

Paradigm shift: Spreadsheets are cool!

Timeline

- intro - 2 min
- theses - 6 min
- conclusion - 2 min

Who am I?

- Andrea Knabe-Schönemann
- business economist and system admin
- private interest in computer science and datalover
- there is a long-standing secret:

In my dreams

I learn fancy programming languages, become a programmer and work with data. 🦄

In real life

I'm a clerical worker and use spreadsheets for different use cases. 😱

Something has changed yet:

I started a new job and I work with data now, nice file formats like json and xml, nice data sets, nice APIs. \o/

Problem:

This data are machine readable, but humans, who are not coders, can't read and analyze this data comfortable.

They want to have nice software - or spreadsheets. :(

Change of mind: stop Python, start "Spreadsheets" from scratch

- made a tsundoku of programming books
- googled "spreadsheet programming"
- found the blog article by Lucas Reis: „Spreadsheets Are An Awesome Functional Programming Tool“

„... she implements selection sort with a spreadsheet and, believe it or not, even showed an implementation of a Turing machine with spreadsheets!“

o_O

... and found my new hero 🦸‍♀️

- **Felienne Hermans**
- assistant professor at Delft University of Technology
- worked on applying methods from software engineering to spreadsheets at her PhD dissertation
- one of her biggest passions in life: to share her enthusiasm for programming and tech with others
- @felienne
- **felienne.com**

her message:

"Stop blaming spreadsheets (and take a good look in the mirror)"

her thesis:

"Spreadsheets are not data, spreadsheets are code!"

Spreadsheets are not data, spreadsheets are code:

- spreadsheet formulas are turing complete

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | AA |
|--|----|----|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|
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| | 5 | S1 | - | - | - | | 1 | 1 | 1 | - | - | - | - | - | - | - | | | | | | | | | | | |
| | 6 | S1 | - | - | - | | 1 | 1 | 1 | - | - | - | - | - | - | - | | | | | | | | | | | |
| | 7 | S1 | - | - | - | | 1 | 1 | 1 | - | - | - | - | - | - | - | | | | | | | | | | | |
| | 8 | S2 | - | - | - | | 1 | 1 | 1 | - | - | - | - | - | - | - | | | | | | | | | | | |
| | 9 | S2 | - | - | - | | 1 | 1 | 1 | - | - | - | - | - | - | - | | | | | | | | | | | |
| | 10 | S2 | - | - | - | | 1 | 1 | 1 | - | - | - | - | - | - | - | | | | | | | | | | | |
| | 9 | S3 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
| | 8 | S3 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
| | 7 | S3 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
| | 6 | S3 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
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| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
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| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
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| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
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| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
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| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
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| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
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| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
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| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
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| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
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| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
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| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
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| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | - | - | | | | | | | | | | | |
| | 7 | S4 | - | - | - | | 1 | 1 | 1 | 1 | - | - | - | - | | | | | | | | | | | | | |

Spreadsheets are not data, spreadsheets are code:

- spreadsheet formulas are turing complete
- spreadsheets and code suffer from the same problems

Spreadsheets and code suffer from the same problems.

Only 33 % of spreadsheets have a manual!

On average spreadsheets are used by 12 different people with different perceptions...

Spreadsheets have a long life span - on average 5 years.

Spreadsheets are not data, spreadsheets are code:

- spreadsheet formulas are turing complete
- spreadsheets and code suffer from the same problems
- spreadsheets and code are used for similar problems

Complexity and problems are the same.

Spreadsheets and code are used for similar problems.

put data in => somethings is being calculated => get output

Felienne:

"You can do this with any programming language but you can also do it in a spreadsheet."

"'Spreadsheets' are not 'a' language, 'spreadsheets' are the next programming language you should learn."

But why???

“We asked IT to build this, they said it would take 6 months and half a million euros. And most likely it will be more expensive and not what we want.”

"Stop blaming spreadsheets (and take a good look in the mirror)" by Felienne Hermans

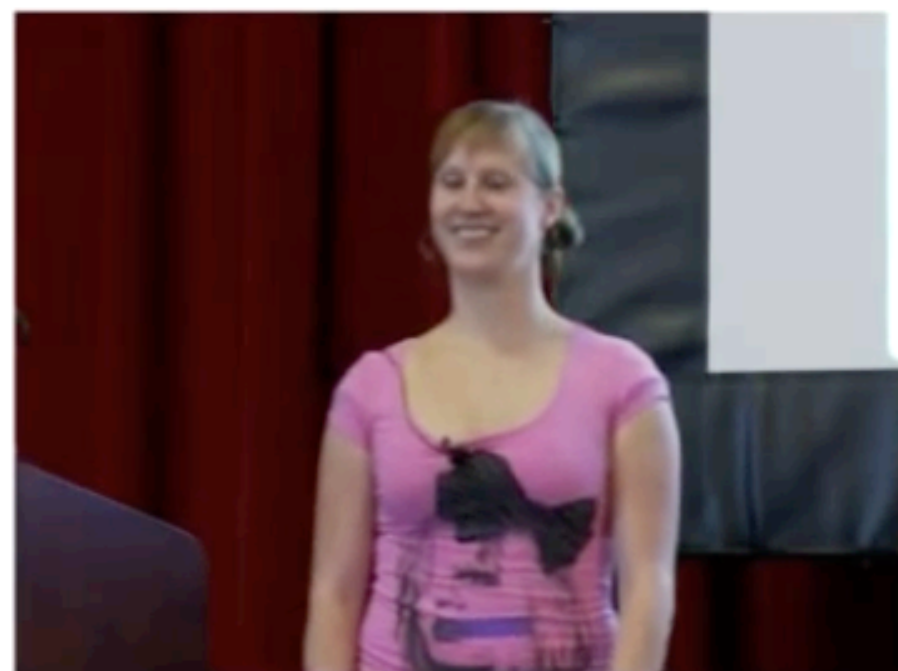
But why???

