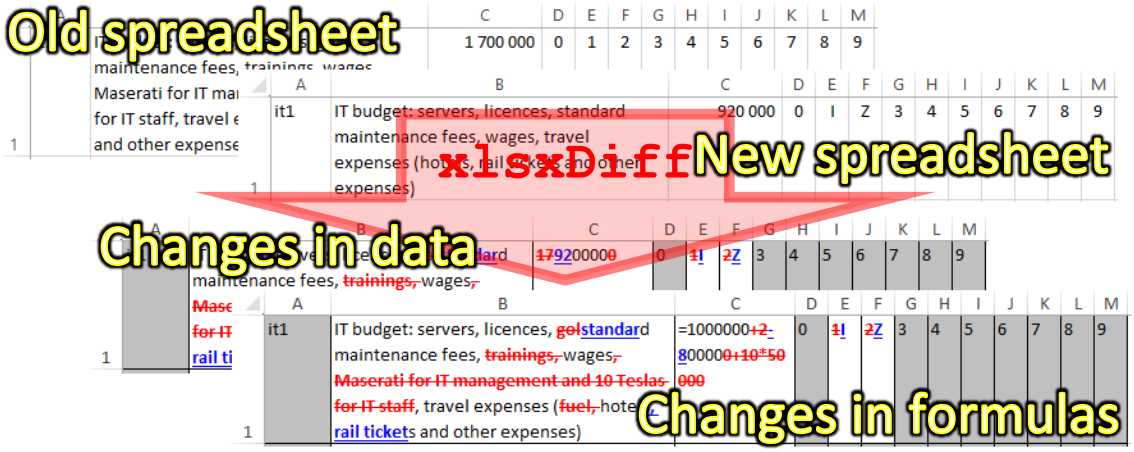


# xlsxDiff

## Python script for Excel spreadsheets comparison

Version 2.0.0

https://github.com/rafal-dot/xlsxDiff

Rafał Czeczótka

<rafal dot czeczotka at gmail dot com>

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# 1 Introduction

Excel is a powerful, complex and flexible tool. It is used for calculations, for storing data or for modelling complex interdependences. However you use it, you may find xlsxDiff useful. Especially if you work in a team and share data, you've surely encountered the challenge of identifying changes made by your workmates (or by yourself some time ago).

I myself have desired to compare two complex Excel spreadsheets many times. I was especially interested in finding things like minor modifications to texts in cells, modifications to numbers, or changes to formulas. Unfortunately, all the solutions I could find were limited to a simple binary comparison of cell values, which helps a lot, but is often too general and requires a huge extra effort to precisely identify changes made. Since I couldn't find a suitable solution, I finally got annoyed and wrote a solution myself which I am making available as open source.

The main purpose of this tool is to fill the gap and facilitate the search and visualization of changes made between file versions, with an emphasis on the ability to track changes made at the level of individual cells with visualization similar to changes tracking feature in Word. This script ignores all other changes made, like removing/adding/changing order of rows/columns/tabs, changes in formatting etc. However, it is easier to quickly identify where such general changes have been made and after minor manual interventions in the input files it is easy to get a comprehensive and clear picture of all changes made.

xlsxDiff uses two, widely used, but not part of any distribution I know of, Python modules. These modules allow the manipulation of Excel files: OpenPyXL and XlsxWriter.

xlsxDiff is designed to be used freely, without any obligation, in any environment, including commercial environment or large MNEs. xlsxDiff itself is released under the open-source GNU Affero GPL license, and I tried to make it based solely on tools and modules under open licenses (GNU Affero GPL, PSF License, MIT/Expat License and BSD 2-Clause License). However, just in case, consult your legal advisor. **And last but not least, remember that none of the licenses used provide any guarantees.**

# 2 Installation

## 2.1 Download xlsxDiff

To download xlsxDiff, just do one of the following:

- download the compressed archive from the repository page GitHub (see Code/Download ZIP button)

