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Machine Learning system mimicking student's choice in Particle Data Analysis lab activity

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In Particle Data Analysis lab activity, aimed at undergraduate and high school students, the student is tasked with classifying collision events which contain two muons decaying from J/ψ meson. The activity provides 2000 collision events from CMS detector, selected by CMS Outreach community. However, classifying 2000 collision events by hand can be a tedious task for any human, so a smaller subset of collision events are usually used in the activity to save time. We built a machine learning classifier which mimic the student's classification based on a subset of collision events handed to the student, using some information from data in corresponding collision event. The information used in this system is part of muon trajectory, extracted from files suited for CMS event viewer on the internet, as well as the four-momentum of both muons, available from the same source. With this system, students can input a subset of graded events into the system, and the system will be able to illustrate the results if the student worked on all 2000 collision events using his/her logic. Users can download the code from our repository and follow easy instructions to replicate this activity.

Authors: WACHIRAPUSITANAND, Vichayanun (Chulalongkorn University (TH)); Dr SUWONJANDEE, Narumon (Chulalongkorn (TH))

Co-authors: Dr ASAVAPIBHOP, Burin (Chulalongkorn University); Dr SRIMANOBHAS, Norraphat (Chulalongkorn University)

Presenter: WACHIRAPUSITANAND, Vichayanun (Chulalongkorn University (TH))

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