Julia for AGC

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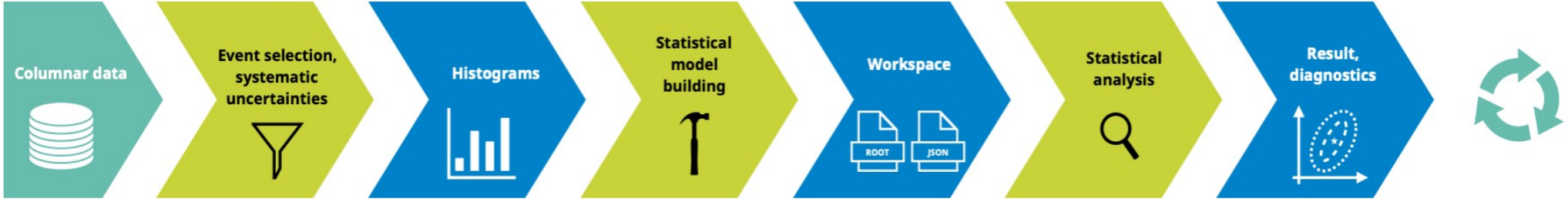
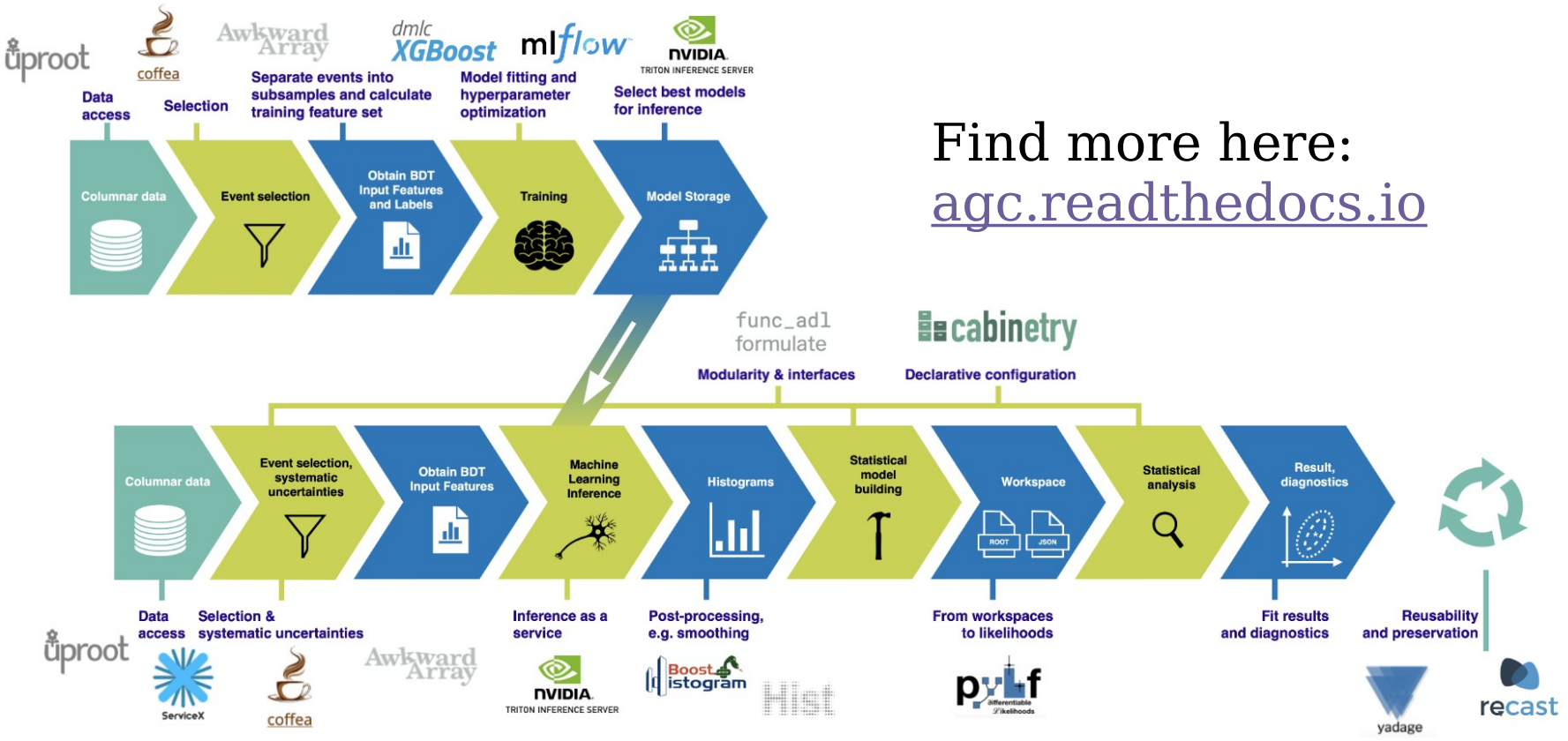
Analysis Grand Challenge

- columnar data extraction from large datasets
- processing of that data (event filtering, construction of observables, evaluation of systematic uncertainties) into histograms
- statistical model construction and statistical inference
- relevant visualisations for these steps



