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SFrame Analysis Framework

Workflow

Below is a short description of the workflow of the analysis framework:

- Production of Patuples from data and MC samples.
- Production of small analysis ntuples from the Patuples.
- Analysis of ntuples.

Production of Patuples

We use the patuples produced by the B2G group. The recipe and location of the patuples are given in this page.

SFrame Installation

Below is a set of instructions based in the instructions from Thomas: twiki:

Prerequisite

* Setup ROOT and create a scratch area for PROOF:

- ♦ Copy to your area and modify according to your needs the ROOT setup files:

```
cp ~yumiceva/RooAlias.C ~/.
cp ~yumiceva/RooCMS.C ~/.
cp ~yumiceva/RooLogon.C ~/.
cp ~yumiceva/.rootrc ~/.
```

- ♦ Edit rootrc file to point the PROOF sandbox to your scratch area. Change the line:

```
Proof.Sandbox: /uscmst1b_scratch/lpc1/cmsroc/yumiceva/proof
```

CMSSW

```
cmsrel CMSSW_5_3_3
cd CMSSW_5_3_3/src
cmsenv
```

Ntuple Writer (as part of CMSSW)

```
cvs co -d UHHAnalysis/NtupleWriter -r Dec-05-2012-v1 UserCode/UHHAnalysis/NtupleWriter
cvs co -d EGamma/EGammaAnalysisTools -r V00-00-08 UserCode/EGamma/EGammaAnalysisTools
scram b -j 10
```

FastJet

```
mkdir -p fastjet/tarfiles
cd fastjet/tarfiles
curl -O http://fastjet.fr/repo/fastjet-X.X.X.tar.gz
tar xvfz fastjet-X.X.X.tar.gz
mv fastjet-X.X.X ../X.X.X
cd ../X.X.X/
./configure --prefix=$PWD/../X.X.X-install
make -j 10
```

```
make install
```

SFrame

```
svn co https://sframe.svn.sourceforge.net/svnroot/sframe/SFrame/tags/SFrame-03-06-11 SFrame
cd SFrame
(Edit the core/Makefile and remove the -lpcre library that is not supported at FNAL)
source setup.sh
make -j 10
```

Setup environment

```
(setup a CMSSW software first)
cd SFrame
source setup.csh
setenv FASTJETDIR /uscms/home/yumiceva/work/sframe/fastjet/3.0.2-install/lib
setenv LD_LIBRARY_PATH ${FASTJETDIR}:${LD_LIBRARY_PATH}
setenv LD_LIBRARY_PATH ${SFRAME_DIR}/SFrameTools/JetMETObjects/lib:${LD_LIBRARY_PATH}
```

Analysis Code

```
cvs co -d SFrameAnalysis UserCode/UHHAnalysis/SFrameAnalysis
cvs co -d SFrameTools UserCode/UHHAnalysis/SFrameTools
cd SFrameTools/include
cvs co -d Objects UserCode/UHHAnalysis/NtupleWriter/Objects
cd ..
make
cd JetMETObjects
make
cd ../../SFrameAnalysis
make

(For the moment, remove the following files to compile the code)
rm include/TMVATreeFiller.h
rm include/TopTagTMVACycle.h
rm src/TMVATreeFiller.cxx
rm src/TopTagTMVACycle.cxx
(run make again)
```

FIT Analysis Code

```
(experimental recipe, work in progress)
cd $SFRAME_DIR
git clone git@github.com:yumiceva/FITAnalysis.git
cd FITAnalysis
make
```

Configuration Examples

Create histograms from a MC sample

```
(First edit configuration file and modify the OutputDirectory to point to your area)
cd FITAnalysis
sframe_main config/FITExampleCycle_config.xml
```

Create histograms using only generator particles

```
(First edit configuration file and modify the OutputDirectory to point to your area)
cd FITAnalysis
sframe_main config/GenTTTTCycle_config.xml
```

Production of Analysis ntuples

Ntuples are produced with the ntuple writer ED analyzer.

```
cd CMSSW_5_3_3/src/UHHAnalysis/NtupleWriter
```

Edit the configuration file ntuplewriter_cfg.py to writhe your ntuples. If the sample is large, you should use crab.

Skimmed Analysis ntuples (Preselection)

A reduced version of the ntuples is needed for fast processing. Below is a recipe to produce a skim of the ntuples:

```
cd SFrame/FITAnalysis/
(Edit configuration file config/FourtopsPreSelectionCycleMuons_config.xml to setup output directo
```

The preselection can be run in PROOF mode with a condor job. You can use the files in the FITAnalysis/tools directory to accomplish this.

PRESELECTION

- At least one good muon: min pt (26 GeV), max eta (2.1) , min reliso (0.12), and muon ID
- No loose electron: pt (35 GeV), eta(2.5), iso (0.1)
- At least 6 jets: pt (40 GeV), eta (2.4)

LOCATION of skimmed ntuples

```
/eos/uscms/store/user/yumiceva/fourtops/sframePreselection/
```

Selection Analysis

- One good PV.
- One good muon: min pt (26 GeV), max eta (2.1) , min reliso (0.12), and muon ID
- No loose electron: pt (35 GeV), eta(2.5), iso (0.1)
- At least 6 jets: pt (40 GeV), eta (2.4)
- At least 2 CSVM b-tagged jets.
- Ht (400 GeV)

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