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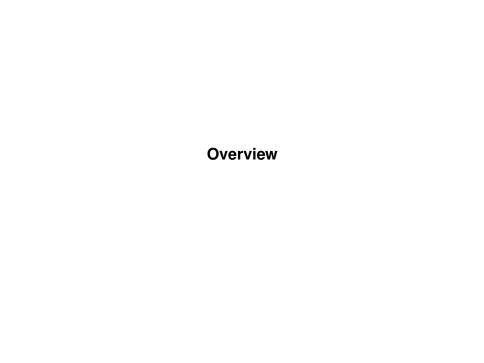
Det matematisk-naturvitenskapelige fakultet

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

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Why apply machine learning to HEP problems?

How do we search for new physics?

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

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

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- Helsø, M. and Ranestad, K. Rational quartic spectrahedra, 2018. https://arxiv.org/abs/1810.11235
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