

Status report

Tokyo Institute of Technology

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5 December, 2016

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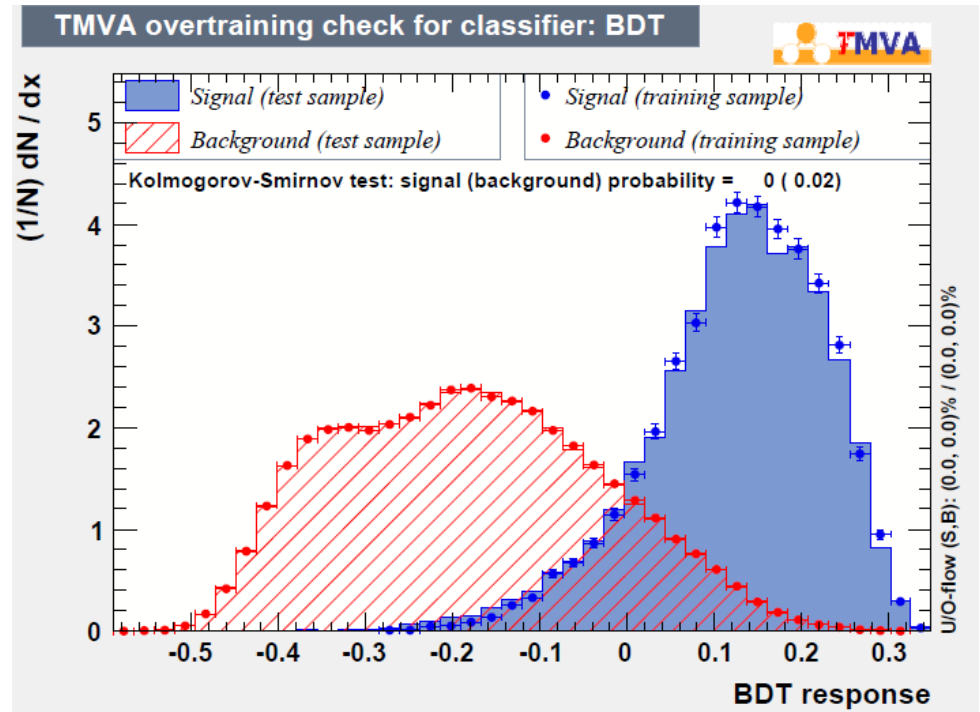
- Increase the number of the input variables ($6 \rightarrow 15$) in MVA
- Change the significance ($2\sigma \rightarrow 3\sigma$ or 5σ)

Analysis ($E_e = 60\text{GeV}$, $E_p = 7\text{TeV}$)

We increased the number of the input variables (6 \rightarrow 15).

Input variables: $p_{T,j}, \eta_j, \phi_j, p_{T,e}, \eta_e, \phi_e, \cancel{E}_T, \phi_{\cancel{E}_T}, \Delta\eta_{ej}, \Delta\phi_{ej}, \Delta\phi_{j\cancel{E}_T}, \Delta\phi_{e\cancel{E}_T}, \Delta R_{ej}, y_e, M_{ej}$

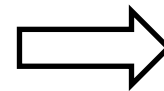
Score >	N_s	N_B	Br[%]
0	6989	64886	7.32
0.05	6253	37072	6.19
0.1	5036	17718	5.33
0.15	3436	6533	4.76
0.2	1933	1948	4.67
0.25	664	356	5.99
0.3	67	24	17.9



Branching ratio calculated by $S/\sqrt{S+B}$:

$$Z = \frac{1933 \times \text{Br}(h \rightarrow \cancel{E}_T)}{\sqrt{1933 \times \text{Br}(h \rightarrow \cancel{E}_T) + 1948}}$$

