

Quasi-Monte Carlo for Everyone

`scipy.stats.qmc` and `torch.quasirandom`

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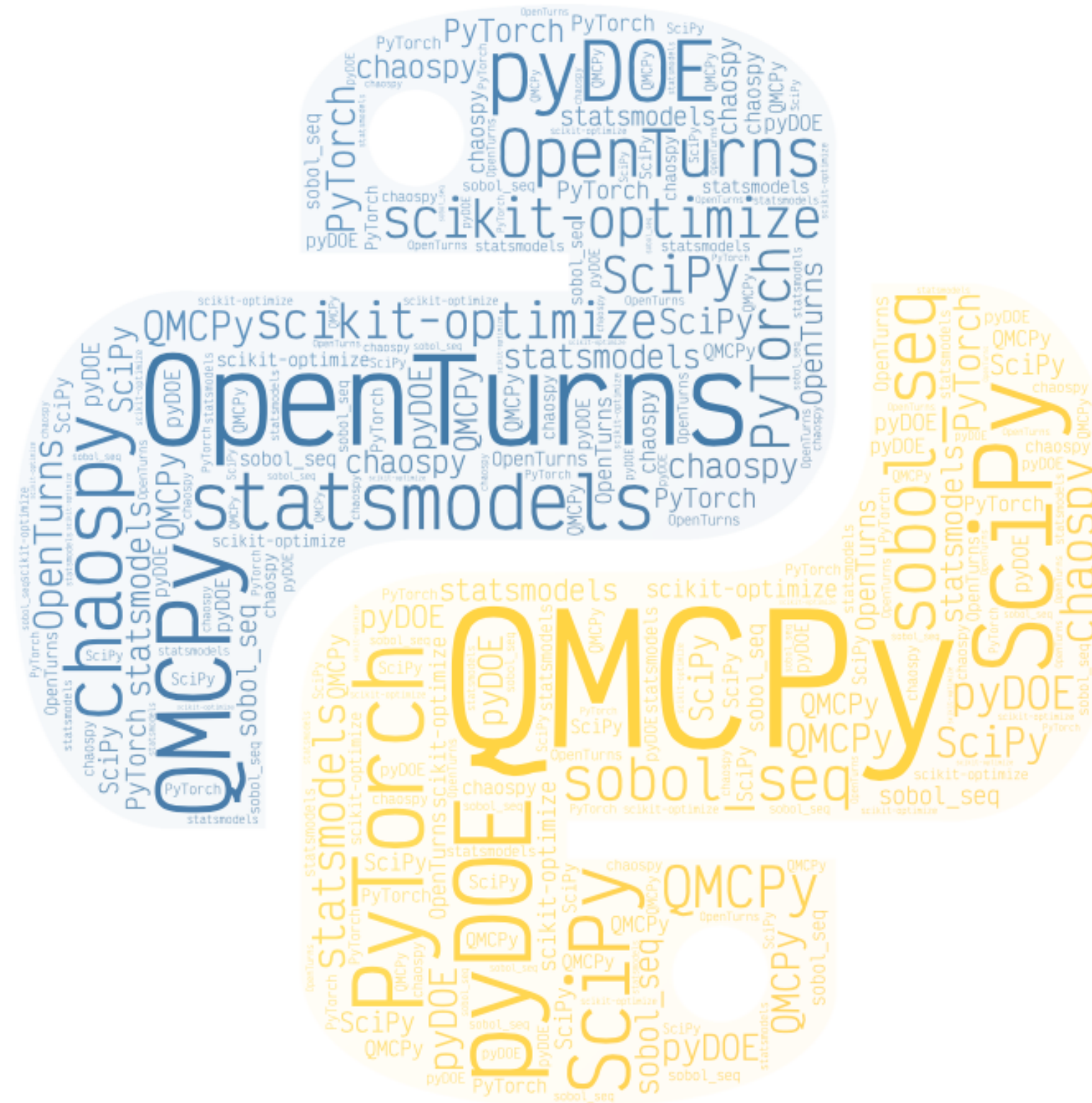


Everyone is Python, but why?

- >>> Python is the 3rd primary programming language and trend is strong
- >>> Half of Python developers are doing machine learning or data analysis
- >>> More than 50% of developers using C-like are not interested in continuing to do so
- >>> Python is fast enough... really. And if not there are solutions (Cython, Pythran, etc.)



There are already tons of options!



Some are great (QMCPy), most have issues!

Fix them? There must be a better way!

- >>> Machine learning community lacks knowledge about QMC
- >>> Open-source projects are driving the state-of-the-art applications
- >>> Research code is not production code
- >>> Need to fix problems for good

QMC for everyone
The future proof solution



SciPy

SciPy's Ecosystem is used by millions

Virtually all Python developers use a package from SciPy (NumPy, Pandas, SciPy, Matplotlib, *):

And now there is a QMC module in SciPy 1.7

```
>>> from scipy.stats import qmc
```

Now millions can do QMC. What exactly?

>>> Sobol'

>>> Halton

>>> LHS and Orthogonal LHS*

>>> Multinomial

>>> Multivariate normal

>>> Discrepancy

>>> Fast numerical inverse (Hermite splines)



Generic QMC Engine

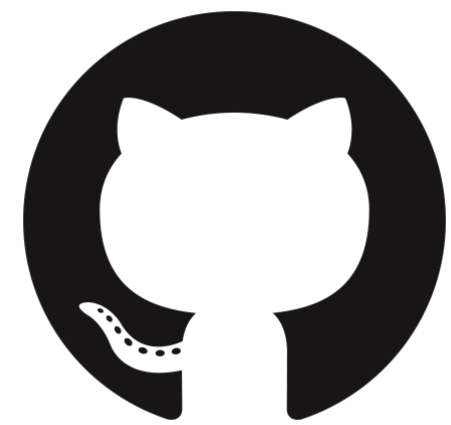
* Thanks to Art Owen! This will be in the next release of SciPy 1.8

Demo

<https://gist.github.com/tupui/4310485c9920868c404728cdf8cfe93f>

Hey, can I help?

Yes! Everything happens on [GitHub](#). Just creating an issue or commenting helps a lot



<https://github.com/scipy/scipy>

>>> New QMC methods

>>> Alternative scrambling/randomizing/direction numbers

>>> Documentation

My wish list is here <https://github.com/scipy/scipy/issues/14510>

QMC for AI /
Machine Learning?
untapped potential



```
>>> from torch.quasirandom import SobolEngine
```

Demo

<https://gist.github.com/tupui/4310485c9920868c404728cdf8cfe93f>

You helped make it happen

For the science

For the code

Thank You!

>>> Fred Hickernell

>>> Ralf Gommers

>>> Art Owen

>>> Tyler Reddy

>>> Sergei Kucherenko

>>> Matt Haberland