$B \to K\ell\ell$ update

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Reminder

$\Rightarrow$ We had a first version of the BDT last time. We had been asked from other for some additional studies. $\Rightarrow$ Here they are.

Feature engineering

$\Rrightarrow$ We wanted to align the training with $B \to Kee$.
The base is:

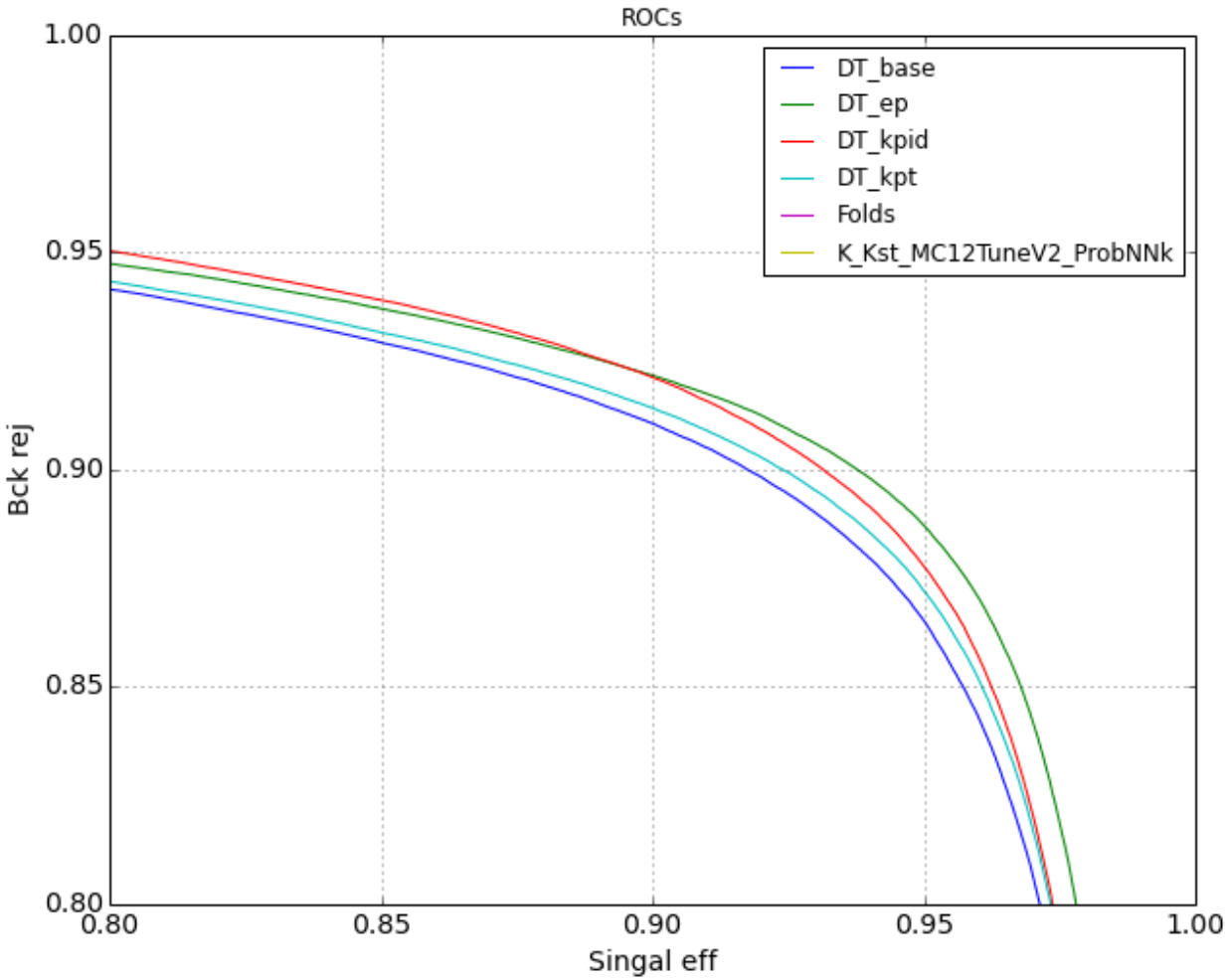
- `K_Kst_IPCHI2_OWNPV`
- `B_plus_ENDVERTEX_CHI2`
- `e_minus_IPCHI2_OWNPV`
- `e_plus_IPCHI2_OWNPV`
- `B_plus_PT`
- `B_plus_IPCHI2_OWNPV`
- `B_plus_FD_OWNPV`
- `B_plus_DIRA_OWNPV`
- `B_plus_P`
- `K_Kst_P`
- `e_plus_TRACK_CHI2NDOF`
- `e_minus_TRACK_CHI2NDOF`
- `K_Kst_TRACK_CHI2NDOF`

