



EuroSciPy

Szczecin 2024



fastplotlib

Augmenting our scientific imagination



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@caitlinllewis



clewis7



Kushal Kolar

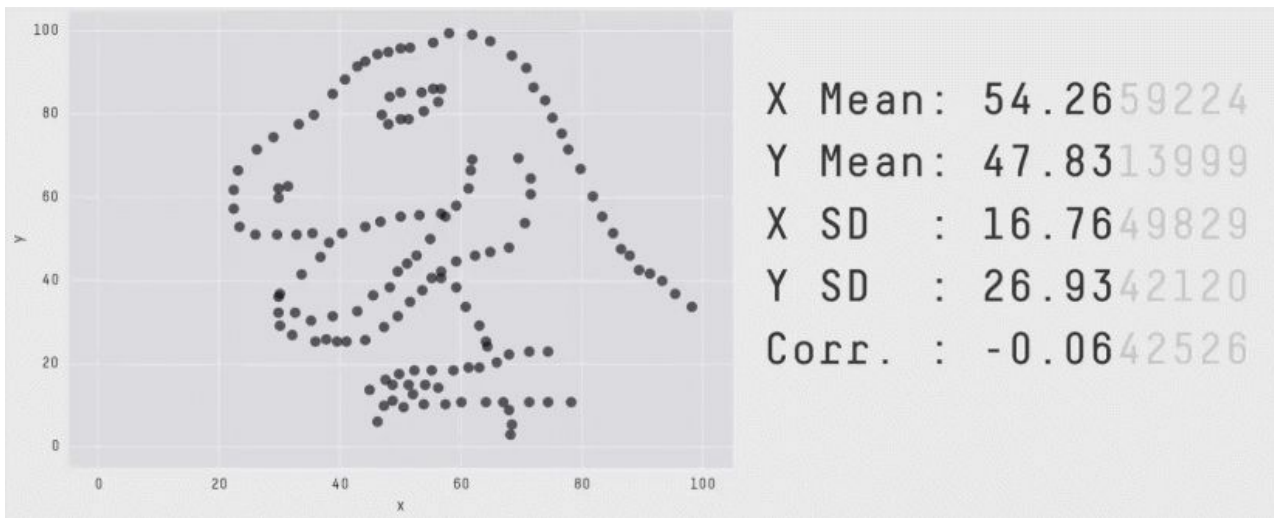
@kushalkolar

kushalkolar

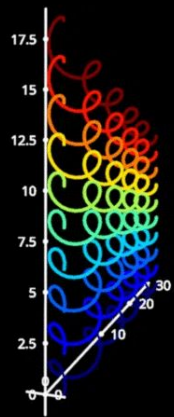
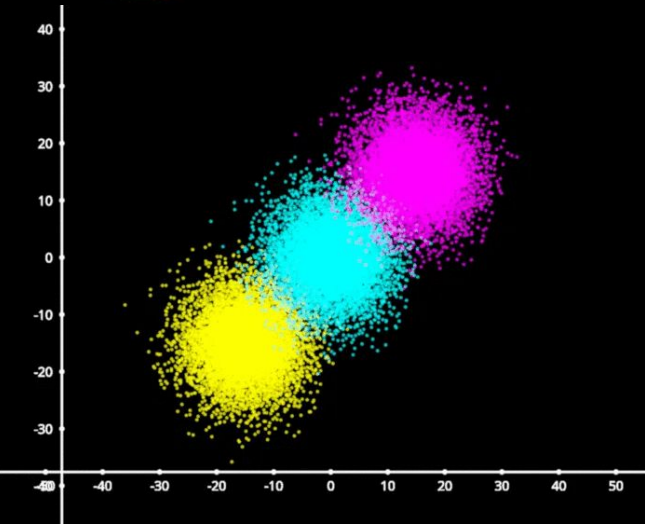
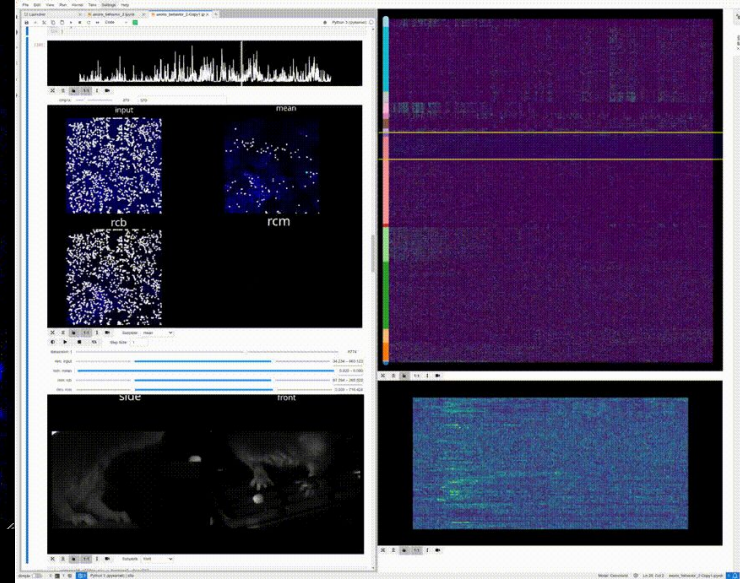
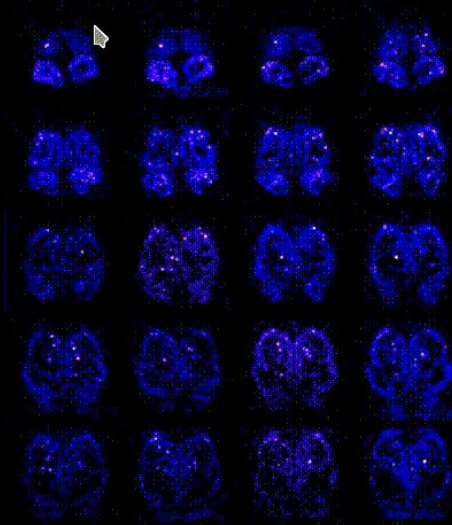
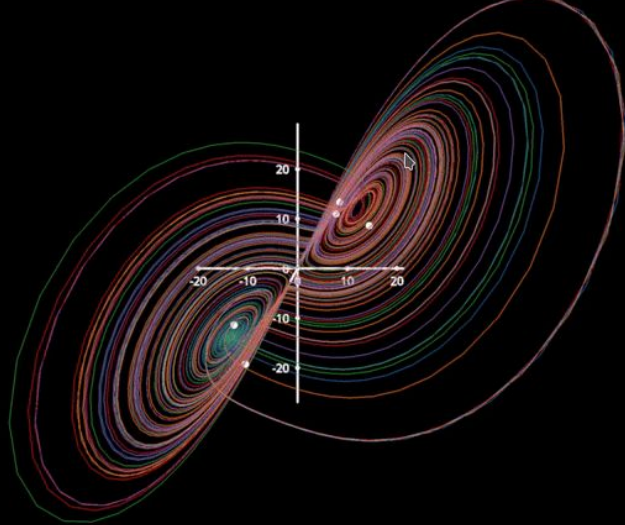


It is important to look at your data!

- Statistics are not sufficient
- “All models are wrong, some are useful”
- All algorithms are approximations



Matejka, Justin, and George Fitzmaurice. "Same stats, different graphs: generating datasets with varied appearance and identical statistics through simulated annealing." *Proceedings of the 2017 CHI conference on human factors in computing systems*. 2017.





fastplotlib

- High-level API for scientific plotting - inspiration from *pyqtgraph* and other libs
 - ❤️ *pyqtgraph*
- Uses the *pygfx* rendering engine
- Very new - 2 years old
- Goals: fast visualization, **expressive & elegant API** - we'll tell you what this means!
- Core developers & leadership:
 - **Kushal Kolar - Flatiron Institute/NYU**
 - **Caitlin Lewis - Duke University**
- Major developers:
 - **Almar Klein - Independent/funded by Flatiron Institute**
 - **Amol Pasarkar - Columbia University**

