on GitHub at reingart/pyfpdf but has been inactive since January of 2018.

About the original `PyFPDF` lib:

> This project started as a Python fork of the FPDF PHP library, ported to Python by Max Pat in 2006: http://www.fpdf.org/dl.php?id=94. Later, code for native reading TTF fonts was added. The project aim is to keep the library up to date, to fulfill the goals of its original roadmap and provide a general overhaul of the codebase to address technical debt keeping features from being added and bugs to be eradicated. Until 2015 the code was developed at Google Code: you can still access the old issues, and old wiki.

As of version 2.5.4, `fpdf2` is fully backward compatible with PyFPDF, with the exception of one minor point: for the `cell()` method, the default value of `h` has changed. It used to be `0` and is now set to the current value of `FPDF.font_size`.

8.1.2 Usage

- PyPI download stats - Downloads per release on Pepy
- pip trends: fpdf2 VS other PDF rendering libs
- packages using `fpdf2` can be listed using GitHub Dependency graph: Dependents, Wheelodex or Watchman Pypi. Some are also listed on its libraries.io page.

8.1.3 Repository structure

- `.github/` - GitHub Actions configuration
- `docs/` - documentation folder
- `fpdf/` - library sources
- `scripts/` - utilities to validate PDF files & publish the package on Pypi
- `test/` - non-regression tests
- `tutorial/` - tutorials (see also Tutorial)
- `README.md` - Github and PyPI ReadMe
- `CHANGELOG.md` - details of each release content
- `LICENSE` - code license information
- `CODEOWNERS` - define individuals or teams responsible for code in this repository
- `CONTRIBUTORS.md` - the people who helped build this library ❤️
- `setup.cfg`, `setup.py`, `MANIFEST.in` - packaging configuration to publish a package on Pypi
- `mkdocs.yml` - configuration for MkDocs
- `tox.ini` - configuration for Tox
- `.banditrc.yml` - configuration for bandit
- `.pylintrc` - configuration for Pylint

8.1.4 Installing fpdf2 from a local git repository

```
pip install --editable $path/to/fpdf/repo
```

This will link the installed Python package to the repository location, basically meaning any changes to the code package will get reflected directly in your environment.

8.1.5 Code auto-formatting

We use black as a code prettifier. This "*uncomprimising Python code formatter*" must be installed in your development environment in order to auto-format source code before any commit:

```
pip install black
black .  # inside fpdf2 root directory
```

8.1.6 Linting

We use pylint as a static code analyzer to detect potential issues in the code.

In case of special "false positive" cases, checks can be disabled locally with `#pylint disable=XXX` code comments, or globally through the `.pylintrc` file.

8.1.7 Pre-commit hook

If you use a UNIX system, you can place the following shell code in `.git/hooks/pre-commit` in order to always invoke `black` & `pylint` before every commit:

```
#!/bin/bash
git_cached_names() { git diff --cached --name-only --diff-filter=ACM; }
if git_cached_names | grep -q 'test.*\.py$' && grep -IRF generate=True $(git_cached_names | grep 'test.*\.py$'); then
    echo '`generate=True` left remaining in a call to assert_pdf_equal'
    exit 1
fi
modified_py_files=$(git_cached_names | grep '\.py$')
modified_fpdf_files=$(git_cached_names | grep '^fpdf.*\.py$')
# If any Python files were modified, format them:
if [ -n "$modified_py_files" ]; then
    if ! black --check $modified_py_files; then
```

```
        black $modified_py_files
        exit 1
    fi
    # If fpdf/ files were modified, lint them:
    [[ $modified_fpdf_files == "" ]] || pylint $modified_fpdf_files
fi
```

It will abort the commit if `pylint` found issues or `black` detect non-properly formatted code. In the later case though, it will auto-format your code and you will just have to run `git commit -a` again.

8.1.8 Testing

Running tests

To run tests, `cd` into `fpdf2` repository, install the dependencies using `pip install -r test/requirements.txt`, and run `pytest`.

You can run a single test by executing: `pytest -k function_name`.

Alternatively, you can use Tox. It is self-documented in the `tox.ini` file in the repository. To run tests for all versions of Python, simply run `tox`. If you do not want to run tests for all versions of python, run `tox -e py39` (or your version of Python).

Why is a test failing?

If there are some failing tests after you made a code change, it is usually because **there are difference between an expected PDF generated and the actual one produced**.

