*“Silence is a true friend who never betrays”**

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@tttthomasssss

PyData Edinburgh
7th Feb 2019 (1549566000)

*) Unless you write code

Whats this all about?

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- This talk is based on a true story
- A story about SCARY BEHAVIOUR in `scipy.sparse` matrices and `numpy` arrays
- A story about **co-occurrence matrices**

Co-occurrence Matrices

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Voodoo Jürgens	0
Miles Davis	7
Bill Evans	12
Muddy Waters	4

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Arab Strap	0	5
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Miles Davis	7	0
Bill Evans	12	0
Muddy Waters	4	0

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Voodoo Jürgens	0	6	0
Miles Davis	7	0	0
Bill Evans	12	0	4
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- So co-occurrence matrices can be very useful for **recommender systems**

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  - Any word doesn't co-occur with most other words
- So when we're creating them ourselves from data, we make use of **`numpy & scipy`** (because we like python and data)

scipy.sparse

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In [196]: x
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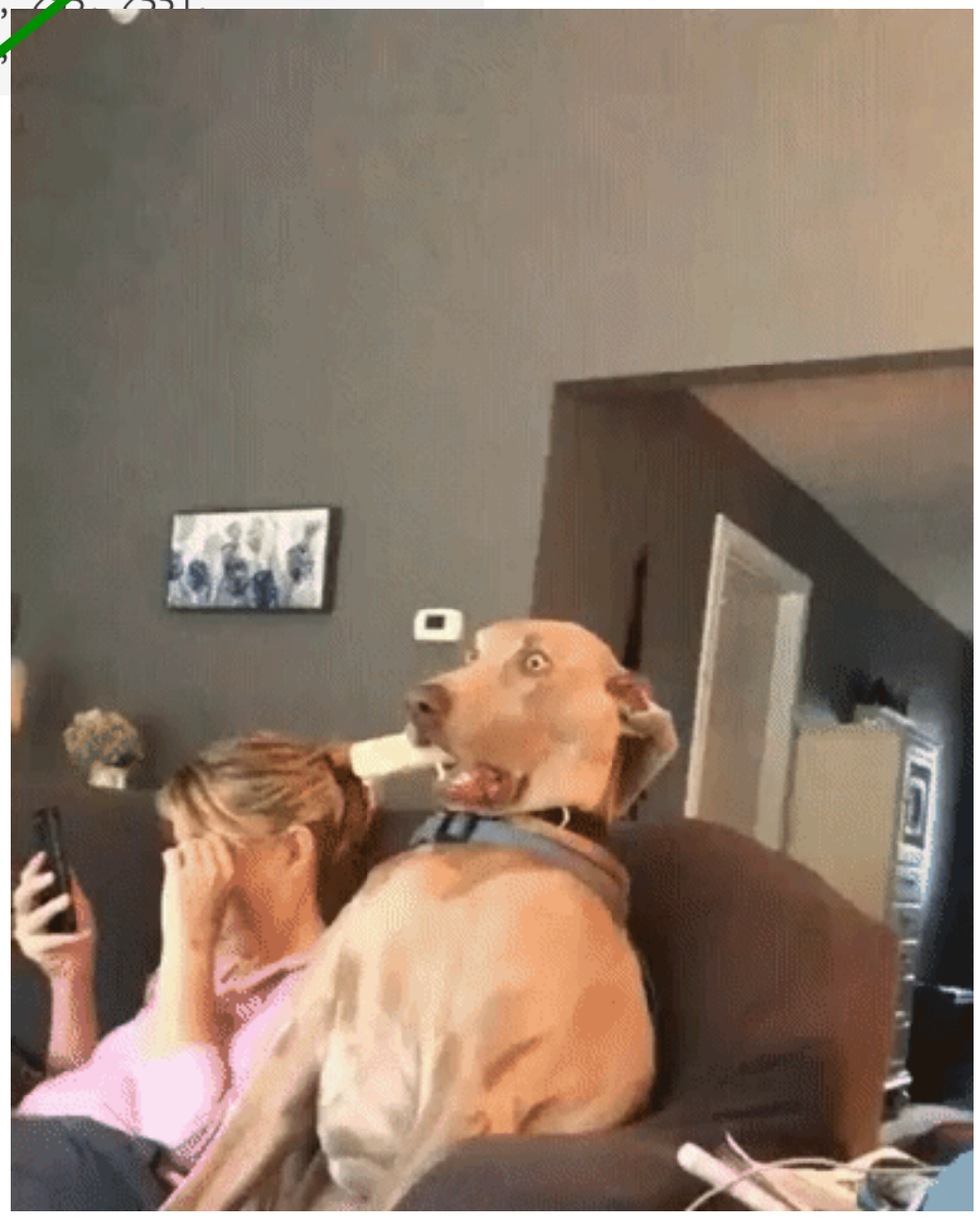

