UiO : Fysisk institutt
Det matematisk-naturvitenskapelige fakultet

Application of Supervised Machine Learning to the Search for New Physics in ATLAS data

A Study of Ordinary Dense, Parameterized and Ensemble Networks and their Application to High Energy Physics

William Hirst

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Outline

Overview

Outline

Why apply machine learning to HEP problems?

How do we search for new physics?

Outline

A summary of the applied methods

Three neural network variants

- Ordinary dense neural network
- Ensemble networks utilizing Local-Winner-Takes-All (LWTA) layers
- Parameterized neural networks (PNN)

One boosted decision tree method

- XGBoost using default settings

How are the methods compared?

Training strategy

Outline

An introduction and study of each method

Ordinary dense neural network

Ensemble methods - LWTA

- What is LWTA?
  - Dropout
- Competing nodes
- Pattern specific pathways
- Channel-out
- Stochatic-channel-out
- Maxout

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Parameterized neural network

Boosted decision trees - XGBoost

Outline

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