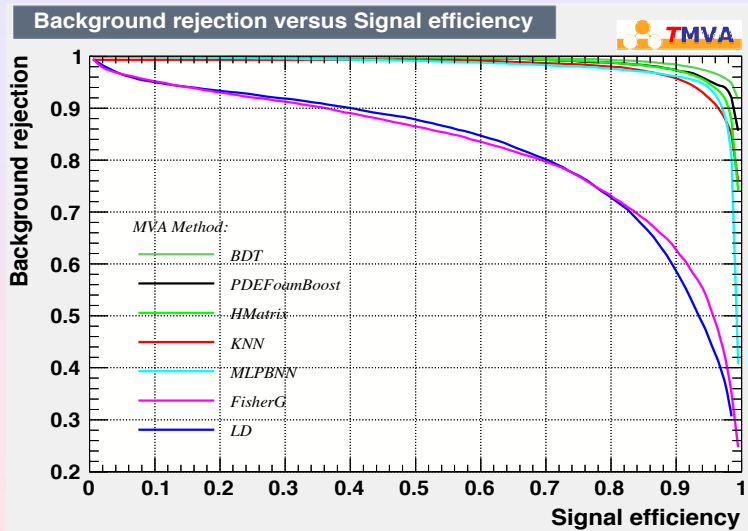


The MVA Method for The Heavy Higgs Signal via Two B-jets plus Di-photon and Background

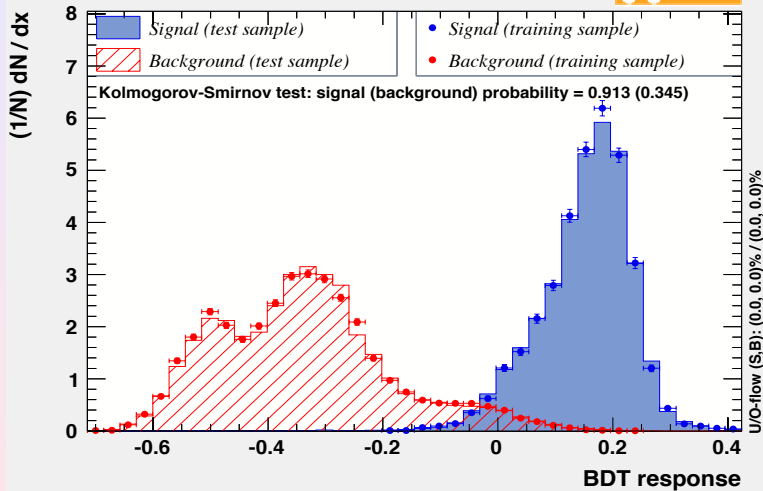
Chun Du

2014.03.25

- 2HDM $H \rightarrow hh \rightarrow bb\gamma\gamma$ signal events for training: 9894; for testing: 9943, $m_H = 300\text{GeV}$.
- SM process $bb\gamma\gamma$ background events for training: 20377; for testing: 20731.
- Basic cuts: $|\eta_{b,\gamma}| \leq 2.5$, $PT_{b,\gamma} \geq 25\text{GeV}$.
- Input variables: $m_{\gamma\gamma}$, m_{bb} , $m_{bb\gamma\gamma}$, $PT_{\gamma,leading}$, $PT_{\gamma,sub-leading}$, $PT_{b,leading}$, $PT_{b,sub-leading}$, $\sum_b PT$, $\sum_{b,\gamma} PT$.

