Astro Machine Learning References

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References

Acciarri et al.: Convolutional neural networks applied to neutrino events in a liquid argon time projection chamber **1748-0221-12-03-P03011**

R. Acciarri et al. "Convolutional neural networks applied to neutrino events in a liquid argon time projection chamber". In: *Journal of Instrumentation* 12.03 (2017), P03011. URL: `http://stacks.iop.org/1748-0221/12/i=03/a=P03011`.

Abstract: We present several studies of convolutional neural networks applied to data coming from the MicroBooNE detector, a liquid argon time projection chamber (LArTPC). The algorithms studied include the classification of single particle images, the localization of single particle and neutrino interactions in an image, and the detection of a simulated neutrino event overlaid with cosmic ray backgrounds taken from real detector data. These studies demonstrate the potential of convolutional neural networks for particle identification or event detection on simulated neutrino interactions. We also address technical issues that arise when applying this technique to data from a large LArTPC at or near ground level.

Aurisano et al.: A convolutional neural network neutrino event classifier **1748-0221-11-09-P09001**

A. Aurisano et al. "A convolutional neural network neutrino event classifier". In: *Journal of Instrumentation* 11.09 (2016), P09001. URL: `http://stacks.iop.org/1748-0221/11/i=09/a=P09001`.

Abstract: Convolutional neural networks (CNNs) have been widely applied in the computer vision community to solve complex problems in image recognition and analysis. We describe an application of the CNN technology to the problem of identifying particle interactions in sampling calorimeters used commonly in high energy physics and high energy neutrino physics in particular. Following a discussion of the core concepts of CNNs and recent innovations in CNN architectures related to the field of deep learning, we outline a specific application to the NOvA neutrino detector. This algorithm, CVN (Convolutional Visual Network) identifies neutrino interactions based on their topology without the need for detailed reconstruction and outperforms algorithms currently in use by the NOvA collaboration.

Baumgartner et al.: Visual Feature Attribution using Wasserstein GANs DBLP:journals/corr/abs-1711-08998

Christian F. Baumgartner et al. "Visual Feature Attribution using Wasserstein GANs". In: *CoRR* abs/1711.08998 (2017). arXiv: `1711.08998`. URL: `http://arxiv.org/abs/1711.08998`.

Bockermann et al.: Online Analysis of High-Volume Data Streams in Astroparticle Physics 10.1007/978-3-319-23461-8_7

Christian Bockermann et al. "Online Analysis of High-Volume Data Streams in Astroparticle Physics". In: *Machine Learning and Knowledge Discovery in Databases*. Ed. by Albert Bifet et al. Cham: Springer International Publishing, 2015, pp. 100–115. ISBN: 978-3-319-23461-8.

Abstract: Experiments in high-energy astroparticle physics produce large amounts of data as continuous high-volume streams. Gaining insights from the observed data poses a number of challenges to data analysis at various steps in the analysis chain of the experiments. Machine learning methods have already cleaved their way selectively at some particular stages of the overall data mangling process.

Caron et al.: Analyzing {\gamma}-rays of the Galactic Center with Deep Learning 2017arXiv170806706C

S. Caron et al. "Analyzing {\gamma}-rays of the Galactic Center with Deep Learning". In: *ArXiv e-prints* (Aug. 2017). arXiv: `1708.06706 [astro-ph.HE]`.

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Qi Feng and Tony T. Y. Lin. "The analysis of VERITAS muon images using convolutional neural networks". In: *Proceedings of the International Astronomical Union* 12.S325 (2016), pp. 173–179. DOI: `10.1017/S1743921316012734`.

Holch et al.: Probing Convolutional Neural Networks for Event Reconstruction in Gamma-Ray Astronomy with Cherenkov Telescopes **ICRC2017-Holch**

T.L. Holch et al. "Probing Convolutional Neural Networks for Event Reconstruction in Gamma-Ray Astronomy with Cherenkov Telescopes". In: vol. 301. (ICRC2017)795. Proceedings of Science, 2017. URL: `https://pos.sissa.it/301/795/`.

IceCube Collaboration: Deep Learning in Physics exemplified by the Reconstruction of Muon-Neutrino Events in IceCube **ICRC2017-Huennefeld**

M. Huennefeld for the IceCube Collaboration. "Deep Learning in Physics exemplified by the Reconstruction of Muon-Neutrino Events in IceCube". In: vol. 301. (ICRC2017)1057. Proceedings of Science, 2017. URL: `https://pos.sissa.it/301/1057/`.