In the case of 2σ



$$\text{Br}(h \rightarrow \cancel{E}_T) \sim 4.67\%$$

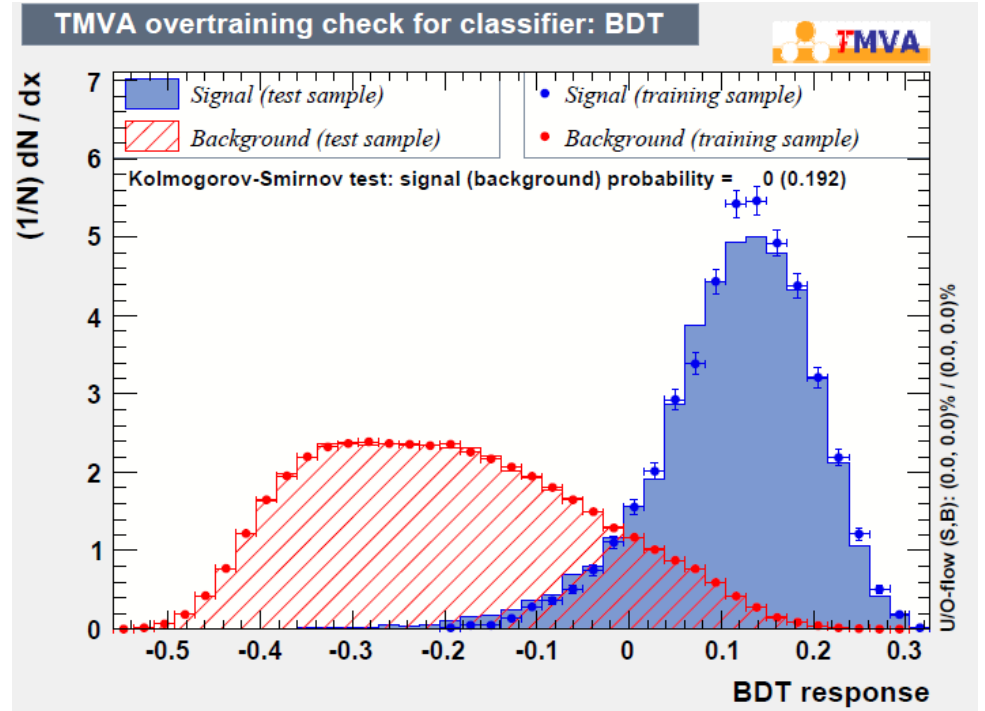
※ $\text{Br}(h \rightarrow \cancel{E}_T) \sim 4.71\%$ (before)

Analysis ($E_e = 60\text{GeV}$, $E_p = 14\text{TeV}$)

We increased the number of the input variables (6 \rightarrow 15).

Input variables: $p_{T,j}, \eta_j, \phi_j, p_{T,e}, \eta_e, \phi_e, \cancel{E}_T, \phi_{\cancel{E}_T}, \Delta\eta_{ej}, \Delta\phi_{ej}, \Delta\phi_{j\cancel{E}_T}, \Delta\phi_{e\cancel{E}_T}, \Delta R_{ej}, y_e, M_{ej}$

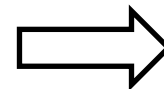
Score >	N_s	N_B	Br[%]
0	13217	101250	4.83
0.05	11723	55170	4.02
0.1	8917	22554	3.39
0.15	5229	6365	3.09
0.2	2075	1243	3.50
0.25	383	110	6.02
0.3	22	2	24.8



Branching ratio calculated by $S/\sqrt{S+B}$:

$$Z = \frac{5229 \times \text{Br}(h \rightarrow \cancel{E}_T)}{\sqrt{5229 \times \text{Br}(h \rightarrow \cancel{E}_T) + 6365}}$$

