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Robust Neural Particle Identification Models

The volume of data processed by the Large Hadron Collider experiments demands sophisticated selection rules typically based on machine learning algorithms. One of the shortcomings of these approaches is their profound sensitivity to the biases in training samples. In the case of particle identification (PID), this might lead to degradation of the efficiency for some decays on validation due to differences in input kinematic distributions. In this talk, we propose a method based on the Common Specific Decomposition that takes into account individual decays and possible misshapes in the training data by disentangling common and decay specific components of the input feature set. We show that the proposed approach reduces the rate of efficiency degradation for the PID algorithms for the decays reconstructed in the LHCb detector.

Significance

This contribution represents an attempt to address an issue of efficiency degradation for the ML solutions in various places of phase space. We show that using specific loss function can improve the PID quality for specific decays.

References

Previous results concerning neural PID (that do not include the problem under investigation): https://www.epj-conferences.org/articles/epjconf/pdf/2019/19/epjconf_chep2018_06011.pdf

Speaker time zone

Compatible with Europe

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