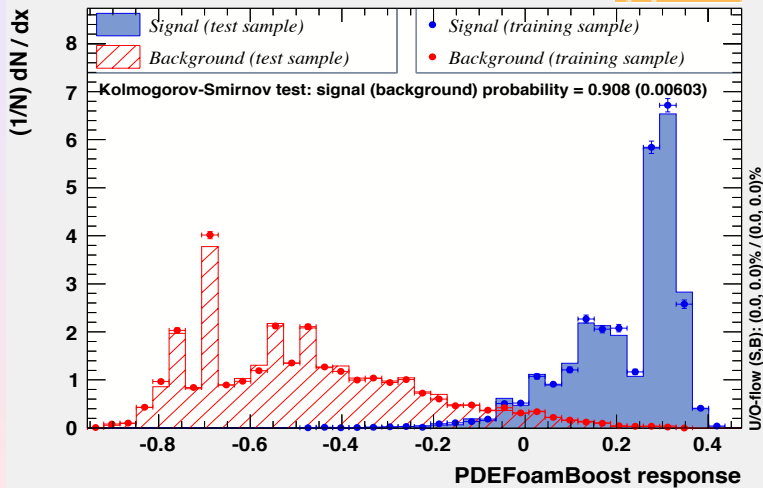


TMVA overtraining check for classifier: BDT

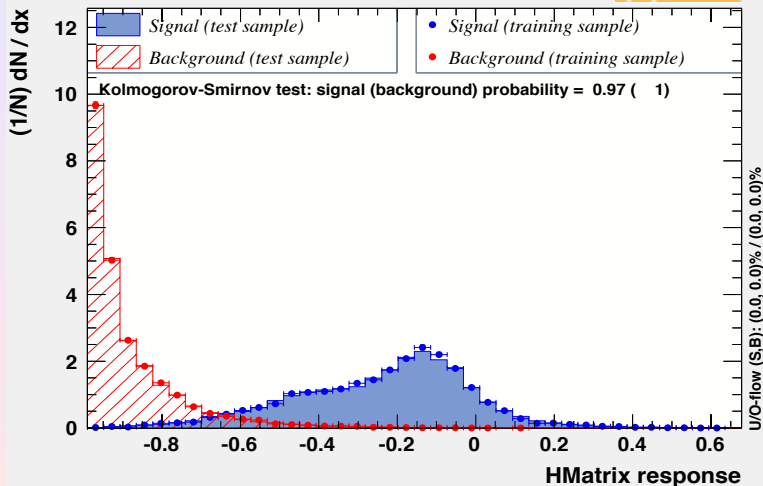


TMVA comparison PDEFoamBoost

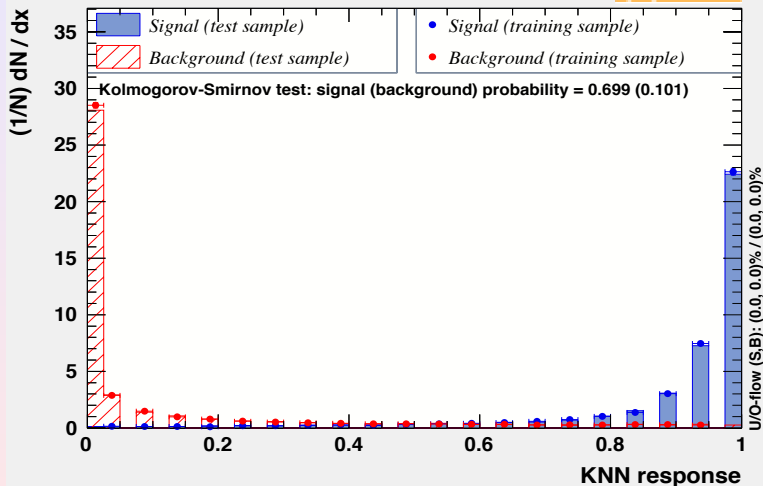
TMVA overtraining check for classifier: PDEFoamBoost