In the case of 2σ



$$\text{Br}(h \rightarrow \cancel{E}_T) \sim 3.09\%$$

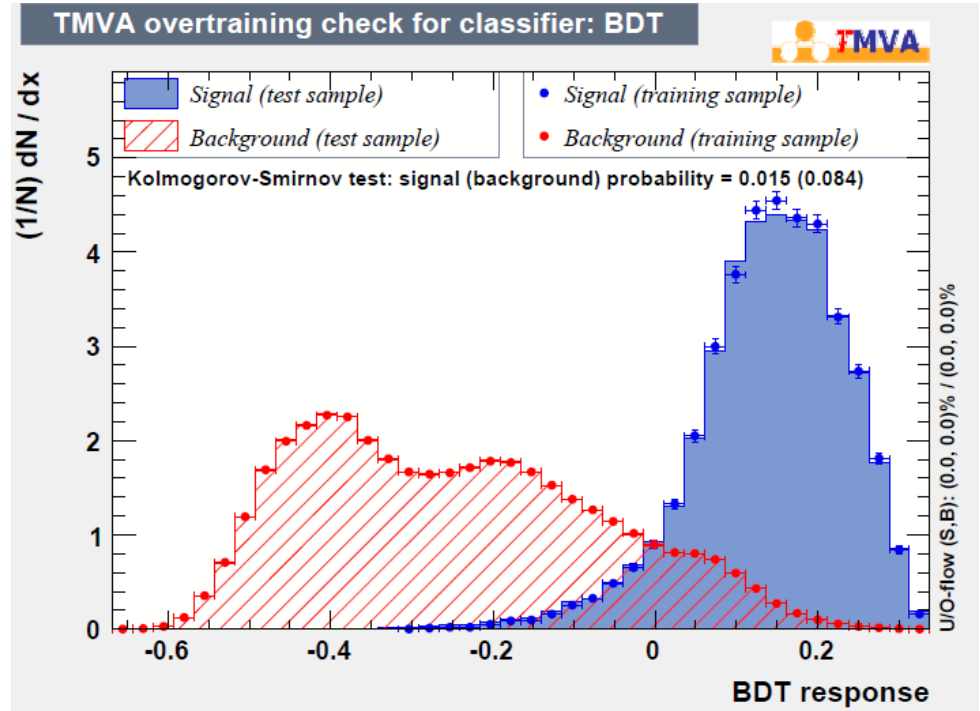
※ $\text{Br}(h \rightarrow \cancel{E}_T) \sim 3.22\%$ (before)

Analysis ($E_e = 60\text{GeV}$, $E_p = 50\text{TeV}$)

We increased the number of the input variables (6 \rightarrow 15).

Input variables: $p_{T,j}, \eta_j, \phi_j, p_{T,e}, \eta_e, \phi_e, \cancel{E}_T, \phi_{\cancel{E}_T}, \Delta\eta_{ej}, \Delta\phi_{ej}, \Delta\phi_{j\cancel{E}_T}, \Delta\phi_{e\cancel{E}_T}, \Delta R_{ej}, y_e, M_{ej}$

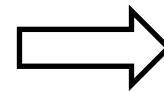
Score >	N_S	N_B	Br[%]
0	31880	255078	3.17
0.05	29484	159709	2.72
0.1	24331	76493	2.28
0.15	16983	27756	1.97
0.2	9465	8188	1.93
0.25	3634	1716	2.34
0.3	477	117	4.97



Branching ratio calculated by $S/\sqrt{S+B}$:

$$Z = \frac{9465 \times \text{Br}(h \rightarrow \cancel{E}_T)}{\sqrt{9465 \times \text{Br}(h \rightarrow \cancel{E}_T) + 8188}}$$