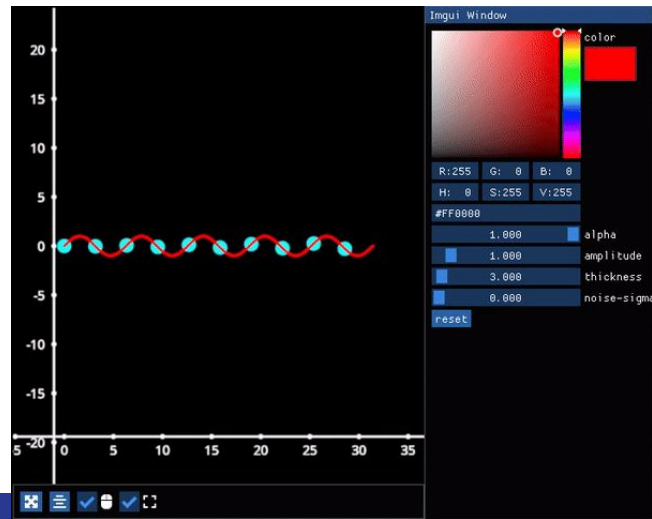
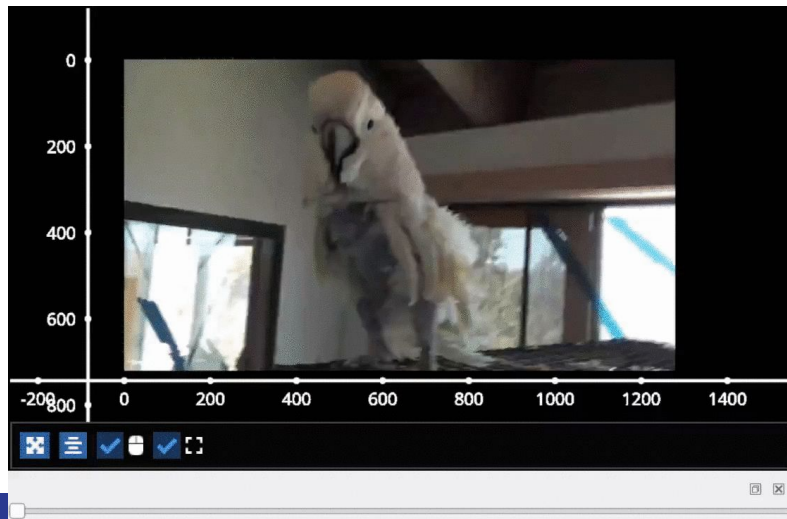
What can I do with fastplotlib?

- GPU accelerated visualization
 - Modern integrated graphics is sufficient for many use-cases!
- Rapid prototyping and algorithm design
 - Examples: matrix decompositions, time series exploration
 - Design, develop, evaluate and ship machine learning models
- Exploration and fast rendering of large-scale data
- Create real-time acquisition systems for instruments

Where can I use fastplotlib?