$\Rrightarrow$ In addition we have extensions:

- `K_Kst_MC12TuneV2_ProbNNk` (kpid)
- `K_Kst_PT` (kpt, ep)
- `e_plus_PT` (ep)
- `e_minus_PT` (ep)

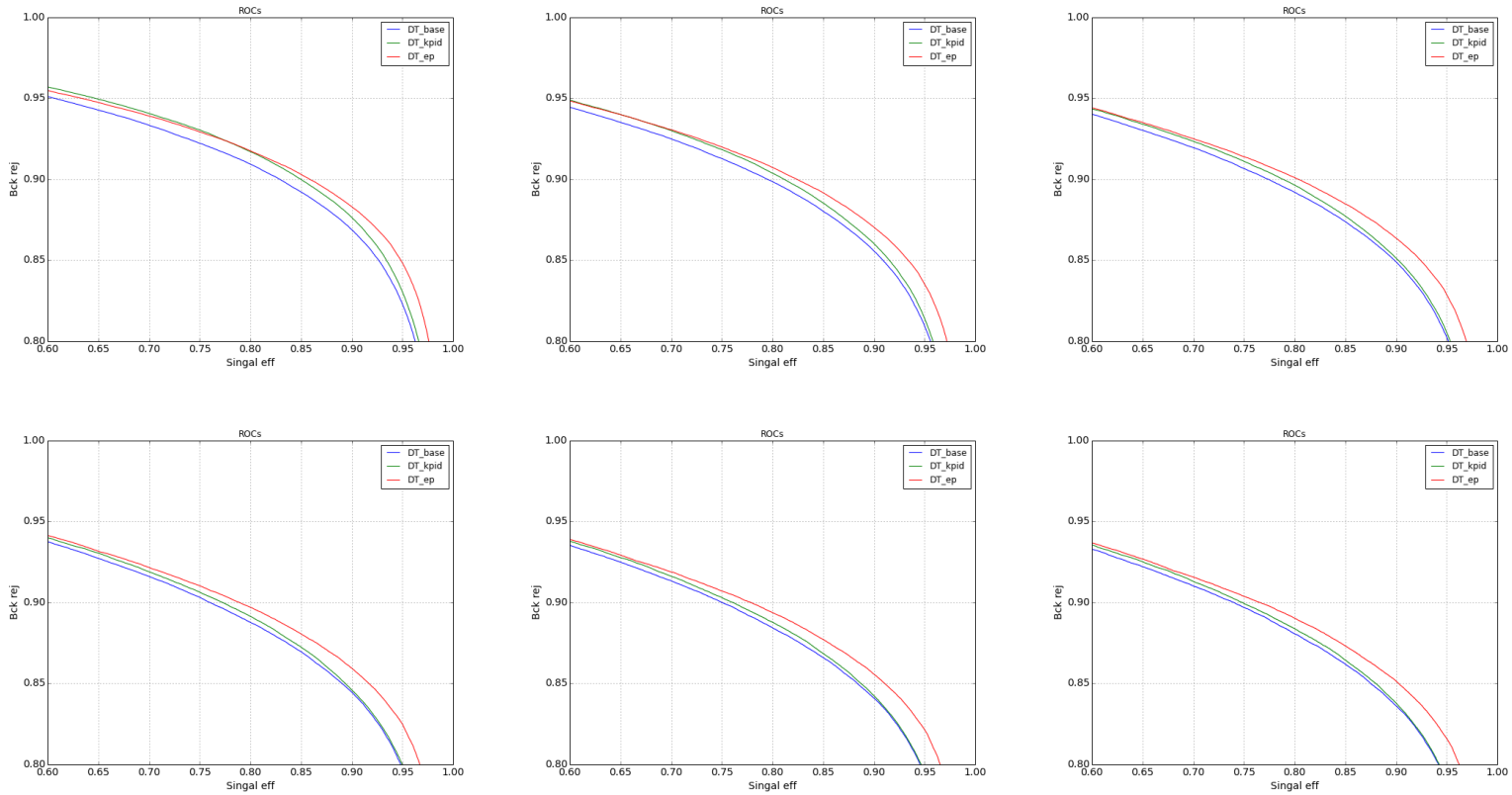
Performance