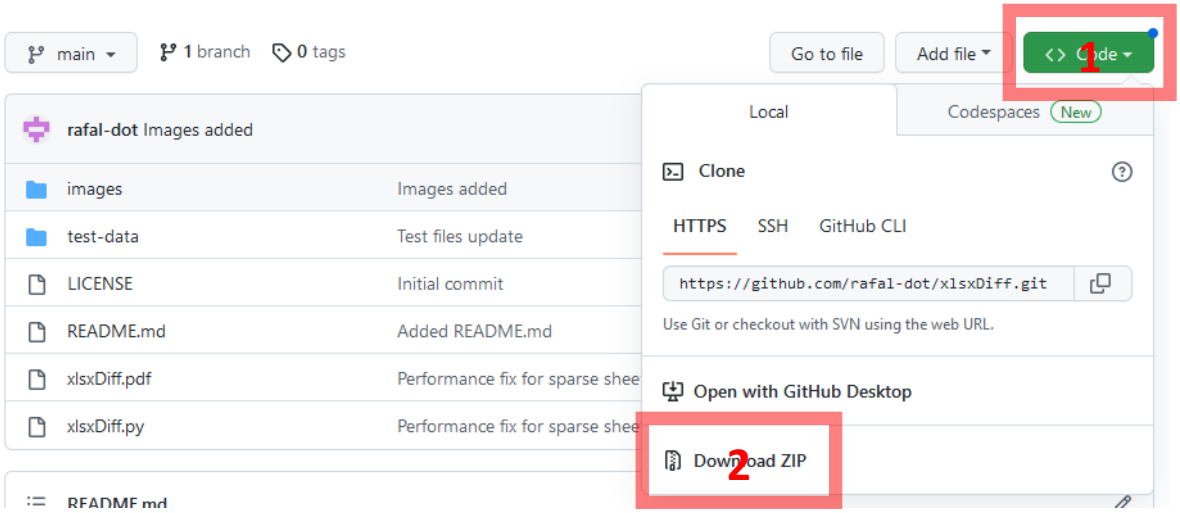



*Figure 1 To download xlsxDiff, on page https://github.com/rafal-dot/xlsxDiff: (1) press "Code" (top right corner) and (2) "Download ZIP"*

or

- execute a git clone command:

```
git clone https://github.com/rafal-dot/xlsxDiff.git
```

## 2.2 Python installation

To avoid legal challenges, I suggest using the standard Python distribution, which can be found at https://www.python.org/downloads/windows/ [1] As of the date of this writing, the most current stable version is `python-3.10.10.exe`, but any version from 3.5 or above should be fine[2]. If you choose "Add python.exe to PATH" option during installation, it will make your life easier later.

## 2.3 Installation of OpenPyXL and XlsxWriter modules

Install two necessary modules being used by xlsxDiff, that allow to manipulate .xlsx files:

```
pip install openpyxl xlsxwriter
```

And *voilà*. That's it, you can enjoy using xlsxDiff.

[1] For any Unix distribution you probably already have Python installed. I do not use macOS, but you can also find a distribution for this system

[2] The script uses some dictionary manipulation features introduced in version 3.5. For older version of Python 3 minor tuning might be required, what should be no problem for more advanced users. Please, RTFS for details 😉

# 3 Use

Using xlsxDiff is simple, in Windows environment just run `cmd` and call the script with three parameters: two input files and output file:

```
python xlsxDiff.py in1.xlsx in2.xlsx out.xlsx
```

It involves comparing two versions of a spreadsheet – the old one and the new one – resulting in a spreadsheet with all changes highlighted.

To make it easier to find the changes, colours are being widely used for marking tabs:

1. All changed tabs are standard (usually white) in colour;
2. All new tabs are coloured blue;
3. All deleted tabs are coloured red;
4. All tabs where no changes have been detected are grey in colour.

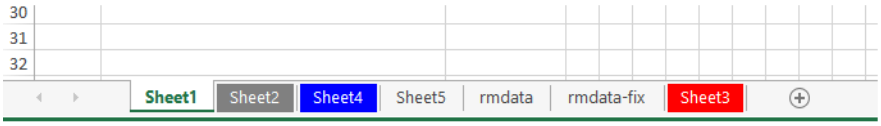



*Figure 2 Tabs view: (i) sheets with white tabs contain cells compared item by item, (ii) grey is tab without any changes, (iii) blue tab is new one and (iv) red is removed tab*

In the tabs where changes were detected (i.e. all except grey tabs):

1. Changed cells have a white background and in addition: unchanged text is black, added text is blue and underlined while ~~deleted text is red and crossed out~~;
2. In addition, when you select the "-x" option – to make it easier to find changes – in all rows where any changes are identified, the cell in the first column has a green background. Also, in all columns where any changes are identified, the cell in the first row has a green background. This allows you to easily filter the changed cells using Excel's built-in option to automatically filter by colour. Details are described in one of the following sections;
3. Unchanged cells have a grey background.

| | A | B | C |
|---|---|---|---|
| 1 | it1 | IT budget: servers, licences, gold maintenance fees, trainings, wages, Maserati for IT management and 10 Teslas for IT staff, travel expenses (fuel, hotels and other expenses) | 1 700 000 |

| | A | B | C |
|---|---|---|---|
| 1 | it1 | IT budget: servers, licences, standard maintenance fees, wages, travel expenses (hotels, rail tickets and other expenses) | 920 000 |

| | A | B | C |
|---|---|---|---|
| 1 | it1 | IT budget: servers, licences, ~~gol~~standard maintenance fees, ~~trainings,~~ wages~~,~~ ~~Maserati for IT management and 10 Teslas for IT staff~~, travel expenses (~~fuel,~~ hotels~~,~~ rail tickets and other expenses) | ~~1~~792000~~0~~ |

*Figure 3 Example of compared cells: cells in the compared spreadsheets at the top and the result of the comparison at the bottom. Red text fragments were removed, blue text fragments were added, while the cell with the gray background was not changed*