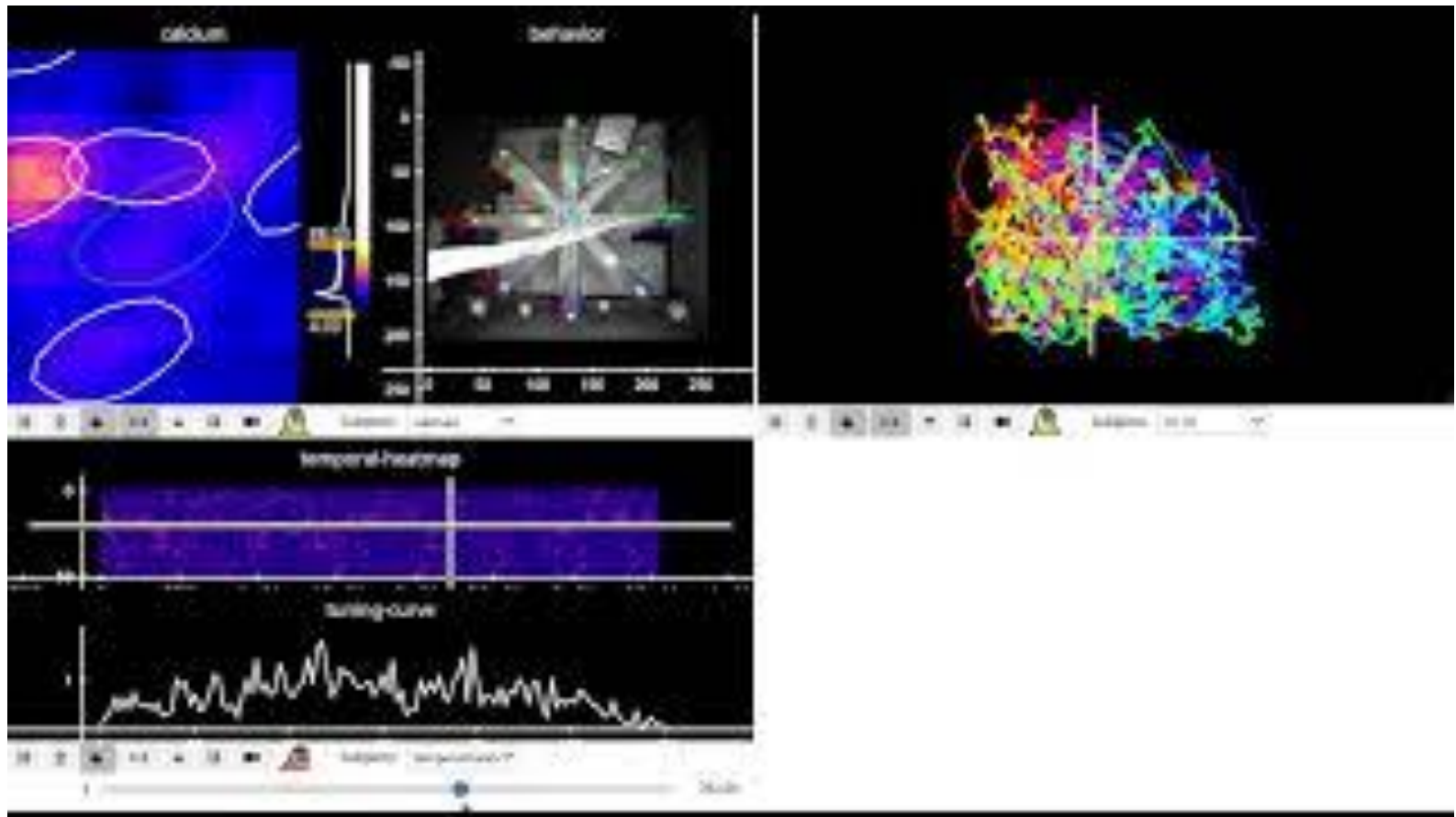
- Identical code across Qt, glfw, and jupyter lab. (and wx?)
 - **cloud computing, remote infrastructure**
 - Prototype in jupyter → ship Qt, glfw or web app!
- ImGui-integration (next release)

“Write once, run everywhere”, a.k.a. ~~“Write once debug everywhere”~~



Real use case examples

- Exploration of large multi-modal experimental datasets
 - Measurements from multiple instruments
- Matrix decomposition algorithm development
- Real-time data acquisition from microscopes, prototyping medical devices
- Developing computer vision algorithms or models