„Then, in addition to our ridicule, we try to push tools to them, “real” programming languages, that nor fit their needs nor their skills. They will never learn Java or C#. Python maybe, that seems to be easy to use for end-users, but certainly not for all of them. End-users are not programmers, they don’t want to be and they should not need to be.

"Stop blaming spreadsheets (and take a good look in the mirror)" by Felienne Hermans

Spreadsheets are

- live programming
- pure functional by definition
- the most successful programming language in the history of mankind
- the lingua franca of computing - everybody knows spreadsheets
- programmers should know what every one else is programming



Sept 17-19, 2014 - St. Louis, MO
<http://thestrangeloop.com>

@ a_ka_es, **Enthusiasticon**, Berlin, 2018

SelectionSort.xlsx - Microsoft Excel

File Home Insert Page Layout Formulas Data Review View Developer Team

fx Insert Function

Σ AutoSum • Logical • Lookup & Reference • Define Name • Trace Precedents • Show Formulas • Watch Window • Calculation Options •

Recently Used • Text • Math & Trig • Use in Formula • Trace Dependents • Error Checking • Formula Auditing •

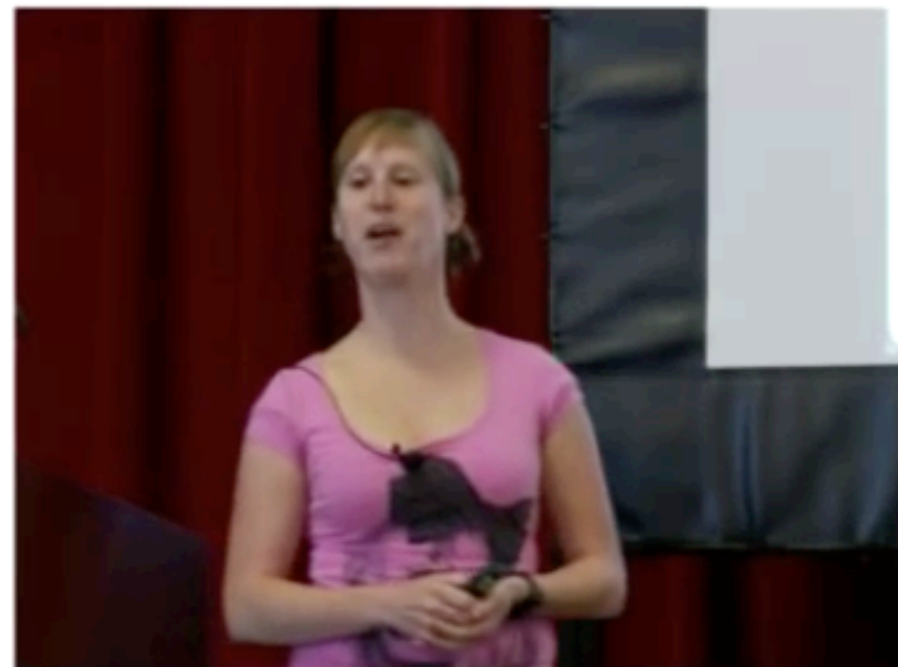
Financial • Date & Time • More Functions • Name Manager • Create from Selection • Remove Arrows • Evaluate Formula • Calculation

E4 =IF(Index=IndexMin,Swap,IF(Index=IndexSwap,Min,PreviousRow))