# 4 Options

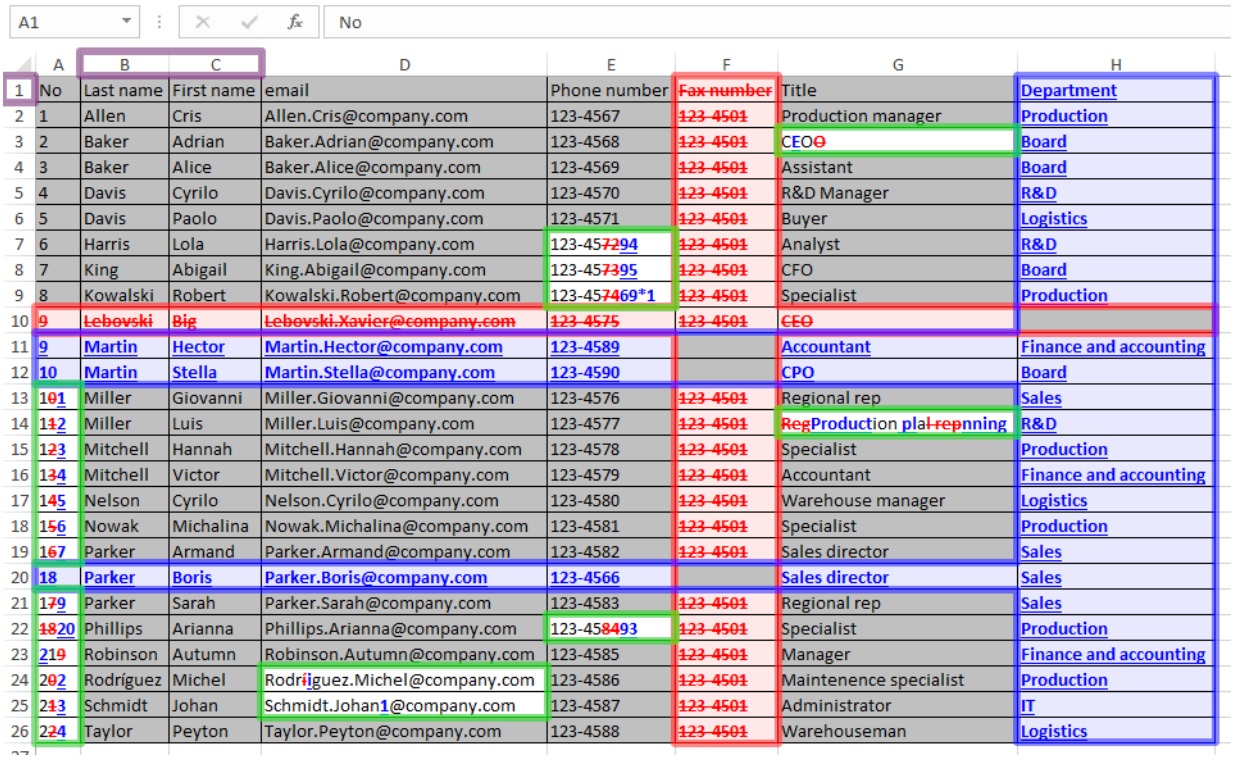
## 4.1 "-c"/"--icolumn" and "-r"/"--irow" – analyse and visualize changes in entire rows and columns

It is possible to track changes in columns and rows and, respectively, changes in other cells:

```
python xlsxDiff.py in1.xlsx in2.xlsx out.xlsx -c staff!B,C -r staff!1
```

Syntax is as follows: tab name, "`!`" sign (exclamation mark) and column(s) names. If there are more than one columns, column names are comma separated. If there is space in tab name, text should be closed in quotation mark, for example "`new elements!A`".