Calling `pytest -vv` will display **the difference of PDF source code** between the expected & actual files, but that may be difficult to understand,

You can also have a look at the PDF files involved by navigating to the temporary test directory that is printed out during the test failure:

```
================================== FAILURES ===================================
_____________________________ test_html_simple_table _____________________________

tmp_path = PosixPath('/tmp/pytest-of-runner/pytest-0/test_html_simple_table0')
```

This directory contains the **actual** & **expected** files, that you can vsualize to spot differences:

```
$ ls /tmp/pytest-of-runner/pytest-0/test_html_simple_table0
actual.pdf
actual_qpdf.pdf
expected_qpdf.pdf
```

assert_pdf_equal & writing new tests

When a unit test generates a PDF, it is recommended to use the `assert_pdf_equal` utility function in order to validate the output. It relies on the very handy qpdf CLI program to generate a PDF that is easy to compare: annotated, strictly formatted, with uncompressed internal streams. You will need to have its binary in your `$PATH`, otherwise `assert_pdf_equal` will fall back to hash-based comparison.

All generated PDF files (including those processed by `qpdf`) will be stored in `/tmp/pytest-of-USERNAME/pytest-current/NAME_OF_TEST/`. By default, three last test runs will be saved and then automatically deleted, so you can check the output in case of a failed test.

In order to generate a "reference" PDF file, simply call `assert_pdf_equal` once with `generate=True`.

8.1.9 GitHub pipeline

A GitHub Actions pipeline is executed on every commit on the `master` branch, and for every *Pull Request*.

It performs all validation steps detailed above: code checking with `black`, static code analysis with `pylint`, unit tests... *Pull Requests* submitted must pass all those checks in order to be approved. Ask maintainers through comments if some errors in the pipeline seem obscure to you.

Release checklist

1. complete `CHANGELOG.md` and add the version & date of the new release
2. bump `FPDF_VERSION` in `fpdf/fpdf.py`. Also (optionnal, once every year), update `contributors/contributors-map-small.png` based on https://pyfpdf.github.io/fpdf2/contributors.html
3. `git commit` & `git push`
4. check that the GitHub Actions succeed, and that a new release appears on Pypi
5. perform a GitHub release, taking the description from the `CHANGELOG.md`. It will create a new `git` tag.
6. Announce the release on r/pythonnews

8.1.10 Documentation

The standalone documentation is in the `docs` subfolder, written in Markdown. Building instructions are contained in the configuration file `mkdocs.yml` and also in `.github/workflows/continuous-integration-workflow.yml`.

Additional documentation is generated from inline comments, and is available in the project home page.

After being committed to the master branch, code documentation is automatically uploaded to GitHub Pages.

There is a useful one-page example Python module with docstrings illustrating how to document code: pdoc3 example_pkg.

To preview the Markdown documentation, launch a local rendering server with:

```
mkdocs serve
```

To preview the API documentation, launch a local rendering server with:

```
pdoc --html -o public/ fpdf --http :
```

8.1.11 PDF spec & new features

The **PDF 1.7 spec** is available on Adobe website: PDF32000_2008.pdf.

It may be intimidating at first, but while technical, it is usually quite clear and understandable.

It is also a great place to look for new features for `fpdf2`: there are still many PDF features that this library does not support.

8.1.12 Useful tools to manipulate PDFs

qpdf

qpdf is a very powerful tool to analyze PDF documents.

One of it most useful features is the QDF mode that can convert any PDF file to a human-readable, decompressed & annotated new PDF document:

```
qpdf --qdf doc.pdf doc-qdf.pdf
```

This is extremely useful to peek into the PDF document structure.

set_pdf_xref.py

set_pdf_xref.py is a small Python script that can **rebuild a PDF xref table**.

This is very useful, as a PDF with an invalid xref cannot be opened. An xref table is basically an index of the document internal sections. When manually modifying a PDF file (for example one produced by `qpdf --qdf`), if the characters count in any of its sections changes, the xref table must be rebuilt.

With `set_pdf_xref.py doc.pdf --inplace`, you can change some values inside any PDF file, and then quickly make it valid again to be viewed in a PDF viewer.

8.2 Logging

`fpdf.FPDF` generates useful `DEBUG` logs on generated sections sizes when calling the `output()` method., that can help to identify what part of a PDF takes most space (fonts, images, pages...).