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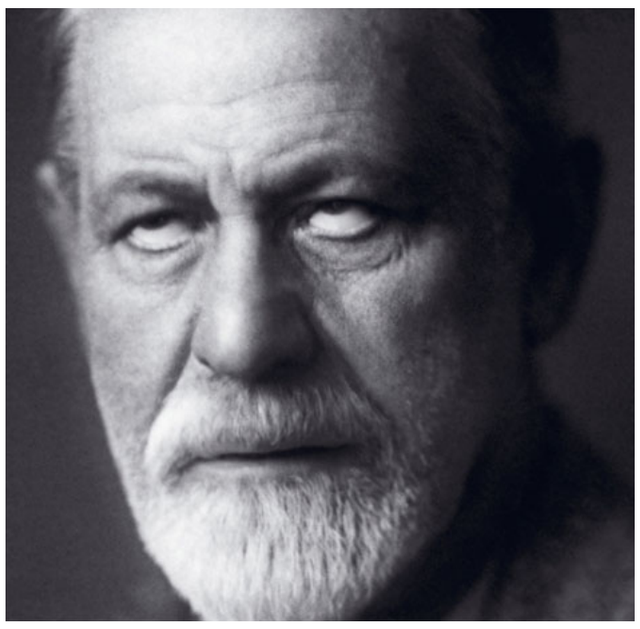

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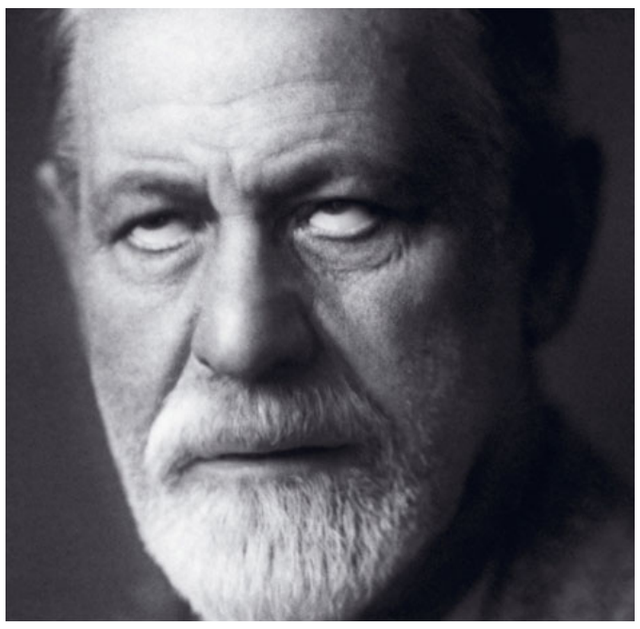

- Lets Live Demo the buggy code

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        - Floating point overflows are detected at the hardware level

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    - SILENCE - there is no warning or error anywhere that tells you that bad stuff happened
    - The bug leads to **inconsistent data**, even though the code - arguably - is correct
    - This is very bad if you care about the correctness of your data
    - Also, this is a **known problem** (at least in numpy, going back to 2012 - see e.g. https://github.com/numpy/numpy/issues/593)
    - The reason why this hasn't been addressed yet is performance (see https://github.com/numpy/numpy/issues/8987#issuecomment-327378779)
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        - Integer overflows aren't - they would need to be checked by `numpy`/`scipy`, which is too costly for arrays

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    - Trouble is, even a `uint64` with a max value of 18446744073709551615 can theoretically overflow