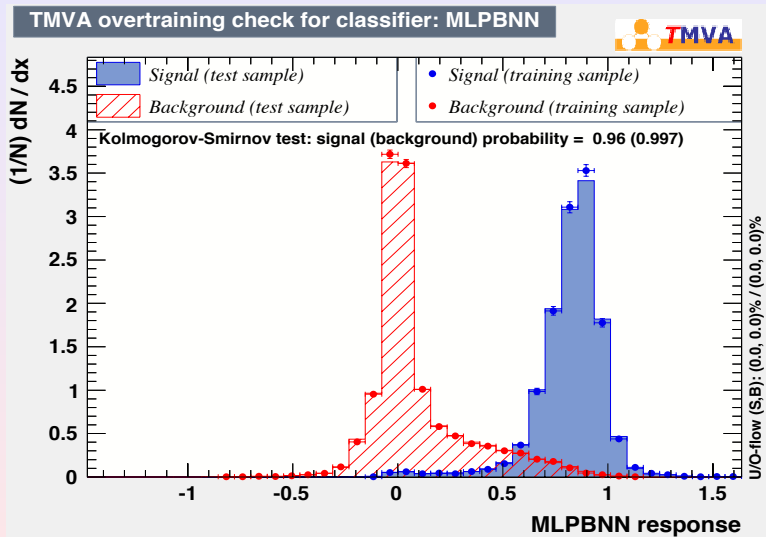


TMVA overtraining check for classifier: HMatrix

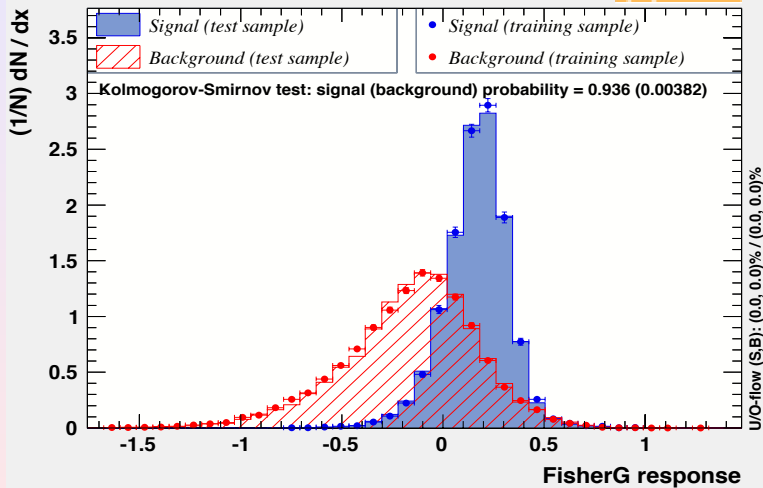


TMVA overtraining check for classifier: KNN

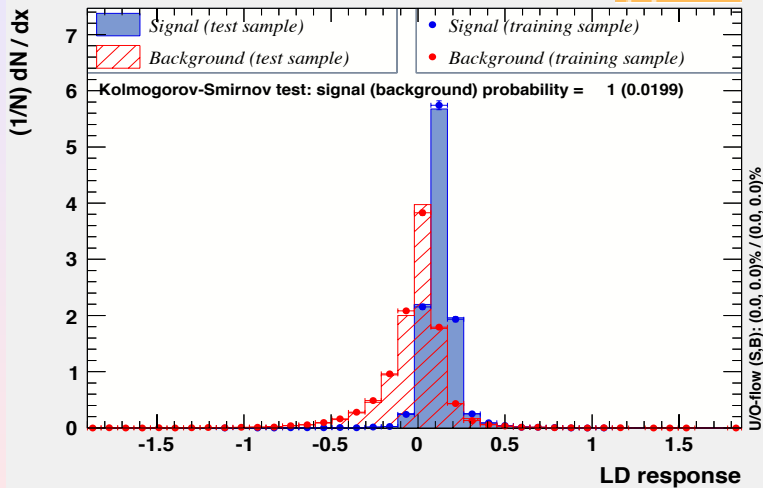




TMVA overtraining check for classifier: FisherG

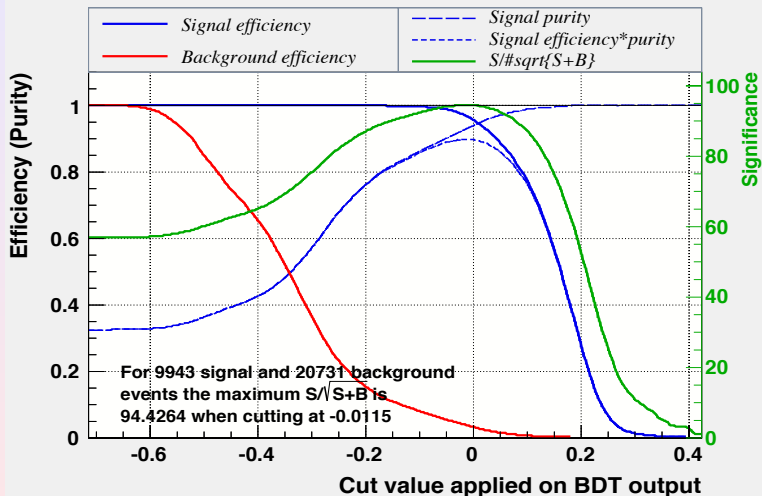


TMVA overtraining check for classifier: LD



Cut efficiencies for BDT

Cut efficiencies and optimal cut value



- Theoretical work, signal for different mass of heavy Higgs, adding other backgrounds, adding other variables like ΔR , some discussion with Ning Chen.
- Generating bbja, bbjj, bjaa, bjja, jjaa backgrounds.
- Experiment data? for application.