⇛ The performance of the training (10-Fold training)



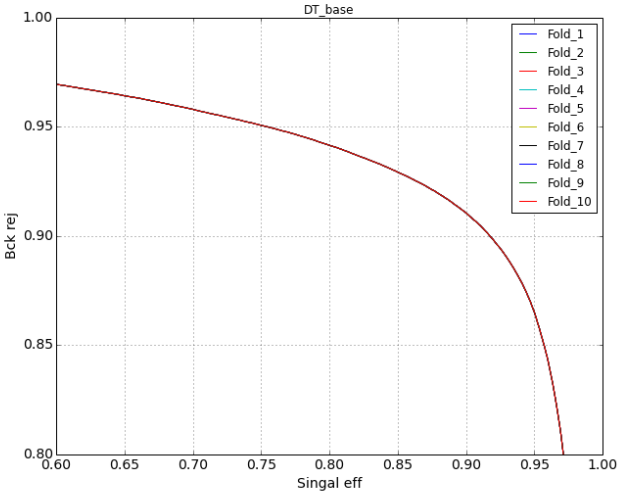
Put or not to put PIDK in BDT

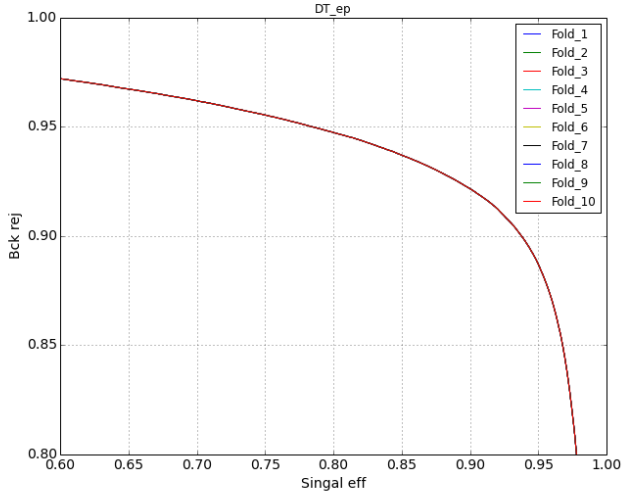
$\Rrightarrow$ Cuts: `K_Kst_MC12TuneV2_ProbNNk` $> 0.1, 0.2, 0.3, 0.4, 0.5, 0.6$.