Beware typos (!!!) and remember, that tab name can also end with space 😉



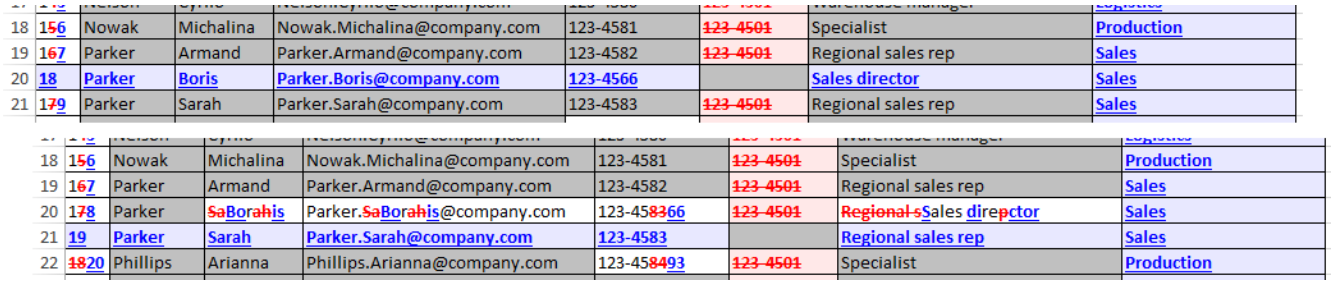
| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | No | Last name | First name | email | Phone number | ~~Fax number~~ | Title | Department |
| 2 | 1 | Allen | Cris | Allen.Cris@company.com | 123-4567 | ~~123-4501~~ | Production manager | Production |
| 3 | 2 | Baker | Adrian | Baker.Adrian@company.com | 123-4568 | ~~123-4501~~ | CEO~~0~~ | Board |
| 4 | 3 | Baker | Alice | Baker.Alice@company.com | 123-4569 | ~~123-4501~~ | Assistant | Board |
| 5 | 4 | Davis | Cyrilo | Davis.Cyrilo@company.com | 123-4570 | ~~123-4501~~ | R&D Manager | R&D |
| 6 | 5 | Davis | Paolo | Davis.Paolo@company.com | 123-4571 | ~~123-4501~~ | Buyer | Logistics |
| 7 | 6 | Harris | Lola | Harris.Lola@company.com | 123-457~~2~~94 | ~~123-4501~~ | Analyst | R&D |
| 8 | 7 | King | Abigail | King.Abigail@company.com | 123-457~~3~~95 | ~~123-4501~~ | CFO | Board |
| 9 | 8 | Kowalski | Robert | Kowalski.Robert@company.com | 123-4574~~6~~9*1 | ~~123-4501~~ | Specialist | Production |
| 10 | ~~9~~ | ~~Lebovski~~ | ~~Big~~ | ~~Lebovski.Xavier@company.com~~ | ~~123-4575~~ | ~~123-4501~~ | ~~CEO~~ | |
| 11 | 9 | Martin | Hector | Martin.Hector@company.com | 123-4589 | | Accountant | Finance and accounting |
| 12 | 10 | Martin | Stella | Martin.Stella@company.com | 123-4590 | | CPO | Board |
| 13 | 10~~1~~ | Miller | Giovanni | Miller.Giovanni@company.com | 123-4576 | ~~123-4501~~ | Regional rep | Sales |
| 14 | 11~~2~~ | Miller | Luis | Miller.Luis@company.com | 123-4577 | ~~123-4501~~ | ~~Reg~~Production pla~~l repn~~ning | R&D |
| 15 | 12~~3~~ | Mitchell | Hannah | Mitchell.Hannah@company.com | 123-4578 | ~~123-4501~~ | Specialist | Production |
| 16 | 13~~4~~ | Mitchell | Victor | Mitchell.Victor@company.com | 123-4579 | ~~123-4501~~ | Accountant | Finance and accounting |
| 17 | 14~~5~~ | Nelson | Cyrilo | Nelson.Cyrilo@company.com | 123-4580 | ~~123-4501~~ | Warehouse manager | Logistics |
| 18 | 15~~6~~ | Nowak | Michalina | Nowak.Michalina@company.com | 123-4581 | ~~123-4501~~ | Specialist | Production |
| 19 | 16~~7~~ | Parker | Armand | Parker.Armand@company.com | 123-4582 | ~~123-4501~~ | Sales director | Sales |
| 20 | 18 | Parker | Boris | Parker.Boris@company.com | 123-4566 | | Sales director | Sales |
| 21 | 17~~9~~ | Parker | Sarah | Parker.Sarah@company.com | 123-4583 | ~~123-4501~~ | Regional rep | Sales |
| 22 | ~~18~~20 | Phillips | Arianna | Phillips.Arianna@company.com | 123-458~~8~~493 | ~~123-4501~~ | Specialist | Production |
| 23 | 21~~9~~ | Robinson | Autumn | Robinson.Autumn@company.com | 123-4585 | ~~123-4501~~ | Manager | Finance and accounting |
| 24 | 20~~2~~ | Rodríguez | Michel | Rodr~~i~~iguez.Michel@company.com | 123-4586 | ~~123-4501~~ | Maintenence specialist | Production |
| 25 | 21~~3~~ | Schmidt | Johan | Schmidt.Johan1@company.com | 123-4587 | ~~123-4501~~ | Administrator | IT |
| 26 | 22~~4~~ | Taylor | Peyton | Taylor.Peyton@company.com | 123-4588 | ~~123-4501~~ | Warehouseman | Logistics |

*Figure 4 An example of applying option with pre-defined filters for columns B and C and row 1 automatically identifies many added and deleted rows and columns, and a few modified cells. This makes it much easier to identify the changes made*[3]

Please see elements highlighted:

- Purple: columns `B` and `C` used as index to identify changes in rows, and `1`st row used as index to identify changes columns. Tab name being analysed is `staff`, so options are:
  - "`-c staff!B,C`" for columns `B` and `C` in tab staff;
  - "`-r staff!1`" for row `1` in tab staff
- Blue: added columns/rows;
- Red: removed columns/rows;
- Green: changes in other cells. Necessary cell position adjustments after inserting and/or deleting columns and/or rows are included.

