



$$e^+ e^- \rightarrow ZH \rightarrow \nu \nu WW^* \rightarrow \nu \nu \ell^+ \nu \ell^- \nu (l = e, \mu)$$

Xianke He

2018-01-15

How to classify different types of bkg in TMVA?

$e^+e^- \rightarrow$	<i>Signal</i>	<i>ZHbkg</i>	<i>SZ</i>	<i>SW</i>	<i>ZorW</i>
Total	46019	948401	871051	3.3278×10^6	520935
$N_\gamma < 4, 1 < N_{ch} < 5$	97.4836%	5.502%	19.3409%	66.1578%	96.9088%
$1 < N_{iso_lep} < 3$	86.523%	1.23872%	13.3392%	36.6292%	81.071%
$P_T < 75\text{GeV}$	85.7885%	1.2346%	11.5029%	32.3109%	72.7615%
$ P_Z < 50\text{GeV}$	81.3881%	1.20888%	4.46162%	13.9104%	33.6885%
$20\text{GeV} < E_{l1} < 85\text{GeV}$	80.9709%	1.02183%	4.34062%	13.7239%	33.2972%
$E_{l2} < 45\text{GeV}$	80.2169%	1.02151%	2.19551%	8.65478%	18.6661%
$140\text{GeV} < E_{Miss}$	80.0821%	1.02151%	1.00511%	7.13561%	14.655%
$InvMass_{ll} < 75\text{GeV}$	79.591%	1.02077%	0.461397%	4.87213%	9.80218%
$Included_Angle_{ll} < 75\text{GeV}$	79.5541%	1.02024%	0.460134%	4.85867%	9.79681%
<i>Pull</i>	78.9304%	0.885701%	0.396762%	4.33493%	9.50099%
<i>BDTcut</i>	31.5%	0.4%	0.05%	0.08%	0.43%



Half for training, half for test. That's ok. But what if

Half(sampler 1) for training(sample 2) , the other half for test **for the first time, and the second time**, sample 2 for training, sample 1 for test ?

Mo Xin shixiong's result

Table 6: Efficiencies of signal and background in the $\mu^+\mu^-$ channel

	$Z(\mu^+\mu^-)H(\text{invisible})$	ZZ	WW	ZZ or WW	$Z(2f)$
Total generated	100000	5711445	44794678	17977941	423674068
$2 \leq N_\mu \leq 3, N_{ch} \leq 3$	89.9%	2.08%	0.72%	5.68%	17.3%
$N_\gamma \leq 1$	88.9%	2.00%	0.71%	5.56%	11.7%
$10\text{GeV} < P_t^{\mu^+\mu^-} < 70\text{GeV}$	86.8%	1.13%	0.64%	4.65%	6.61%
$ P_z^{\mu^+\mu^-} < 65\text{GeV}$	86.6%	0.49%	0.54%	4.17%	2.97%
$ \cos\theta_{\mu^+\mu^-} < 0.7$	85.7%	0.28%	0.42%	3.88%	2.89%
$90\text{GeV}_i \text{ Visible Energy}_i 120\text{GeV}$	85.0%	0.07%	0.12%	0.38%	0.04%
$80\text{GeV} < M_{\mu^+\mu^-} < 100\text{GeV}$	80.0%	0.06%	0.06%	0.21%	0.03%
BDT cut	64.1%	0.04%	0.03%	0.13%	0.00%
fit window	59.4%	0.02%	0.01%	0.05%	0.00%

My naive method

```
factory->AddSpectator( "identify" , "identify" , "" , 'D' );
```

Identify	signal	zhbkg	sz	sw
value	19	20	0	1

failed !

the possible solution:

TMVAClassificationApplication.C ?

Backup

My naive method

```
factory->AddSpectator( "identify" , "identify" , "" , 'D' );
```

The second time, run the code that was commented out ?

```
TRandom3 *rand=new TRandom3();  
rand->SetSeed(10*i+1e11);  
double temp_prob=rand->Uniform(0,1);  
if (temp_prob>0.5) factory->AddSignalTrainingEvent( variable, 1);  
//if (temp_prob<0.5) factory->AddSignalTrainingEvent( variable, 1);  
  
else factory->AddSignalTestEvent ( variable, 1);
```