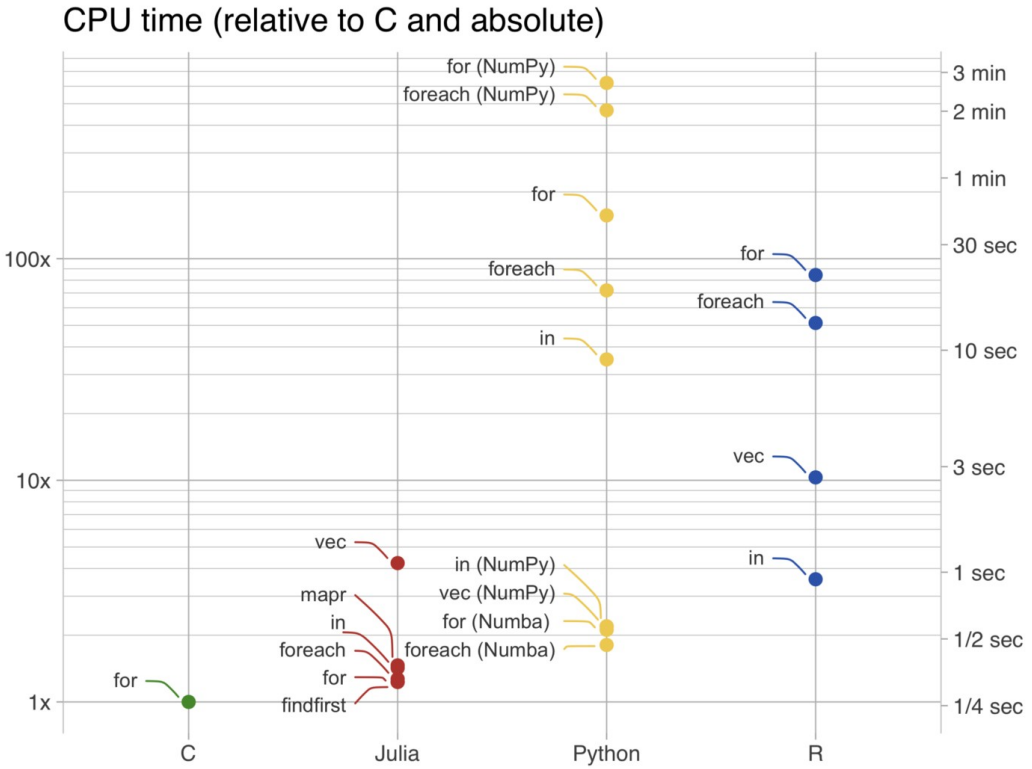
Analysis Grand Challenge



Find more here:
agc.readthedocs.io

Why julia

- Perfect for Physics and Mathematics
- Fast by design, not because of packages & JIT-compiled
- Can interact with C, FORTRAN & Python
- Proven to be efficient for HEP: github.com/JuliaHEP
- www.juliahep.org
- arxiv.org/abs/2306.03675

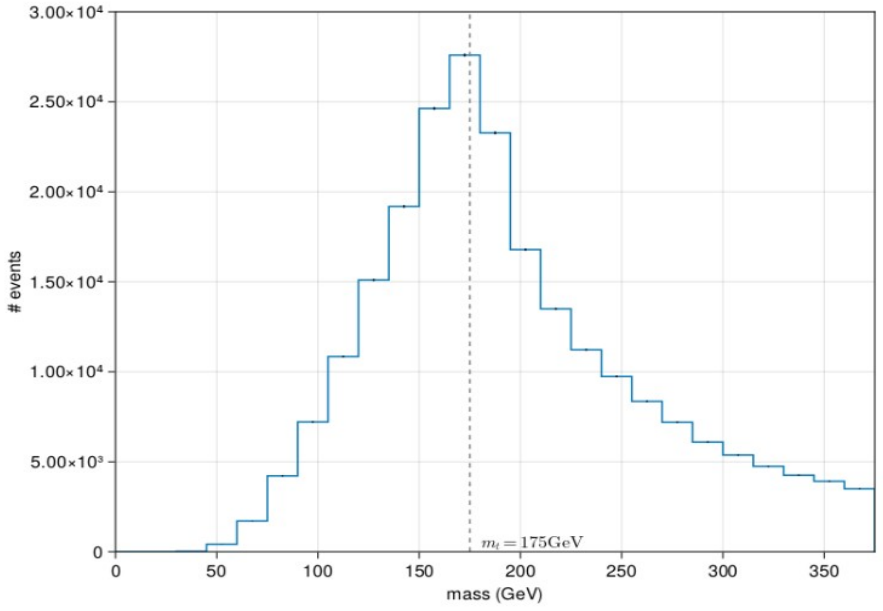


(towardsdatascience.com/r-vs-python-vs-julia-90456a2bcbab)

Goals & Status

Goals:

- The goal is to have the AGC 1.1 pipeline as well as some supplementary features implemented in Julia
- Explore the possible design solutions for the systematics
- Scale the project up and make it run remotely
- “stretch” goal: tools for ML inference from beyond v1.0.
- moelf.github.io/LHC_AGC.jl/




```
begin
    nominal_hist = res["nominal"]["4j2b"]
    stairs(nominal_hist,
        axis=(xlabel="mass (GeV)", ylabel="# events",
        limits=(0,375,0,30000),
        xticks=0:50:400,
        yticks=0:5000:80000,
        )
    )
    errorbars!(nominal_hist)
    vlines!(175, color=:grey, linestyle=:dash)
    text!(180, 20, text = L"m_t = 175 \mathrm{GeV}")
    current_figure()
end
```