[3] Coloured boundary lines are manually overlayed (i.e. are not included in Excel spreadsheet) to facilitate visualisation of changes. All other formats are just screenshot from Excel



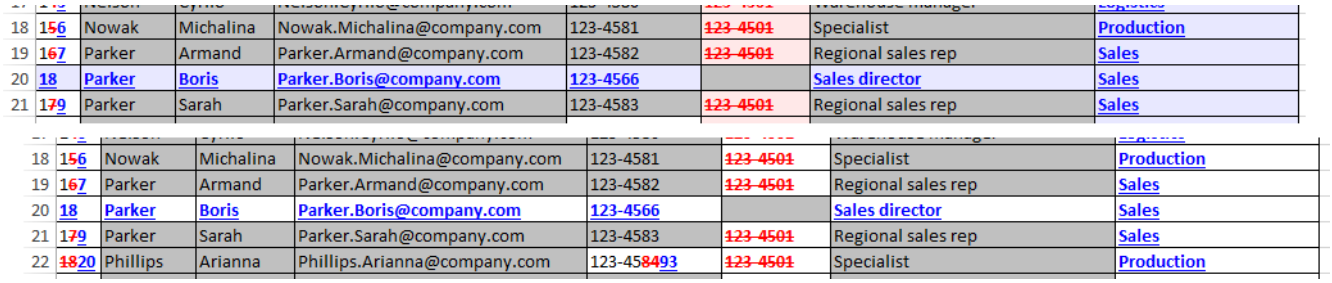
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18 | 156 | Nowak | Michalina | Nowak.Michalina@company.com | 123-4581 | 123-4501 | Specialist | Production |
| 19 | 167 | Parker | Armand | Parker.Armand@company.com | 123-4582 | 123-4501 | Regional sales rep | Sales |
| 20 | 18 | Parker | Boris | Parker.Boris@company.com | 123-4566 | | Sales director | Sales |
| 21 | 179 | Parker | Sarah | Parker.Sarah@company.com | 123-4583 | 123-4501 | Regional sales rep | Sales |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18 | 156 | Nowak | Michalina | Nowak.Michalina@company.com | 123-4581 | 123-4501 | Specialist | Production |
| 19 | 167 | Parker | Armand | Parker.Armand@company.com | 123-4582 | 123-4501 | Regional sales rep | Sales |
| 20 | 178 | Parker | SaBorahis | Parker.SaBorahis@company.com | 123-458366 | 123-4501 | Regional sSales direpctor | Sales |
| 21 | 19 | Parker | Sarah | Parker.Sarah@company.com | 123-4583 | | Regional sales rep | Sales |
| 22 | 1820 | Phillips | Arianna | Phillips.Arianna@company.com | 123-458493 | 123-4501 | Specialist | Production |

*Figure 5 An example of too narrow application of filter. Above, limiting only to column B (i.e. "-c staff!B -r staff!1") incorrectly identifies row 20 as modified and row 21 as added instead of identifying only 1 added row, without modifications in "Parker, Sarah" record*

## 4.2 "-X"/"--no_highlight_added_removed" - do not highlight added/removed columns/rows

This option disables highlighting of added/deleted rows/columns with light blue/red text background. Disabling this text formatting to highlight such cells makes it easier to auto filter rows using cell colours.



| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18 | 156 | Nowak | Michalina | Nowak.Michalina@company.com | 123-4581 | 123-4501 | Specialist | Production |
| 19 | 167 | Parker | Armand | Parker.Armand@company.com | 123-4582 | 123-4501 | Regional sales rep | Sales |
| 20 | 18 | Parker | Boris | Parker.Boris@company.com | 123-4566 | | Sales director | Sales |
| 21 | 179 | Parker | Sarah | Parker.Sarah@company.com | 123-4583 | 123-4501 | Regional sales rep | Sales |

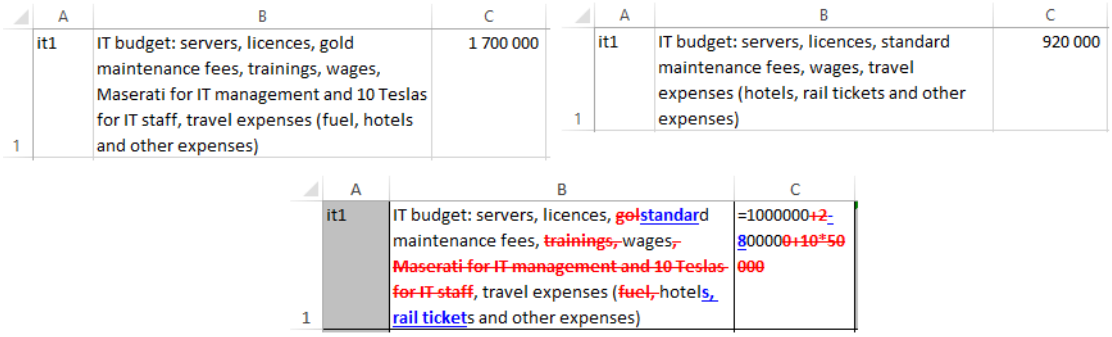
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 18 | 156 | Nowak | Michalina | Nowak.Michalina@company.com | 123-4581 | 123-4501 | Specialist | Production |
| 19 | 167 | Parker | Armand | Parker.Armand@company.com | 123-4582 | 123-4501 | Regional sales rep | Sales |
| 20 | 18 | Parker | Boris | Parker.Boris@company.com | 123-4566 | | Sales director | Sales |
| 21 | 179 | Parker | Sarah | Parker.Sarah@company.com | 123-4583 | 123-4501 | Regional sales rep | Sales |
| 22 | 1820 | Phillips | Arianna | Phillips.Arianna@company.com | 123-458493 | 123-4501 | Specialist | Production |

