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Support Vector Machines and generalisation in HEP

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We review the concept of support vector machines (SVMs) and discuss examples of their use in a number of scenarios.

One of the benefits of SVM algorithms, compared with neural networks and decision trees is that they can be less susceptible to over fitting than those other algorithms are to over training. This issue is related to the generalisation of a multivariate algorithm (MVA); a problem that has often been overlooked in particle physics.

We discuss cross validation and how this can be used to improve the generalisation of a MVA in the context of High Energy Physics analyses. The examples presented use the Toolkit for Multivariate Analysis (TMVA) based on ROOT and describe our improvements to the SVM functionality and new tools introduced for cross validation within this framework.

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