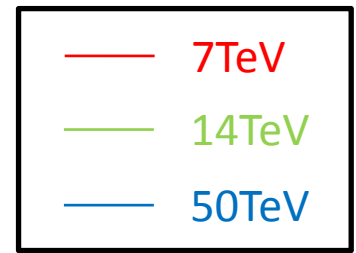
In the case of 2σ



$$\text{Br}(h \rightarrow \cancel{E}_T) \sim 1.93\%$$

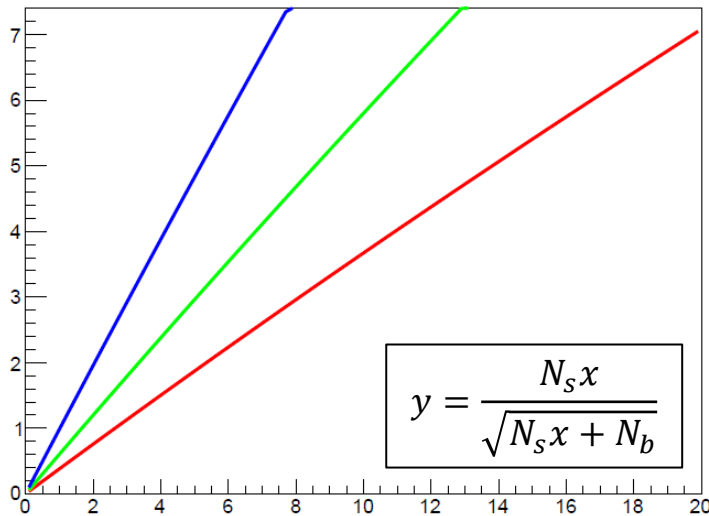
※ $\text{Br}(h \rightarrow \cancel{E}_T) \sim 1.93\%$ (before)

Change the significance



We changed the significance for 1ab^{-1} .

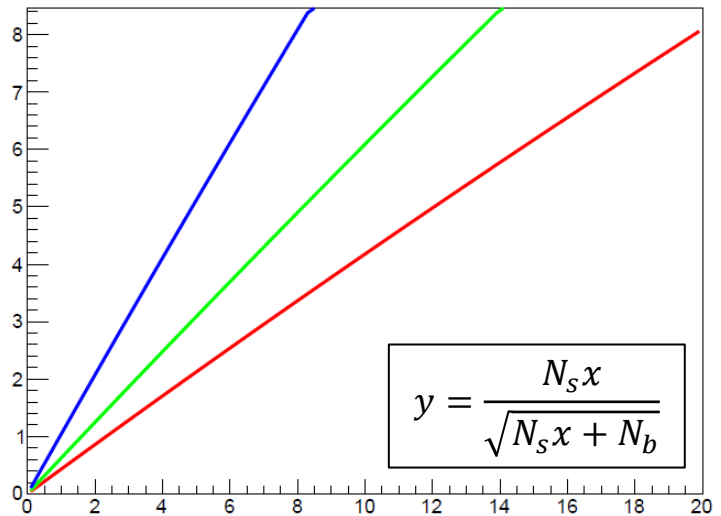
Significance [σ]



Cut-base

$\text{Br}(h \rightarrow \cancel{E}_T)[\%]$

Significance [σ]



MVA

$\text{Br}(h \rightarrow \cancel{E}_T)[\%]$

	7TeV	14TeV	50TeV
2σ	5.35% (4.67%)	3,36% (3.09%)	2.05% (1.93%)
3σ	8.11% (7.09%)	5.07% (4.66%)	3.08% (2.92%)
5σ	13.8% (12.1%)	8.57% (7.87%)	5.19% (4.91%)

Summary

- When we increased the number of the input variables (6 \rightarrow 15), $\text{Br}(h \rightarrow \cancel{E}_T)$ didn't change very much.
- When the proton energy is 7TeV, $\text{Br}(h \rightarrow \cancel{E}_T) = 7.09\%$ (3σ), 12.1% (5σ).
- When the proton energy is 14TeV, $\text{Br}(h \rightarrow \cancel{E}_T) = 4.66\%$ (3σ), 7.87 (5σ).
- When the proton energy is 50TeV, $\text{Br}(h \rightarrow \cancel{E}_T) = 2.92\%$ (3σ), 4.91% (5σ).