classifier

December 17, 2022

```
[1]: %cd ../../../
```

```
/home/jan/FMF/masters
```

```
[2]: saved = "ml_hep_sim/notebooks/article_notebooks/saved/"
```

```
[3]: from ml_hep_sim.pipeline.pipelines.classifier_pipeline import *
     from ml_hep_sim.plotting.style import style_setup

     import matplotlib.pyplot as plt

     style_setup(seaborn_pallete=True)
```

0.1 Trained classifiers

All trained on background.

Saved run names are: - Higgs_resnet_classifier - Higgs_linear_classifier

```
[4]: run_name = "Higgs_resnet_classifier"
     test_dataset= "higgs_bkg"
     run = False

     pipelines = classifier_pipeline(
         run_name=run_name,
         override={
             "model_config": {"learning_rate": 3e-4, "resnet": False,␣
     ↪"hidden_layers": [128, 128, 128, 1]},
             "datasets": {"data_name": "higgs", "subset_n": [10 ** 6, 10 ** 5, 10 **␣
     ↪5]},
             "logger_config": {"run_name": run_name},
             "trainer_config": {"gpus": 1, "max_epochs": 50},
         },
         train=False,
         run=run,
         test_dataset=test_dataset,
     )
```

0.2 Classifier results

- Higgs_resnet_classifier_higgs_bkg.p
- Higgs_resnet_classifier_higgs_sig.p
- Higgs_linear_classifier_higgs_bkg.p
- Higgs_linear_classifier_higgs_sig.p

```
[5]: if run:
         res = pipelines[1].pipes[-1].results
         pickle_save(saved, run_name + f"_{test_dataset}.p", res)
```

```
[6]: save = ["Higgs_resnet_classifier_higgs_bkg.p",
             "Higgs_resnet_classifier_higgs_sig.p",
             "Higgs_linear_classifier_higgs_bkg.p",
             "Higgs_linear_classifier_higgs_sig.p"]
```

```
[7]: save_res = []

     for s in save:
         save_res.append(pickle_load(saved, s))
```

```
WARNING:root:Loading from
ml_hep_sim/notebooks/article_notebooks/saved/Higgs_resnet_classifier_higgs_bkg.p
WARNING:root:Loading from
ml_hep_sim/notebooks/article_notebooks/saved/Higgs_resnet_classifier_higgs_sig.p
WARNING:root:Loading from
ml_hep_sim/notebooks/article_notebooks/saved/Higgs_linear_classifier_higgs_bkg.p
WARNING:root:Loading from
ml_hep_sim/notebooks/article_notebooks/saved/Higgs_linear_classifier_higgs_sig.p
```

