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Modeling of Fitting of Fit and

RootStats

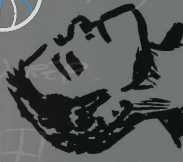
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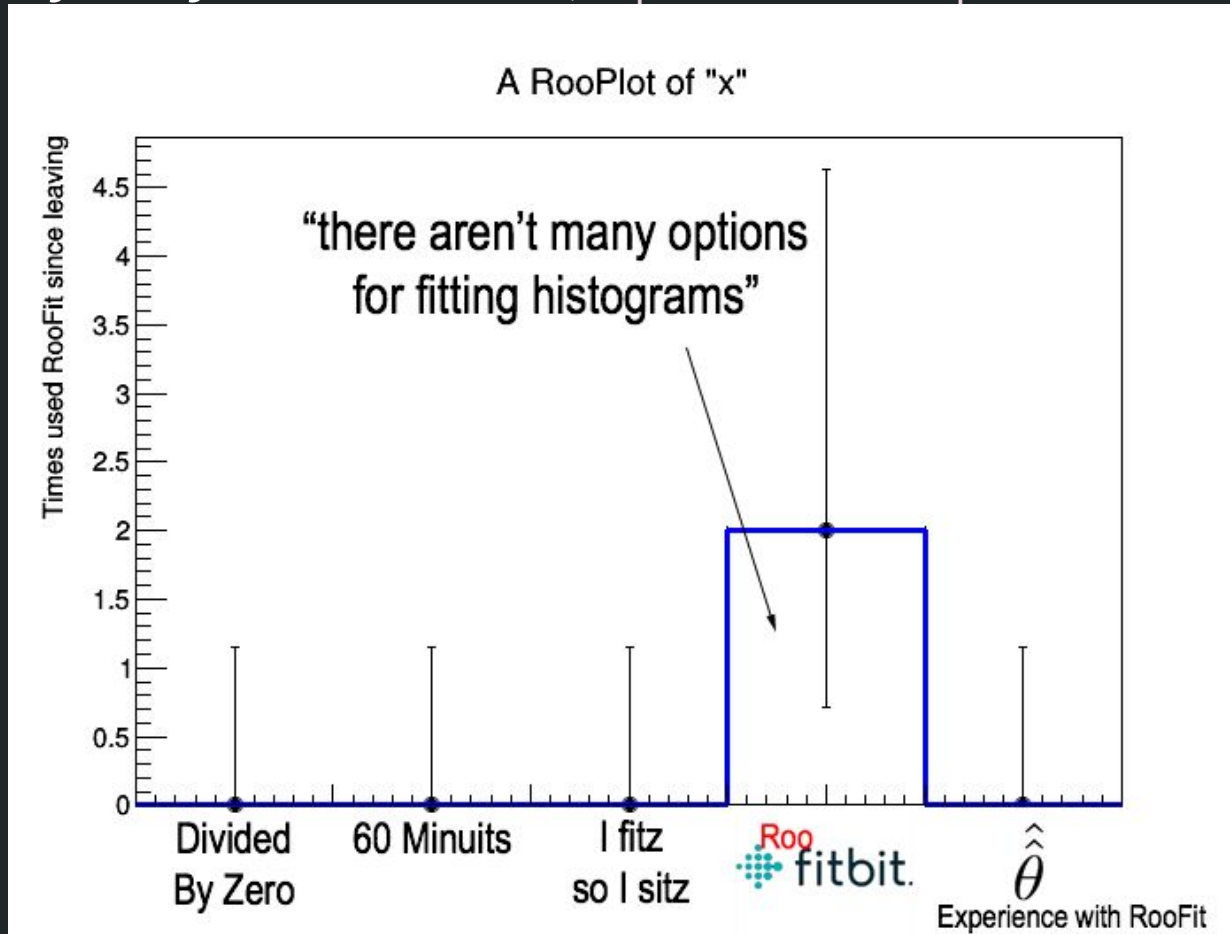


Vince Croft, Carsten Burgard and Wouter Verkerke

September 11, 2018 - ROOT Users Forum, Sarajevo

Our Survey Says...

Former RooFit/RooStats users, now working in data science, report on their experiences and needs.



Our Survey Says...

A Summary

Despite a high dependence of the majority of RooFit usage on the ability to build complex likelihoods with multiple regions and hundreds of regions, most users rely on others to provide an interface to the underlying statistical interpretation.

RooFit remains an excellent tool with which to model 'Semi-parametric' distributions and provide quantitative inference on these models. Education might be the only barrier stopping people from making use of this.

Anatomy of a Stats Framework

- Approx 30 files
- Represents hundreds of researcher hours to compile and thousands to write
- A conglomeration of **ALL** scripts needed for a researcher to go from analysis+data to result.
- Shows how RooStats tools are actually used...