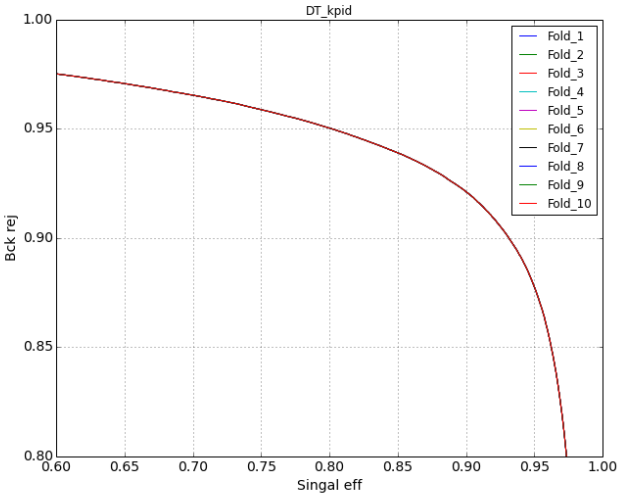


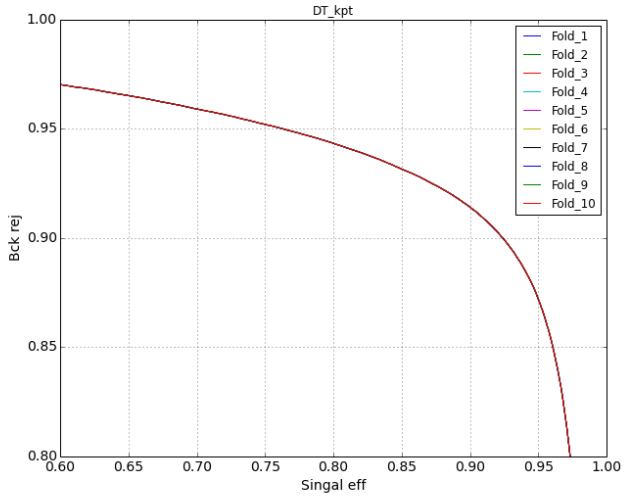
Fold consistency

⇛ Comparison of the ROC curves



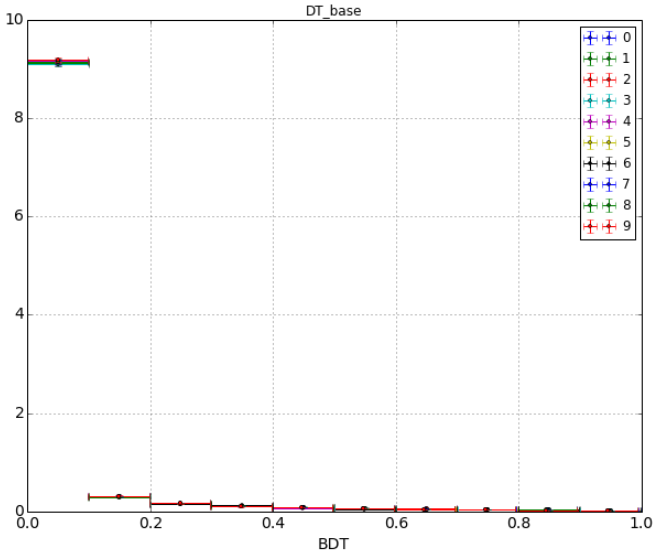


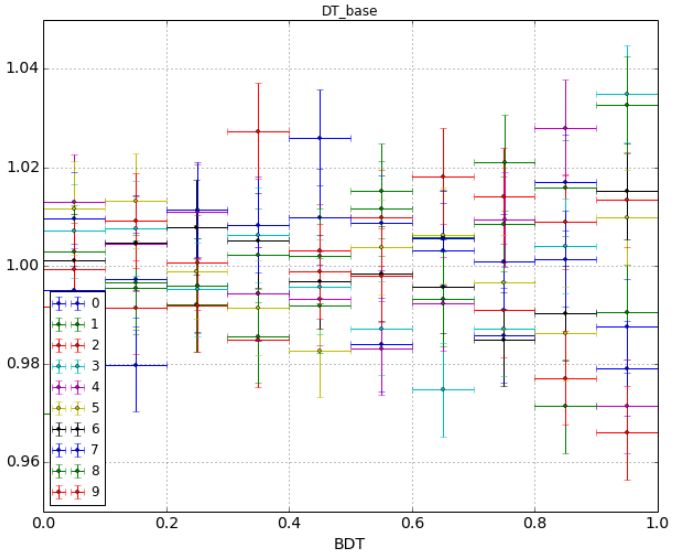




Distribution consistency