0.3 ResNet

```
[8]: for s in save_res[:2]:
         plt.hist(s, bins=30, histtype="step", lw=2, density=True, range=[-0.5, 1.2])

     plt.legend(["bkg", "sig"])
     plt.axvline(0.5, c='k', ls='--')
     plt.xlabel("classifier output")
     plt.ylabel("PDF")
     plt.tight_layout()
     plt.savefig(saved + "resnet_class_pdf.pdf")
```
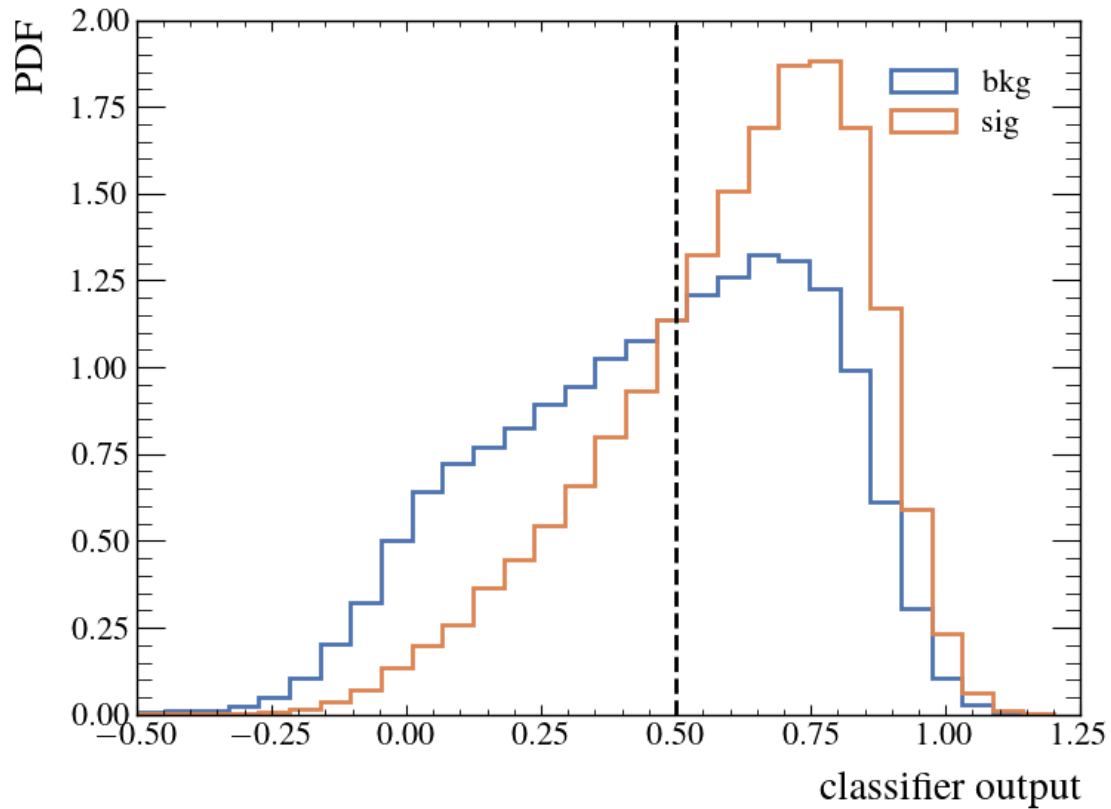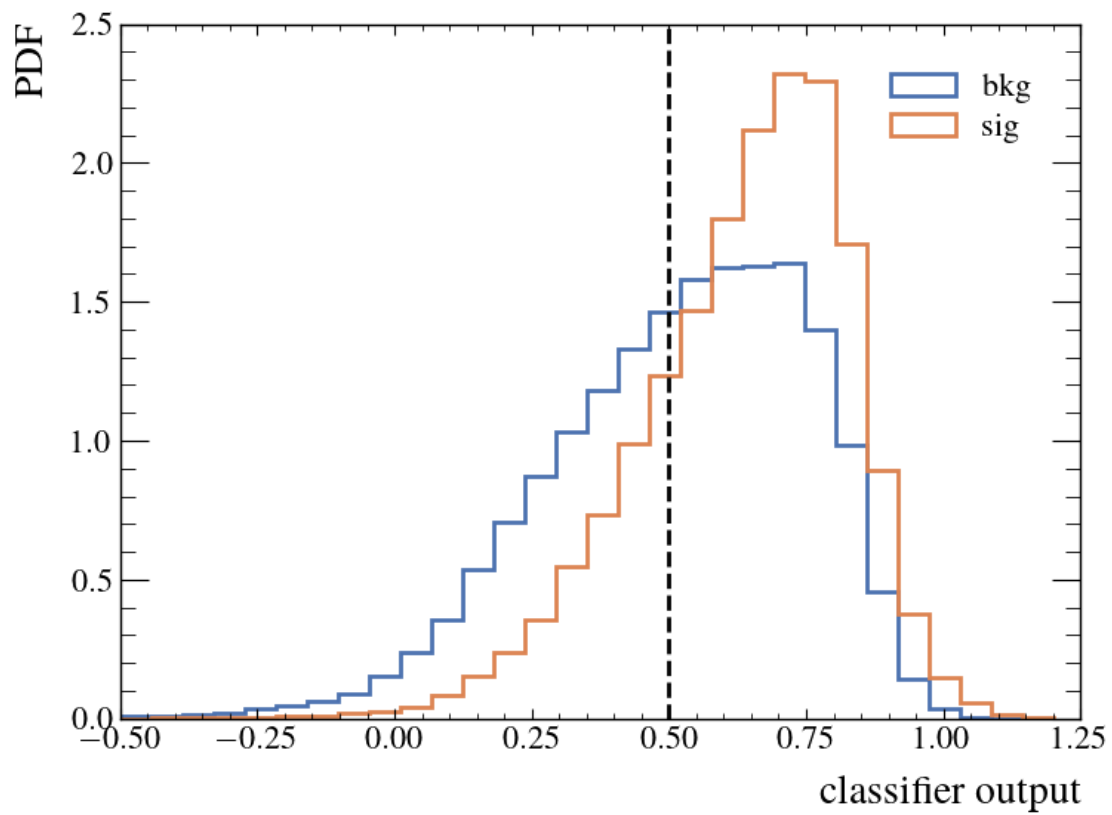
1 Linear

```
[9]: for s in save_res[2:]:
         plt.hist(s, bins=30, histtype="step", lw=2, density=True, range=[-0.5, 1.2])

     plt.legend(["bkg", "sig"])
     plt.axvline(0.5, c='k', ls='--')
     plt.xlabel("classifier output")
     plt.ylabel("PDF")
     plt.tight_layout()
     plt.savefig(saved + "linear_class_pdf.pdf")
```

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