CONTROL ENGINEERING IN JULIA: MODELLING, CONTROL DESIGN AND OPTIMIZATION

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BACKGROUND

- Good software is essential for building engineering applications
- Currently MATLAB/Maple/Mathematica/Octave/ Python(SciPy,Numpy)... are our main platforms for education, research and industrial use in automatic control
- Great variety of toolboxes for control, signal processing, identification, statistics, power systems, ...

DRAWBACKS

- Expensive
- Many toolboxes with closed-source code
- Black-box GUIs hiding details
- Limited group of contributors
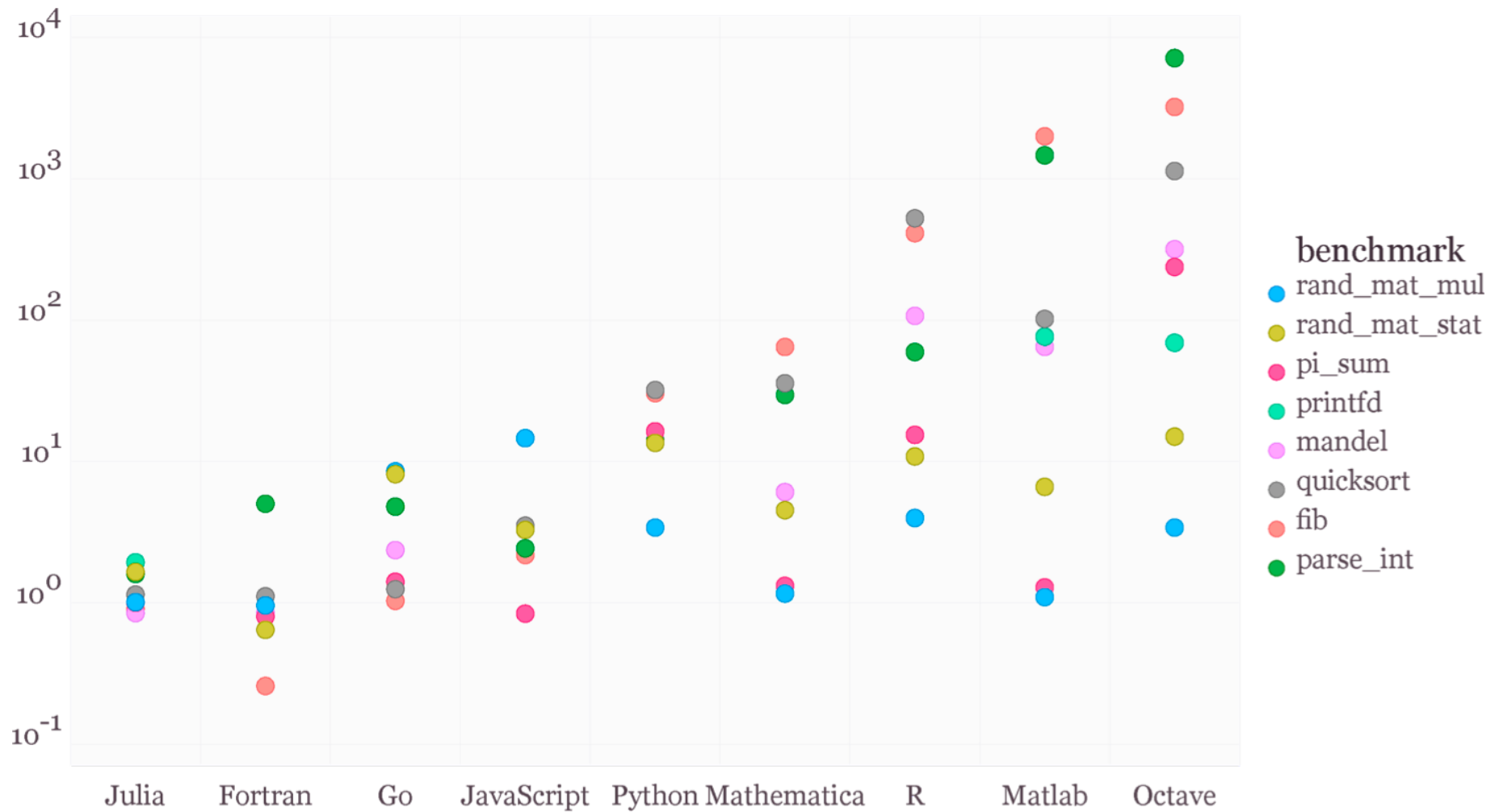- Sometimes slow (to run and maintain)…
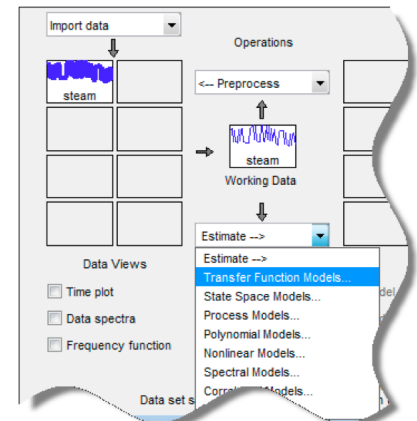
A RECENT ALTERNATIVE: JULIA

- Free and open source
- High-level language (like MATLAB, Python)
- Yet, high performance (like C, FORTRAN)
- Ability to generate low-level code for embedding (via LLVM)
- Fast growing ecosystem of libraries
- Already adopted for classroom teaching at MIT, Stanford, KTH, Cornell, ...

DID WE MENTION FAST?

CURRENT STATUS

A large number of package collections:

- JuliaML: Machine learning
- JuliaStats: Statistics
- JuliaDiffEq: Differential equations
- JuliaPlots: Data visualization
- JuliaOpt: Optimization
- JuliaControl: Control system design
- JuliaSystems: Systems, Identification and Control

... and much, much more!

(check http://pkg.julialang.org)

SPEAKERS

- Arda Aytekin (KTH, Sweden)

- Chris Coey (MIT, USA)

- Niklas Everitt (KTH, Sweden)

- Zachary Sunberg (Stanford, USA)

- Madeleine Udell (Cornell, USA)

SCHEDULE

- 8:30-9:30 Tutorial on Julia

- 9:30-10:30 Control and identification toolboxes

- 10:30-11:30 Optimization in Julia

- 11:30-12:30 Research talks:

  - Pajarito Solver for Mixed-Integer Convex Optimization

  - POMDPs.jl: a unified interface for POMDPs

ENJOY!