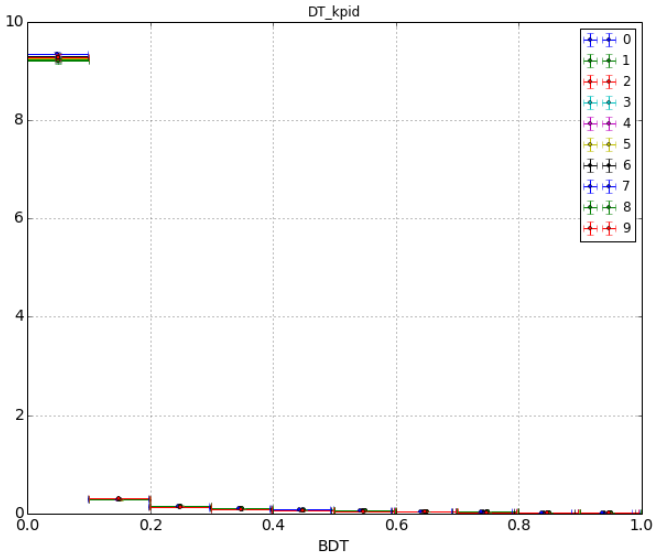
⇛ Comparison of the Distributions (base):

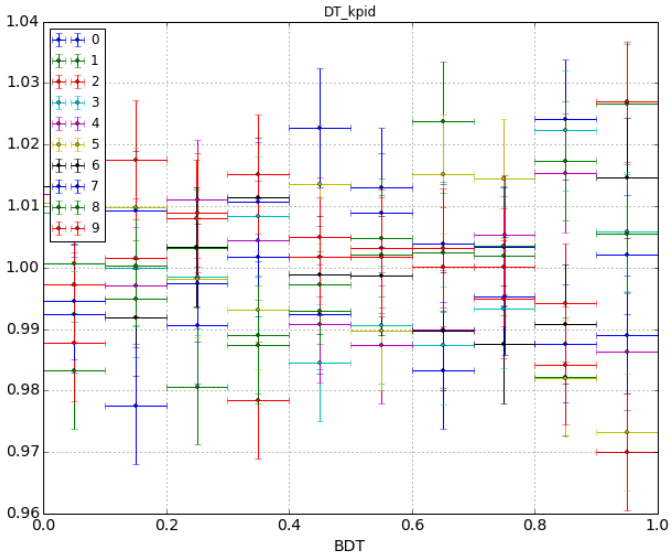




Distribution consistency

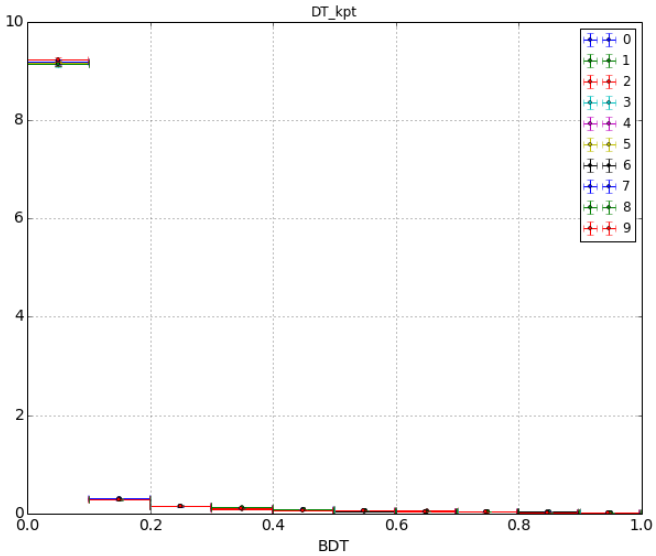
⇛ Comparison of the Distributions (kpid):