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R |
|----|------|-----------|-----|----------|----|---|---|----|----|----|---|----|----|----|----|----|----|---|
| 1 | Swap | IndexSwap | Min | IndexMin | | | | | | | | | | | | | | |
| 2 | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | |
| 3 | | | | | 13 | 5 | 3 | 10 | 14 | 4 | 8 | 11 | 7 | 1 | 9 | 6 | 12 | |
| 4 | 13 | 1 | 1 | 10 | 1 | 5 | 3 | 10 | 14 | 4 | 8 | 11 | 7 | 13 | 9 | 6 | 12 | |
| 5 | 5 | 2 | 3 | 3 | 1 | 3 | 5 | 10 | 14 | 4 | 8 | 11 | 7 | 13 | 9 | 6 | 12 | |
| 6 | 5 | 3 | 4 | 6 | 1 | 3 | 4 | 10 | 14 | 5 | 8 | 11 | 7 | 13 | 9 | 6 | 12 | |
| 7 | 10 | 4 | 5 | 6 | 1 | 3 | 4 | 5 | 14 | 10 | 8 | 11 | 7 | 13 | 9 | 6 | 12 | |
| 8 | 14 | 5 | 6 | 12 | 1 | 3 | 4 | 5 | 6 | 10 | 8 | 11 | 7 | 13 | 9 | 14 | 12 | |
| 9 | 10 | 6 | 7 | 9 | 1 | 3 | 4 | 5 | 6 | 7 | 8 | 11 | 10 | 13 | 9 | 14 | 12 | |
| 10 | 8 | 7 | 8 | 7 | 1 | 3 | 4 | 5 | 6 | 7 | 8 | 11 | 10 | 13 | 9 | 14 | 12 | |
| 11 | 11 | 8 | 9 | 11 | 1 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 13 | 11 | 14 | 12 | |
| 12 | 10 | 9 | 10 | 9 | 1 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 13 | 11 | 14 | 12 | |
| 13 | 13 | 10 | 11 | 11 | 1 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 13 | 14 | 12 | |
| 14 | 13 | 11 | 12 | 13 | 1 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 14 | 13 | |
| 15 | 14 | 12 | 13 | 13 | 1 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | |
| 16 | | | | | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | | | | | |

Step14 Step15 BStep1 BStep2 BStep3 BStep4 BStep5 BStep6

Ready 140%



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@ a_ka_es, **Enthusiasticon**, Berlin, 2018

```
76 SelectionSort.py - C:/Users/Felienne/Dropbox/TU Delft/slides/2014/StrangeLoo...
File Edit Format Options Windows Help

def selectionSort(List):
    for IndexSwap in range(len(List)):

        Min = min(List[IndexSwap:])
        IndexMin = List.index(Min)

        Swap = List[IndexSwap]

        for Index in range(IndexSwap, len(List)):

            if Index == IndexMin:
                List[Index] = Swap

            elif Index == IndexSwap:
                List[Index] = Min

        return List

Ln: 19 Col: 0
```


Wow, my hero said that I am a programmer too!

That is really motivating!

"95 % of all US companies still use spreadsheets for financial reports - so if you are still doing it you don't have to feel bad."

Spreadsheets from /o\ ... to ... \o/

my thesis:

Spreadsheets are cool!

(Really!)

If I had realized this years ago, I could be a programmer yet.

- spreadsheet software was installed on every computer I used for work since 1987!!!
- no need for extra permissions
- no need to ask any system administrator
- no need for other installations
- no strictly orders for using this software

I could have done the boring stuff with "programming in Spreadsheets" instead of "using spreadsheets" during working hours and could have learned fancy programming languages in my spare time.

"Spreadsheets" is a programming language, seriously:

- function tables vs. library docs
- stack overflow: 13,701 questions are tagged with "google-spreadsheet" actually
- trouble with syntax (all similar but not equal)
- trouble with versions (Excel/Win : Excel/Mac = Python2 : Python3)
- need for best practice solutions

You are still unchallenged? You could change the language preferences of your device. ^^

Spreadsheets are cool because:

- they are a "babel fish" for developer and clerical worker
- they are multilanguage universal GUI for data
- there is no need for extra installations and extra updates
- there is no need for extra knowledge
- there is no need for an extra budget

Conclusion

- spreadsheets are code (spread the word, please)
- spreadsheets enables participation
- spreadsheets are efficient
- spreadsheets enables inclusion

Example for participation

Google Sheets, in partnership with Refinery29, invited illustrators Marina Esmeraldo in Barcelona and Mallory Heyer in NYC to create an original work of art together in a spreadsheet—without ever meeting.

These artists went beyond Google Sheets to make a mural

The Art of Collaboration: From Sheets to the Streets

"If you're ever bored and want to create something unique, why not turn to Google Sheets?"

Hero of the heart

"The 77-year-old illustrator shunned the idea of paying for expensive painting supplies or even a basic drawing program for his computer, saying that he prefers Excel even over Microsoft Paint because it has 'more functions and is easier to use.'"

Meet Tatsuo Horiuchi, the 77-Year-Old Artist Who 'Paints' Japanese Landscapes With Excel

Thanks for your attention

I was inspired by programmers to learn programming languages and learning to think like a programmer. Many thanks to all of you.

I hope I could give some inspirations back today, perhaps. :)

My journey from Python to "Spreadsheets"

- Lucas Reis: „Spreadsheets Are An Awesome Functional Programming Tool“
- Felienne Hermans: "Pure Functional Programming in Excel"
- Felienne Hermans: "Spreadsheets for developers"
- Joel Spolsky "You Suck at Excel" - it was really fun to brush up my Excel skills this way
- building a turing machine and a selection sort sheet with Excel and with Google Sheets, inspired by Felienne Hermans

- Course "**Data Analysis: Take it to the MAX()**" at TU Delft Online Learning, taught by Felienne Hermans
- for pleasure, as a compromise and as a game I took a programmingbook for children - "Python for kids" - and transferred the examples to "spreadsheets" - it's really funny
- at work: no more simple and boring spreadsheets - take every chance to exercise spreadsheet formulas