*Figure 6 An example of using the "-X" option. At the top, a view of normal application usage, at the bottom cells with light blue/red text background turned off*

## 4.3 "-f"/"--formula" – compare formulas instead of data

By default, cell values are used to compare cells. These values were calculated by Excel when the spreadsheet was last used.

Use the "-f" option, if it is more important to compare changes in formulas rather than changes in data.



| | A | B | C |
|---|---|---|---|
| 1 | it1 | IT budget: servers, licences, gold maintenance fees, trainings, wages, Maserati for IT management and 10 Teslas for IT staff, travel expenses (fuel, hotels and other expenses) | 1 700 000 |

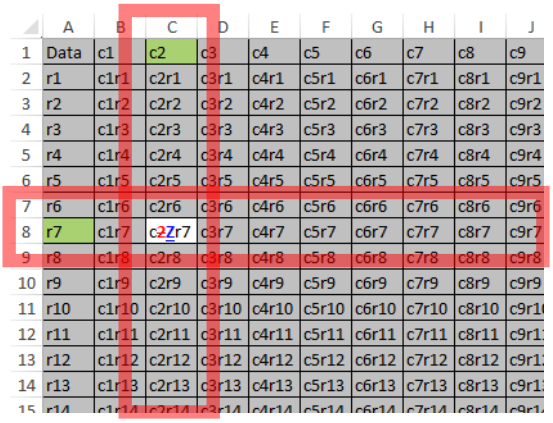
| | A | B | C |
|---|---|---|---|
| 1 | it1 | IT budget: servers, licences, standard maintenance fees, wages, travel expenses (hotels, rail tickets and other expenses) | 920 000 |

| | A | B | C |
|---|---|---|---|
| 1 | it1 | IT budget: servers, licences, goldstandard maintenance fees, trainings, wages, Maserati for IT management and 10 Teslas for IT staff, travel expenses (fuel, hotels, rail tickets and other expenses) | =1000000+2-80000+10*50000 |

*Figure 7 "-f" comparison mode – compare formulas. See column C and compare with column C in the previous figure*

## 4.4 "-x"/"--highlight" – highlight columns and rows with changes

This parameter highlights rows and columns containing changes, making it easier to find them. In all rows where any changes are identified, the cell in the first column has a green background. Also, in all columns where any changes have been identified, the cell in the first row has a green background.



| | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Data | c1 | c2 | c3 | c4 | c5 | c6 | c7 | c8 | c9 |
| 2 | r1 | c1r1 | c2r1 | c3r1 | c4r1 | c5r1 | c6r1 | c7r1 | c8r1 | c9r1 |
| 3 | r2 | c1r2 | c2r2 | c3r2 | c4r2 | c5r2 | c6r2 | c7r2 | c8r2 | c9r2 |
| 4 | r3 | c1r3 | c2r3 | c3r3 | c4r3 | c5r3 | c6r3 | c7r3 | c8r3 | c9r3 |
| 5 | r4 | c1r4 | c2r4 | c3r4 | c4r4 | c5r4 | c6r4 | c7r4 | c8r4 | c9r4 |
| 6 | r5 | c1r5 | c2r5 | c3r5 | c4r5 | c5r5 | c6r5 | c7r5 | c8r5 | c9r5 |
| 7 | r6 | c1r6 | c2r6 | c3r6 | c4r6 | c5r6 | c6r6 | c7r6 | c8r6 | c9r6 |
| 8 | r7 | c1r7 | c2r7 | c3r7 | c4r7 | c5r7 | c6r7 | c7r7 | c8r7 | c9r7 |
| 9 | r8 | c1r8 | c2r8 | c3r8 | c4r8 | c5r8 | c6r8 | c7r8 | c8r8 | c9r8 |
| 10 | r9 | c1r9 | c2r9 | c3r9 | c4r9 | c5r9 | c6r9 | c7r9 | c8r9 | c9r9 |
| 11 | r10 | c1r10 | c2r10 | c3r10 | c4r10 | c5r10 | c6r10 | c7r10 | c8r10 | c9r10 |
| 12 | r11 | c1r11 | c2r11 | c3r11 | c4r11 | c5r11 | c6r11 | c7r11 | c8r11 | c9r11 |
| 13 | r12 | c1r12 | c2r12 | c3r12 | c4r12 | c5r12 | c6r12 | c7r12 | c8r12 | c9r12 |
| 14 | r13 | c1r13 | c2r13 | c3r13 | c4r13 | c5r13 | c6r13 | c7r13 | c8r13 | c9r13 |
| 15 | r14 | c1r14 | c2r14 | c3r14 | c4r14 | c5r14 | c6r14 | c7r14 | c8r14 | c9r14 |

*Figure 8 Highlight columns and rows with changes*

Note that Excel allows you to easily filter rows using Excel's built-in option to automatically filter by colour (see next section).

