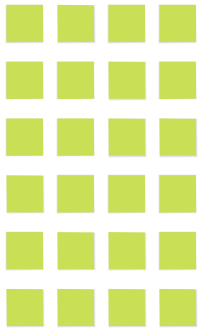


**Systematics**





	RDF	Some of these can be varied by a tool for optimization			
High level description: Produce histograms (can also do more filtering & create new columns)	Coffea fast-carpenter RDF awkward + numba etc.	<ul style="list-style-type: none"> <li>Columnar event data</li> <li>"Histogram" filling python code</li> <li>Cuts applied in Coffea</li> <li>[later, not for starting point Observable (e.g. built from NN)]</li> </ul>			
• Reducer ("builds the histogram")	Coffea fast-carpenter RDF	<ul style="list-style-type: none"> <li>Key Value: {(Region, Sample, Systematic; (Weights, Observables))}</li> <li>Bin specification</li> </ul>	Calculate weighted sum over events (weight associated to cut * weight associated to bin boundaries)  Depends on observable values, cut-related weight, and bin boundaries.	"vertical bin contents" of histograms Vector of length Nhist*Nbins (sum over weights to calculate bin content)	
• Apply weights	Coffea fast-carpenter Query System RDF	<ul style="list-style-type: none"> <li>Columnar event data</li> <li>Variable Calculation (python) code (simple calc, NN)</li> <li>Selection Cut values</li> <li>Depends on cut value how close to cut value)</li> </ul>	Event weight depends on cut value. Eg. $1 + \text{erf}(\text{obs-cut}/\sigma)$	Weighted Histograms by region	
Assemble histograms into statistical model	Cubentry fast-datacard	"Histograms" by region Model metadata		Statistical model / "workspace"	structure of statistical model
Statistical inference	pyhf RF zfit amp fitters SBI combine	• Workspace	Do fit, compute CLs, parameter uncertainties, discovery significance, likelihood scans, nuisance parameter rankings, ...	fit results for parameters, test statistics, ...	correlation matrices, nuisance parameter pulls, ...
• Visualization					
Next Step	diana-hep / recursion your Brain gradient-based optimizer	• Inference Result		• Analysis Configuration	
• Hyperparameter Optimization					

# Let's Define the Steps of an Analysis Workflow

[https://bit.ly/analysis\\_ecosystem](https://bit.ly/analysis_ecosystem)

