Title:	Improving Sensitivity of R-parity Conserving SUSY Searches Using Machine Learning Techniques
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Abstract:	This thesis explores the enhancement of R-parity conserving Supersymmetry (SUSY) search sensitivity at the Large Hadron Collider (LHC) through machine learning techniques. Among the extensive data produced by the LHC, the identification and analyzing of SUSY signals presents a significant challenge due to the current lack of experimental evidence for SUSY. This work proposes innovative analytical methods to uncover potential SUSY signatures more effectively. It details the development and implementation of machine learning mod- els designed to differentiate between SUSY particle signals and standard background noise. By focusing on the nuanced features within the collision data, which traditional analysis methods might overlook, this approach seeks to increase the probability of detecting SUSY particles. The thesis provides a detailed analysis, including the preparation of a proton- √ proton collision data set at s = 13 TeV with an integrated luminosity of 1000 f b −1 , fea- ture selection, model training, and validation, which led to the application of these models to LHC data. The results indicate that machine learning can significantly improve the sensi- tivity of SUSY searches, suggesting a promising avenue for future research in high-energy physics
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