## 4.5 "-a"/"--autofilter" – add automatic filter

This option causes an automatic filter to be added in all changed tabs in the first line automatically. Unfortunately, automatic pre-selection by colour is not available in the current version of the XlsxWriter library and manual intervention is required.

| | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Data | c1 | c2 | c3 | c4 | c5 | c6 | c7 | c8 | c9 |
| 2 | r1 | c1r1 | c2r1 | c3r1 | c4r1 | c5r1 | c6r1 | c7r1 | c8r1 | c9r1 |
| 3 | r2 | c1r2 | c2r2 | c3r2 | c4r2 | c5r2 | c6r2 | c7r2 | c8r2 | c9r2 |
| 4 | r3 | c1r3 | c2r3 | c3r3 | c4r3 | c5r3 | c6r3 | c7r3 | c8r3 | c9r3 |
| 5 | r4 | c1r4 | c2r4 | c3r4 | c4r4 | c5r4 | c6r4 | c7r4 | c8r4 | c9r4 |
| 6 | r5 | c1r5 | c2r5 | c3r5 | c4r5 | c5r5 | c6r5 | c7r5 | c8r5 | c9r5 |
| 7 | r6 | c1r6 | c2r6 | c3r6 | c4r6 | c5r6 | c6r6 | c7r6 | c8r6 | c9r6 |
| 8 | r7 | c1r7 | c2r7 | c3r7 | c4r7 | c5r7 | c6r7 | c7r7 | c8r7 | c9r7 |
| 9 | r8 | c1r8 | c2r8 | c3r8 | c4r8 | c5r8 | c6r8 | c7r8 | c8r8 | c9r8 |
| 10 | r9 | c1r9 | c2r9 | c3r9 | c4r9 | c5r9 | c6r9 | c7r9 | c8r9 | c9r9 |
| 11 | r10 | c1r10 | c2r10 | c3r10 | c4r10 | c5r10 | c6r10 | c7r10 | c8r10 | c9r10 |
| 12 | r11 | c1r11 | c2r11 | c3r11 | c4r11 | c5r11 | c6r11 | c7r11 | c8r11 | c9r11 |
| 13 | r12 | c1r12 | c2r12 | c3r12 | c4r12 | c5r12 | c6r12 | c7r12 | c8r12 | c9r12 |
| 14 | r13 | c1r13 | c2r13 | c3r13 | c4r13 | c5r13 | c6r13 | c7r13 | c8r13 | c9r13 |
| 15 | r14 | c1r14 | c2r14 | c3r14 | c4r14 | c5r14 | c6r14 | c7r14 | c8r14 | c9r14 |

*Figure 9 Added automatic filters*

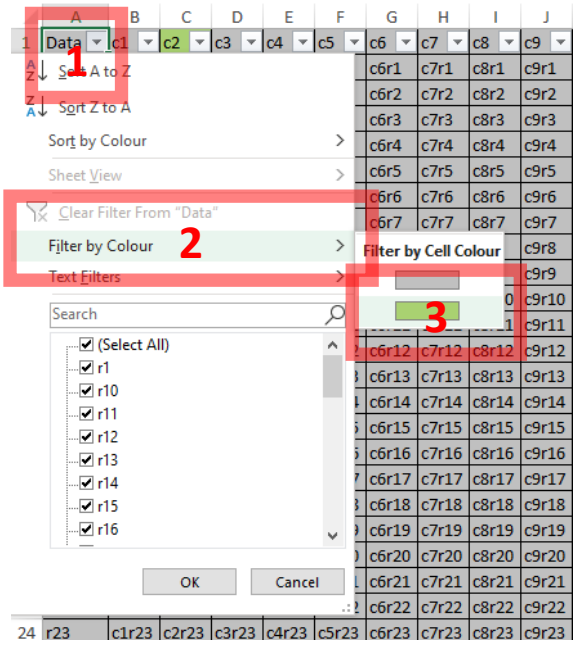



*Figure 10 Steps to follow to preselect by colour: (1) expand the automatic filter menu in column A, (2) expand "Filter by Colour" menu item and (3) finally select green color*

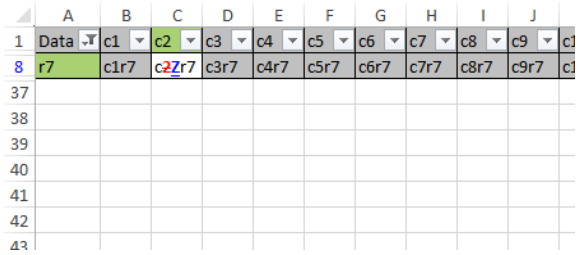


*Figure 11 Result – only changed rows visible*

## 4.6 "-e"/"--noempty" – ignore empty cells

For sparse worksheets (i.e. worksheets with a small amount of data and a large number of empty cells), using this option can reduce the file size and increase processing speed. The disadvantage is that, for the same type of data, many not changed cells in our area of interest will not be marked with a grey background, which can make it more difficult to visually identify changes.