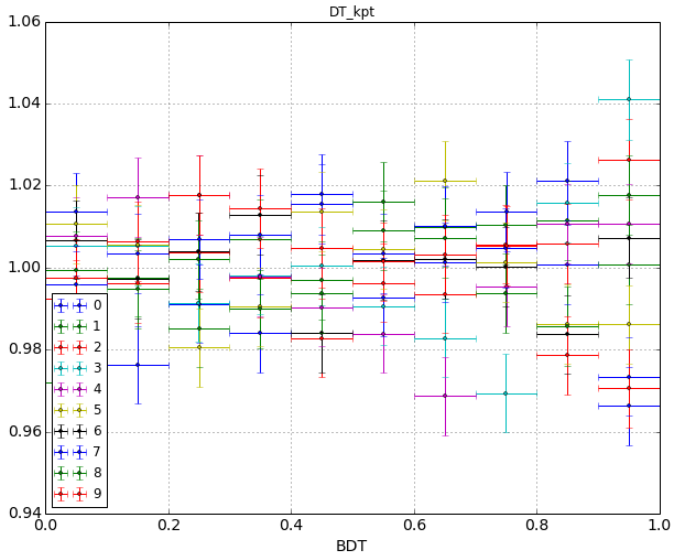




Distribution consistency

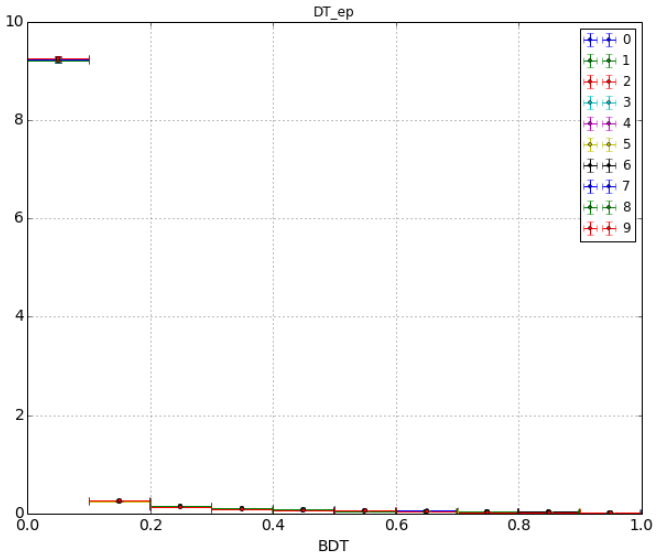
⇛ Comparison of the Distributions (kpt):

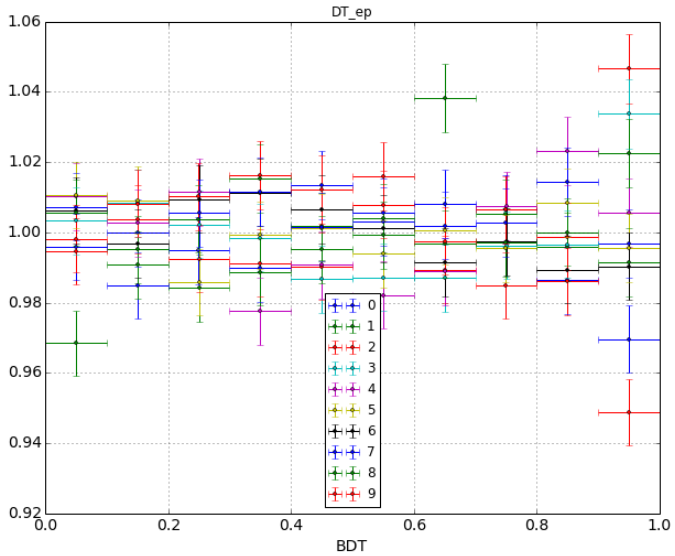




Distribution consistency

⇛ Comparison of the Distributions (ep):





Conclusions

- Large portion of efficiency gain of `K_Kst_MC12TuneV2_ProbNNk` inside the BDT can be recovered by applying a `K_Kst_MC12TuneV2_ProbNNk` cut.
- I would still go with putting it inside the BDT, as it makes life easier.
- See what other people working in this say.

Backup