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Subject: combinations of pid algorithms

Posted by [Dmitry Khanef](#) on Wed, 16 May 2012 13:31:21 GMT

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Dear all,

I have another issue. I tried different combinations of PID algorithms and found out a strange thing.

For example if I use following code with "PidAlgoEmcBayes" enabled only

```
theAnalysis->FillList(eplus, "ElectronVeryTightPlus", "PidAlgoEmcBayes");
```

or another one with many others included

```
theAnalysis->FillList(eplus, "ElectronVeryTightPlus", "PidAlgoEmcBayes;PidAlgoStt;PidAlgoMvd;PidAlgoDrc;PidAlgoDisc;PidAlgoMvd");
```

then the first case gives me less events compare to the second one. It seems very strange for me. I would expect that by adding new algorithms I should be getting less rather than more events.

Cheers,  
Dmitry

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Subject: Re: combinations of pid algorithms

Posted by [Stefano Spataro](#) on Wed, 16 May 2012 13:36:38 GMT

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Dmitry Khanef wrote on Wed, 16 May 2012 15:31

the first case gives me less events compare to the second one. It seems very strange for me. I would expect that by adding new algorithms I should be getting less rather than more events.

Why? If you multiply your initial pdf with another pdf, you will obtain a different probability distribution. I cannot see a direct correlation of drop in efficiency with increasing number of algorithms.

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Subject: Re: combinations of pid algorithms

Posted by [Dmitry Khanef](#) on Wed, 16 May 2012 13:42:20 GMT

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Stefano Spataro wrote on Wed, 16 May 2012 15:36

Why? If you multiply your initial pdf with another pdf, you will obtain a different probability distribution. I cannot see a direct correlation of drop in efficiency with increasing number of algorithms.

Sorry may be I was not clear. It is exactly what I would expect but for some reason my results are opposite. Efficiency goes up with increasing number of algorithms.

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Subject: Re: combinations of pid algorithms

Posted by [Stefano Spataro](#) on Wed, 16 May 2012 13:43:50 GMT

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I am not saying that this is correct. I am just saying that the two things are uncorrelated, I would say.

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Subject: Re: combinations of pid algorithms

Posted by [Dmitry Khanef](#) on Wed, 16 May 2012 13:53:19 GMT

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Hm. I was following tutorial and found these lines

Quote:

...

```
theAnalysis->FillList( looseElectrons, "ElectronLoose",  
"PidAlgoEmcBayes;PidAlgoDrc;PidAlgoMvd");
```

In this case the probabilities for PID selection are achieved by multiplying the probability values of the chosen algorithms, i.e.  $P_e = P_{e,1} \times P_{e,2} \times P_{e,3}$ , etc.

The only case one can get increase in efficiency is if one of the probabilities  $>1$  what is impossible. Am I right?

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Subject: Re: combinations of pid algorithms

Posted by [Stefano Spataro](#) on Wed, 16 May 2012 13:57:40 GMT

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I understand the sentence can be misleading.

The algorithm multiply PDFs (probability density functions), but the final probability is the pdf divided by the sum of all the pdf.  $\rightarrow \text{pdf}(e) / (\text{pdf}(e) + \text{pdf}(\mu) + \text{pdf}(\pi) + \text{pdf}(k) + \text{pdf}(p))$ .

If the denominator goes down, the probability can increase.

Subject: Re: combinations of pid algorithms  
Posted by [Ralf Kliemt](#) on Thu, 17 May 2012 08:28:15 GMT  
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Hi.

In other words: when you increase the probability of a particle being a proton the other probabilities will drop accordingly.

You should also be really careful which PID you want to include for which particle species. Soem detectors might introduce unnecessary mix-ups. Always crosscheck with MC information to be safe.

Cheers, Ralf.

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