## 4.7 "-v"/"--verbose" – verbose runtime output

Using this option increases the level of detail reporting at runtime. By default, xlsxDiff reports only the completion of a column comparison. In verbose mode, every cell comparison is reported, which can be important for very large spreadsheets to make sure the program is still working properly.

## 4.8 "-q"/"--quiet" – quite mode

Disables all runtime messages. This option does not affect the messages generated by the modules used.

## 4.9 "--version" – print version

Prints version of xlsxDiff.

# 5 FAQ

## 5.1 Does xlsxDiff have spreadsheet size limit?

There are no size limits build in xlsxDiff. I have reports on of successful usage of the script with spreadsheets of hundreds of thousands of cells. Unfortunately, due the limits of OpenPyXL library, I have some reports about problems with spreadsheets with predefined names build in (nevertheless, this way of using Excel is not typical).

## 5.2 In the output file, the error "#VALUE!" appears in some cells. How to fix it?

xlsxDiff.py is just script that analyses texts and produces formatted output. It is as simple as that. Nothing more. Unfortunately such approach might cause unexpected errors, when Excel cannot properly interpret formulas in cells of output file. Fortunately, you can easily bypass this, just modifying content of cells. You can just replace = char with ' = chars (i.e. replacing single equals = char at the beginning of formula with two chars: apostrophe ' char and equals = char, what forces Excel not to interpret cell as formula, but as string).

## 5.3 xlsxDiff shows that there are differences between cells, but no differences can be seen

When displaying the contents of a cell, Excel trims spaces at the end of the cell's text, regardless of its formatting. So if the script shows that there are changes between cells and they are invisible in Excel, check if the cell contents end with spaces.

## 5.4 The script runs very slowly. Can I make it run faster?

Start by enabling the "--verbose" option. It is possible that the script detects data in the last rows/columns and performs a lot of unnecessary inspections. For example, using the list data validation function (see "Data" / "Data Tools" / "Data Validation" / "Validation criteria" in Excel), where a common solution is to store the source list at the end of the spreadsheet (somewhere around row 1,000,000). xlsxDiff is unable to detect that there are several hundred thousand empty cells between the end of data intended to be analysed and the validation data, and as a result performs millions of unnecessary operations. To speed up spreadsheet comparisons, it may make sense to manually interfere and reduce the size of the data to be analysed. A slight optimization of the spreadsheet and removal of redundant cells can result in significant increase of speed and increase of clarity of the output spreadsheet.

For more details see also the description of the verbose option as enabling such increased reporting makes it easier to identify aforementioned issue.

## 5.5 Why are two libraries used to process Excel files?

For this script to work properly, it is necessary to read and write .xlsx files. I decided to use the OpenPyXL library. However, at the time of starting writing this script, this library does not allow to embed rich text into cells, which is essential for clear visualization of changes. At the time of development of xlsxDiff, only the XlsxWriter library supported embedding rich text objects. However, this library is only for creating Excel files (it is not able to read them). Therefore, two separate libraries are currently used for reading and writing .xlsx files. Since the latest versions of OpenPyXL also support rich text in cells feature, it is highly likely that in the near future xlsxDiff will be modified to use only this one library. However, both libraries are mature, have been in development for 10 years and can be used simultaneously.

### 5.6 What is PIP and how to find it?

PIP is the “package installer for Python” and it is part of standard distribution. If the PIP program is not in the path, then you should look for pip.exe somewhere in the directory where you installed Python. By default, all Python files from the base distribution mentioned above are installed in the directory:

`C:\Users\<username>\AppData\Local\Programs\Python\Python310-32`

# 6 TODO

GUI – maybe someday 😉

# 7 Useful links

Python 3 – a high-level, general-purpose programming language. See https://www.python.org/ PSF License;

difflib – Python module for comparing sequences, part of standard distribution. PSF License;

OpenPyXL – Excel files processing module. See https://openpyxl.readthedocs.io/ MIT/Expat License;

XlsxWriter – Excel files producing module. See https://xlsxwriter.readthedocs.io/ BSD 2-Clause License.

# 8 Changelog

| Version | Date | Description |
|---|---|---|
| 2.0 | 2023-02-27 | Major update: added detection and visualisation of changes to entire columns/rows |
| 1.1 | 2023-02-11 | Added option to ignore empty cells |
| 1.0 | 2023-02-10 | Initial version |

# 9 Licence