Here is an example of setup code to display them:

```
import logging

logging.basicConfig(format="%(asctime)s %(name)s [%(levelname)s] %(message)s",
                    datefmt="%H:%M:%S", level=logging.DEBUG)
```

Example output using the Tutorial first code snippet:

```
19:25:24 fpdf.output [DEBUG] Final size summary of the biggest document sections:
19:25:24 fpdf.output [DEBUG] - pages: 223.0B
19:25:24 fpdf.output [DEBUG] - fonts: 102.0B
```

8.2.1 fonttools verbose logs

Since `fpdf2` v2.5.7, verbose **INFO** logs are generated by `fonttools`, a library we use to parse font files:

```
fontTools.subset [INFO] maxp pruned
fontTools.subset [INFO] cmap pruned
fontTools.subset [INFO] post pruned
fontTools.subset [INFO] EBDT dropped
fontTools.subset [INFO] EBLC dropped
fontTools.subset [INFO] GDEF dropped
fontTools.subset [INFO] GPOS dropped
fontTools.subset [INFO] GSUB dropped
fontTools.subset [INFO] DSIG dropped
fontTools.subset [INFO] name pruned
fontTools.subset [INFO] glyf pruned
fontTools.subset [INFO] Added gid0 to subset
fontTools.subset [INFO] Added first four glyphs to subset
fontTools.subset [INFO] Closing glyph list over 'glyf': 25 glyphs before
fontTools.subset [INFO] Glyph names: ['.notdef', 'b', 'braceleft', 'braceright', 'd', 'e', 'eight', 'five', 'four', 'glyph1', 'glyph2', 'h', 'l', 'n', 'nine',
'o', 'one', 'r', 'seven', 'six', 'space', 'three', 'two', 'w', 'zero']
fontTools.subset [INFO] Glyph IDs:   [0, 1, 2, 3, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 69, 71, 72, 75, 79, 81, 82, 85, 90, 94, 96]
fontTools.subset [INFO] Closed glyph list over 'glyf': 25 glyphs after
fontTools.subset [INFO] Glyph names: ['.notdef', 'b', 'braceleft', 'braceright', 'd', 'e', 'eight', 'five', 'four', 'glyph1', 'glyph2', 'h', 'l', 'n', 'nine',
'o', 'one', 'r', 'seven', 'six', 'space', 'three', 'two', 'w', 'zero']
fontTools.subset [INFO] Glyph IDs:   [0, 1, 2, 3, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 69, 71, 72, 75, 79, 81, 82, 85, 90, 94, 96]
fontTools.subset [INFO] Retaining 25 glyphs
fontTools.subset [INFO] head subsetting not needed
fontTools.subset [INFO] hhea subsetting not needed
fontTools.subset [INFO] maxp subsetting not needed
fontTools.subset [INFO] OS/2 subsetting not needed
fontTools.subset [INFO] hmtx subsetted
fontTools.subset [INFO] cmap subsetted
fontTools.subset [INFO] fpgm subsetting not needed
fontTools.subset [INFO] prep subsetting not needed
fontTools.subset [INFO] cvt  subsetting not needed
fontTools.subset [INFO] loca subsetting not needed
fontTools.subset [INFO] post subsetted
fontTools.subset [INFO] name subsetting not needed
fontTools.subset [INFO] glyf subsetted
fontTools.subset [INFO] head pruned
fontTools.subset [INFO] OS/2 Unicode ranges pruned: [0]
fontTools.subset [INFO] glyf pruned
```

You can easily suppress those logs with this single line of code:

```
logging.getLogger('fontTools.subset').level = logging.WARN
```

Similarly, you can omit verbose logs from `fontTools.ttLib.ttFont`:

```
logging.getLogger('fontTools.ttLib.ttFont').level = logging.WARN
```

9. FAQ

See Project Home for an overall introduction.

- FAQ
- What is fpdf2?
- What is this library not?
- How does this library compare to ...?
- What does the code look like?
- Does this library have any framework integration?
- What is the development status of this library?
- What is the license of this library (fpdf2)?

9.1 What is fpdf2?

`fpdf2` is a library with low-level primitives to easily generate PDF documents.

This is similar to ReportLab's graphics canvas, but with some methods to output "fluid" cells ("flowables" that can span multiple rows, pages, tables, columns, etc).

It has methods ("hooks") that can be implemented in a subclass: `headers` and `footers`.

Originally developed in PHP several years ago (as a free alternative to proprietary C libraries), it has been ported to many programming languages, including ASP, C++, Java, Pl/SQL, Ruby, Visual Basic, and of course, Python.

For more information see: http://www.fpdf.org/en/links.php

9.2 What is this library not?

This library is not a:

- charts or widgets library. But you can import PNG or JPG images, use PIL or any other library, or draw the figures yourself.
- "flexible page layout engine" like Reportlab PLATYPUS. But it can do columns, chapters, etc.; see the Tutorial.
- XML or object definition language like Geraldo Reports, Jasper Reports, or similar. But look at write_html for simple HTML reports and Templates for fill-in-the-blank documents.
- PDF text extractor, converter, splitter or similar.

9.3 How does this library compare to ...?

The API is geared toward giving the user access to features of the Portable Document Format as they are described in the Adobe PDF Reference Manual, this bypasses needless complexities for simpler use cases.