Dataset from Guillaume Viejo

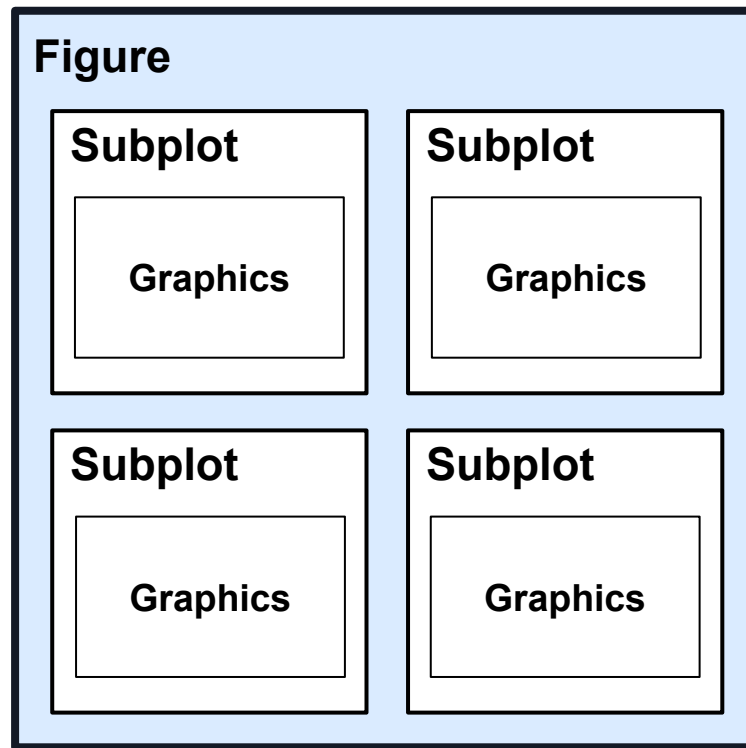
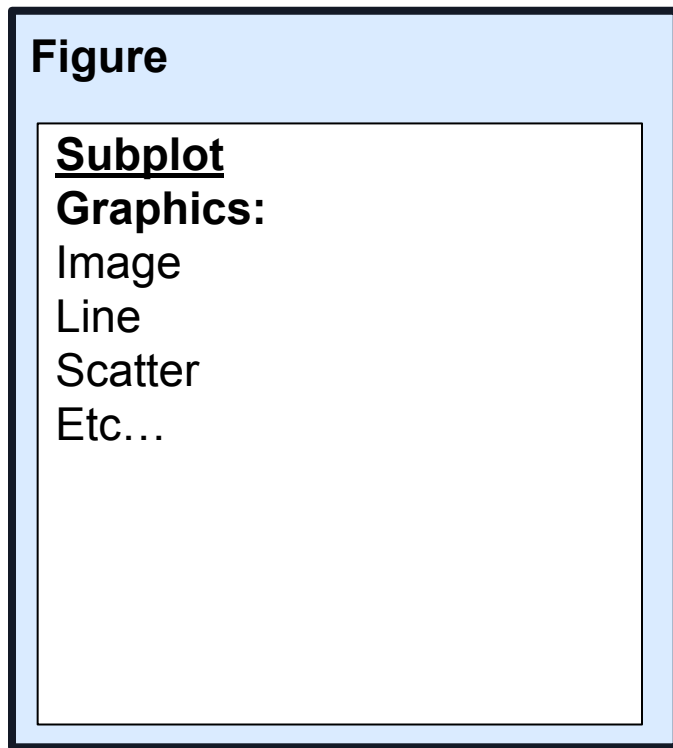
Matrix decompositions

Dataset acknowledgement to: Jason Moore, Basu Lab Cite Moore*, Robert* et al, Neuroscience 2022 Moore et al, Research Square 2023

What fastplotlib is not

- Fastplotlib is NOT related to matplotlib in any way!
 - Different use cases, different APIs!
 - Fastplotlib is not aimed towards the creation of static publication figures
- Fastplotlib does not handle data loading
 - Numpy-like data arrays which support **memoryview()** should work
- Fastplotlib is a plotting library, not a viewer, GUI, or application
 - You can use it to build viewers and GUI applications

API Walkthrough!



Roadmap for 2024-25

Contributions and ideas are welcome from people with all levels of experience!

Roadmap: <https://github.com/fastplotlib/fastplotlib/issues/55>

Come to our sprint tomorrow morning! - free stickers!

- **fastplotlib for your use case**
- **Contributions**

Things we would like help with:

- **Meshes, Image volumes**
- **More axes complexity**
- **User feedback!**
 - Examples/demos if you find fastplotlib useful!

API Stability

- **Currently in alpha**
 - Solidifying core API - graphics, graphic properties and layouts
 - Less stable: selectors, imgui-integration, axes

