Table of Contents

There is a new framework for Multi Variate Selections in DaVinci!

Please have a look at DaVinciTutorial9 to learn how it works. Any new selections, please use the tools described therein!

The following information is kept here for historical reference.

MultiVariateSelections

The purpose of these selections in LHCb is to improve the data selection performance compared to those obtained from applying a set of cuts one after the other.

The current (first) implementation is for selecting events in the Bs2DsK channel and Bs2DsPi channel. It is expected that, this package will be expanded to include other channels.

Software to use for the selections

The selection is implemented in a DaVinci based package named MvaSelections. To access it and try out a test run, one may do:

```
getpack Phys/MvaSelections
cd ../Phys/MvaSelections
make
gaudirun.py ../Phys/MvaSelections/options/Bs2DsKSelection.py
gaudirun.py ../Phys/MvaSelections/options/Bs2DsPiSelection.py
```

Input and Output of the selections

The input can be a DST or a microDST. In the example .py file mentioned above, a microDST is used as input. This was created by applying standard preselection cuts to a signal DST.

The output is a flag setFilterPassed=true for selected events and false for others.

Adapting the usage of this package

This package uses few Davinci Tools to test if a given Bs candidate is to be selected or not. These Tools are used by a DaVinci Algorithm named Bs2DsKMvaSelectionAlg. In principle they can be directly accessed any DaVinci algorithm in a similar way.

The Bs2DsKMvaSelectionAlg searches through all Bs candidates in the event and if there is at least one candidate selected, the event is set to be selected. It also selects the candidate with largest Fisher discriminant as the best candidate and sends that candidate to histogram monitoring within the package. Any of these manipulations with Bs candidates may be modified for different purposes.

All the options for running this can be modified by editing the Bs2Ds2KSelection.py file or by editing the Bs2DsPiSelection.py or by copying the relevent part of these files into your options file area. It also has an option to activate histogram monitoring to plot quantities like the Bs mass before/after selection.

Current Selection Strategy

A sample of DC06 simulated data are used to create the TMVA-Fisher discriminants which are stored in a 'weights' file. This 'weights' file is used by the MvaSelections package to perform the selections on preselected data. For now, the fisher cut is applied only to obtain about 92% background rejection and the rest of the background rejection is achieved by applying a small set of cuts. Similar procedure is done with MC09 data. Weight files are available for these tunings done each of these datasets. For example the TMVAnalysis_BsDsK_F401Sph_FisherD.weights.xml is fpr MC09 data and the file TMVAnalysis_BsDsK_F190Sph_FisherD.weights.xml is for DC06 data.

-- SajanEaso - 14 June 2010

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