It is small:

```
$ du -sh fpdf
1,6M    fpdf

$ scc fpdf
─────────────────────────────────────────────────────────────────────────────
Language                 Files     Lines   Blanks  Comments     Code Complexity
Python                      21     16879      480       571    15828        462
```

It includes `cell()` and `multi_cell()` primitives to draw fluid document like invoices, listings and reports, and includes basic support for HTML rendering.

Compared to other solutions, this library should be easier to use and adapt for most common documents (no need to use a page layout engine, style sheets, templates, or stories...), with full control over the generated PDF document (including advanced features and extensions).

Check also the list of features on the home page.

9.4 What does the code look like?

Following is an example similar to the Reportlab one in the book of web2py. Note the simplified import and usage: (http://www.web2py.com/book/default/chapter/09?search=pdf#ReportLab-and-PDF)

```
from fpdf import FPDF

def get_me_a_pdf():
    title = "This The Doc Title"
    heading = "First Paragraph"
    text = 'bla ' * 10000

    pdf = FPDF()
    pdf.add_page()
    pdf.set_font('Times', 'B', 15)
    pdf.cell(w=210, h=9, txt=title, border=0,
            new_x="LMARGIN", new_y="NEXT", align='C', fill=False)
    pdf.set_font('Times', 'B', 15)
    pdf.cell(w=0, h=6, txt=heading, border=0,
            new_x="LMARGIN", new_y="NEXT", align='L', fill=False)
    pdf.set_font('Times', '', 12)
    pdf.multi_cell(w=0, h=5, txt=text)
    response.headers['Content-Type'] = 'application/pdf'
    return pdf.output()
```

With Reportlab:

```
from reportlab.platypus import *
from reportlab.lib.styles import getSampleStyleSheet
from reportlab.rl_config import defaultPageSize
from reportlab.lib.units import inch, mm
from reportlab.lib.enums import TA_LEFT, TA_RIGHT, TA_CENTER, TA_JUSTIFY
from reportlab.lib import colors
from uuid import uuid4
from cgi import escape
import os

def get_me_a_pdf():
    title = "This The Doc Title"
    heading = "First Paragraph"
    text = 'bla ' * 10000

    styles = getSampleStyleSheet()
    tmpfilename = os.path.join(request.folder, 'private', str(uuid4()))
    doc = SimpleDocTemplate(tmpfilename)
    story = []
    story.append(Paragraph(escape(title), styles["Title"]))
    story.append(Paragraph(escape(heading), styles["Heading2"]))
    story.append(Paragraph(escape(text), styles["Normal"]))
    story.append(Spacer(1, 2 * inch))
    doc.build(story)
    data = open(tmpfilename, "rb").read()
    os.unlink(tmpfilename)
    response.headers['Content-Type'] = 'application/pdf'
    return data
```

9.5 Does this library have any framework integration?

Yes, if you use web2py, you can make simple HTML reports that can be viewed in a browser, or downloaded as PDF.

Also, using web2py DAL, you can easily set up a templating engine for PDF documents.

Look at Web2Py for examples.

9.6 What is the development status of this library?

This library was improved over the years since the initial port from PHP. As of 2021, it is **stable** and actively maintained, with bug fixes and new features developped regularly.

In contrast, `write_html` support is not complete, so it must be considered in beta state.

9.7 What is the license of this library (fpdf2)?

LGPL v3.0.

Original FPDF uses a permissive license: http://www.fpdf.org/en/FAQ.php#q1

"FPDF is released under a permissive license: there is no usage restriction. You may embed it freely in your application (commercial or not), with or without modifications."

FPDF version 1.6's license.txt says: http://www.fpdf.org/es/dl.php?v=16&f=zip

Permission is hereby granted, free of charge, to any person obtaining a copy of this software to use, copy, modify, distribute, sublicense, and/or sell copies of the software, and to permit persons to whom the software is furnished to do so.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED.

The original `fpdf.py` library was a revision of a port by Max Pat. The original source uses the same licence: http://www.fpdf.org/dl.php?id=94

```
# * Software: FPDF
# * Version:  1.53
# * Date:     2004-12-31
# * Author:   Olivier PLATHEY
# * License:  Freeware
# *
# * You may use and modify this software as you wish.
# * Ported to Python 2.4 by Max (maxpat78@yahoo.it) on 2006-05
```

To avoid ambiguity (and to be compatible with other free software, open source licenses), LGPL was chosen for the Google Code project (as freeware isn't listed).

Some FPDF ports had chosen similar licences (wxWindows Licence for C++ port, MIT licence for Java port, etc.): http://www.fpdf.org/en/links.php

Other FPDF derivatives also choose LGPL, such as sFPDF by Ian Back.