The screenshot shows the GitLab interface for a repository named 'StatTools'. The left sidebar contains navigation options: Project, Details, Activity, Cycle Analytics, Repository, Issues (1), Merge Requests (0), CI / CD, Operations, Registry, and Members. The main content area displays the repository details, including a description: 'An OR of all scripts used to evaluate workspaces for profile likelihoods made in RooStats'. Below the description are buttons for Star, Fork, and a dropdown menu. The file browser shows the 'master' branch with a search bar and a 'Find file' button. A recent commit is highlighted: 'Merge branch [redacted] into 'master'' authored 1 week ago. Below this is a table of commit history.

Name	Last commit	Last update
[redacted]	[redacted]	
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	1 month ago
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	1 month ago

Family Feud/Fortunes

- Plumbing - 20 %
- Procedural macros - 15 %
- Reinventing the Wheel - 35%
- Misc - 10%
- Simple RooStats Calls - 20%

The screenshot displays the GitLab web interface for the 'StatTools' project. The top navigation bar includes 'Projects', 'Groups', 'Activity', 'Milestones', and 'Snippets'. The main content area shows the project name 'StatTools' and a description: 'An OR of all scripts used to evaluate workspaces for profile likelihoods made in RooStats'. Below this, there are buttons for 'Star', 'Fork', and 'KRBS'. The interface also shows a list of files and a commit history table.

Name	Last commit	Last update
[redacted]	[redacted]	
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	1 month ago
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	1 month ago

Ideal RooFortunes

- Plumbing
- Procedural macros
 - Diagnostics
 - Inference
 - Analysis/Collaboration specific tests and tools
 - Updates to RooStats API

The screenshot shows the GitLab interface for the 'StatTools' project. The page title is 'ATLAS Physics > StatTools > Details'. The project description is 'An OR of all scripts used to evaluate workspaces for profile likelihoods made in RooStats'. The interface includes a sidebar with navigation options like Project, Details, Activity, and Cycle Analytics. The main content area shows a list of files with columns for Name, Last commit, and Last update. A merge request is visible at the top of the file list.

Name	Last commit	Last update
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	1 month ago
[redacted]	[redacted]	5 months ago
[redacted]	[redacted]	1 month ago

Many tools passed into the domain of the 'fit framework guru' do not make it into general usage. Efficient computation and precise inference are dependent on this knowledge being passed on.

Education about RooFit usage should not be constrained to beginner development. Advanced topics need to be addressed and shared and a dialog between users and developers started.

Open Fit

- The Demon PR

- 6108 lines changed.
- 39 files changed.
- 7 years of ATLAS updates and bug fixes.
- Half a year of PR conflicts and discussion.
- 0 issue tracking, continuity, version control or accrediting authors.

Search or jump to... Pull requests Issues Marketplace Explore

root-project / root Watch 83 Star 633 Fork 450

Code Pull requests 87 Insights

New PR to Merge Roofit changes from PR #792 (Cburgard h comb merge new) #1307

Merged Imoneta merged 14 commits into root-project:master from lmoneta:cburgard-hComb-merge-new on Nov 10, 2017

Conversation 2 Commits 14 Checks 0 Files changed 39

Changes from all commits Jump to... +4,640 -1,468

Diff settings Review changes

```
6 roofit/roofit/inc/LinkDef1.h
@@ -45,10 +45,12 @@
45 45 #pragma link C++ class RooIntegralMorph+ ;
46 46 #pragma link C++ class RooIntegralMorph::MorphCacheElem+ ;
47 47 #pragma link C++ class RooMomentMorph+ ;
48 + #pragma link C++ class RooMomentMorphFunc+ ;
49 + #pragma link C++ class RooMomentMorphND+ ;
50 + #pragma link C++ class RooMomentMorphFuncND+ ;
51 + #pragma link C++ class RooMomentMorphFuncND::Grid2+ ;
48 52 #pragma link C++ class RooStepFunction+ ;
49 53 #pragma link C++ class RooMultiBinomial+ ;
50 - #pragma link C++ class Roo1DMomentMorphFunction+ ;
51 - #pragma link C++ class Roo2DMomentMorphFunction+ ;
52 54 /* #pragma link C++ class std::vector< TVector2 >; */
53 55 /* #pragma link C++ class std::vector< TVector2 >::iterator ; */
54 56 /* #pragma link C++ class RooPolyMorph2D+ ; */
```


Open Fit

- Want to make sure that all bugs and updates are reported, and quickly available to all users.
- Some features are not useful to all users and critical to others.
- Help should first come from those in similar situations.
- RooFit/RooStats bugs and developments can be conceptually very different from standard computing issues.

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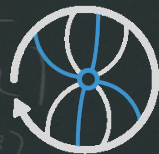
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```

Summary

- Documentation is underway... but it's a large task.
 - Needs accurate representation of both statistical and computational aspects for analyses.
 - Needs to be useful for pedagogical, instructional and reference purposes.
 - Can be used to validate new tools.
- Interactive
 - Hosted on SWAN (and eventually maybe more)
 - See a plot, make a plot.
- Representative
 - For analysts by analysts.
 - Currently lots of ATLAS recommendations, maybe eventually expand.



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